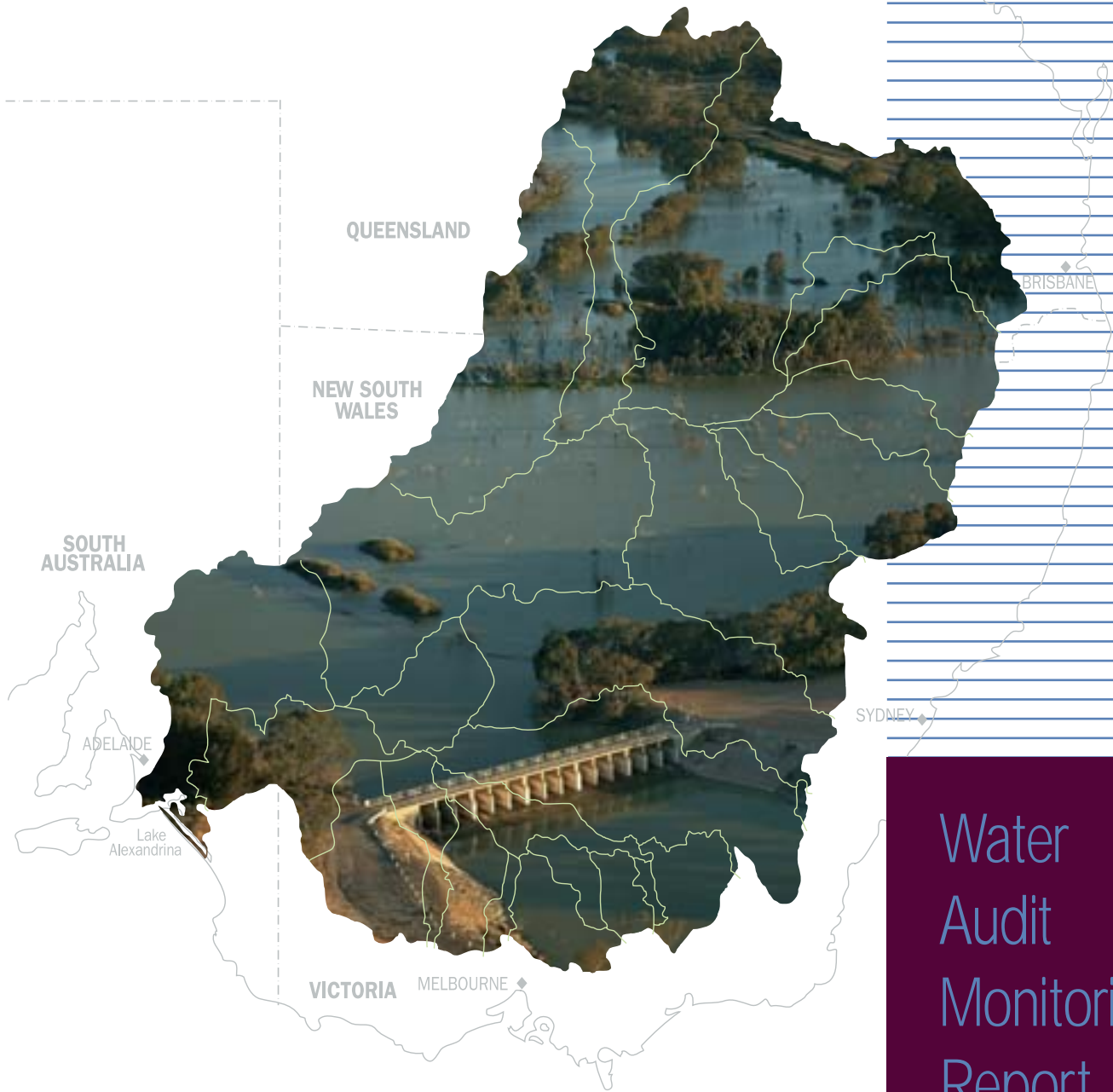


Water Audit Monitoring Report 2005/06

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



Water
Audit
Monitoring
Report
2005/06

June 2007



Integrated catchment management in the Murray-Darling Basin

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

Our values

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

Courage

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

Inclusiveness

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

Commitment

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

Respect and honesty

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

Flexibility

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

Practicability

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

Mutual obligation

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

Our principles

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

Integration

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

Accountability

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

Transparency

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

Effectiveness

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

Efficiency

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

Full accounting

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

Informed decision-making

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

Learning approach

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

Water Audit Monitoring Report 2005/06

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

***Water Audit
Monitoring
Report
2005/06***

J U N E 2 0 0 7

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The development of the Murray-Darling Basin Commission's 2005/06 Water Audit Monitoring Report has involved the valuable input, support and commitment of many people. Each stage of the development of the report was overseen by the members of the inter-Governmental working groups and committees. Without naming each particular contributor, thanks are due to the following agencies:

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Office Address

Level 4, 51 Allara St,
Canberra, Australian Capital Territory

Postal Address

GPO Box 409, Canberra ACT 2601

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

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

Email: info@mdbc.gov.au

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

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I&D 11982

Foreword

June 2007

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

Dear Minister

I have great pleasure in submitting to you the Water Audit Monitoring Report 2005/06. The Council established the Cap in 1995 and set the operating framework in 1996. The Council formalised the operating rules for the Cap in the form of Schedule F to Murray-Darling Basin Agreement in 2000. The Water Audit Monitoring Report 2005/06 is the tenth in a series of the reports on the Cap on Diversion and has been produced as a requirement of Schedule F.

The Water Audit Monitoring Report 2005/06 complements the Independent Audit Group Report 2005/06. Whereas the focus of the Independent Audit Group Report is the Cap compliance and the activities related to it, this Report provides a broader picture of the Cap compliance, water use, accuracy of water use figures, climatic overview for the water year, water availability through allocations, off-allocations and water trading, storages losses, and groundwater use.

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

The text in Chapters 4, 5, 6, 7 and 8 and data published in this Report have been supplied by the States and Territory. The published data are considered to be the best available estimates for Water Diversion, Water Trade, Cap targets and other data. If better estimates become available in future, the Diversion Cap Register will be amended accordingly. The Diversion and Trade figures in this Report are considered to be the latest figures for the water year and supersede those reported in the Independent Audit Group Report 2005/06.

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

Yours sincerely



Wendy Craik
Chief Executive

Lined area for notes or content.

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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 2005/06 water year, as per the requirements of Schedule F of the *Murray-Darling Basin Agreement*.

The water year in the Queensland Murray-Darling valleys at present varies but generally is October to September. On completion of Water Resources Planning processes in Queensland Murray-Darling valleys, water year will become July to June. The water year for the remainder of the Basin is July to June.

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

In addition to detailing water use, this report also contains information on the States' implementation of management rules in designated river valleys that impact on water use within the Basin. Each State has provided a description of their major activities occurring in 2005/06 and further actions that each State plans to undertake over the coming years (Sections 4 to 8).

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

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

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

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

Table 1. 2005/06 Cap Compliance by State

<i>State / Territory</i>	<i>2005/06 Cap Compliance</i>
New South Wales	
Border Rivers	An IQQM (Interim) model yet to be audited and approved by the Commission is available. The IAG could not audit the NSW Border Rivers Cap as a Cap is yet to be defined. The Commission meeting 91 - 5 December 2006 noted that finalisation, of Cap together with agreed Water Management Plan was expected by June 2007. The 2005/06 diversion was 152 GL.
Gwydir	An IQQM (Interim) model submitted for approval but yet to be audited and approved by the Commission, is available to determine the Cap compliance. The 2005/06 diversion of 230 GL was below the annual Cap target of 367 GL. The Valley has a cumulative Cap credit of 335 GL since 1997/98.
Namoi/Peel	An IQQM model approved by the Commission is available to determine the Cap compliance for the Namoi valley. An IQQM (Interim) model submitted for approval and yet to be audited and approved by the Commission is available to determine the Cap compliance in the Peel Valley. The 2005/06 diversion of 234 GL was below the annual Cap target of 285 GL. The Valley has a cumulative Cap credit of 60 GL since 1997/98.
Macquarie/Castlereagh/Bogan	An IQQM (Interim) model submitted for audit and yet to be approved by the Commission is available to determine Cap compliance. The 2005/06 diversion of 224 GL was below the annual Cap target of 421 GL. The Valley has a cumulative Cap credit of 782 GL since 1997/98.
Barwon-Darling/Lower Darling	Council Meeting 29 - 25 August 2000 decided to combine the Barwon-Darling and Lower Darling into a single Designated River Valley for Cap accounting purpose. An IQQM (Interim) for the Barwon-Darling and MSM (Interim) for the Lower Darling, both of which are yet to be audited and approved by the Commission, are available to determine the Cap compliance. The combined Barwon-Darling/Lower Darling Cap valley was declared in breach of the Cap by Commission Meeting 84 - 7 June 2005. The combined valley diversion of 199 GL exceeded its annual Cap target of 192 GL. The combined Valley's cumulative Cap debit of 143 GL at the end of 2005/06 exceeded the trigger of 62 GL for Special Audit. Commission Meeting 91 - 5 December 2006 reiterated its earlier declaration that the combined Barwon-Darling/Lower Darling Cap Valley continues to exceed the Cap and asked the IAG to conduct a Special Audit. The Special Audit by the IAG conducted in March 2007 confirmed the Cap exceedence.
Lachlan	An IQQM model approved by the Commission is available to determine Cap compliance. The 2005/06 diversion of 128 GL was below the annual Cap target of 167 GL. The Lachlan valley has a cumulative Cap credit of 46 GL since 1997/98.
Murrumbidgee	An IQQM (Interim) model yet to be audited and approved by the Commission is available to determine the Cap compliance. The 2005/06 diversion of 2200 GL for the Murrumbidgee valley was below its Cap target of 2451 GL. The Valley has a cumulative Cap credit of 918 GL since 1997/98.
Murray	The MSM (Interim) model yet to be audited and approved by the Commission is available to determine Cap compliance. The 2005/06 diversion of 1667 GL for the Murray valley was below its annual Cap of 1816 GL. The Valley has a cumulative Cap credit of 799 GL since 1997/98.
Victoria	
Goulburn/Broken/Loddon	A computer model known as Goulburn Simulation model (GSM) which has been audited and recommended for approval by the Commission is available to determine Cap compliance. The 2005/06 diversion of 1592 GL for the Goulburn/Broken/Loddon system was above its Cap target of 1571 GL. But the Valley has a cumulative Cap credit of 83 GL since 1997/98.
Campaspe	The GSM, which has been audited and recommended for approved by the Commission, is available to determine the Cap compliance. The diversion of 22 GL for the Campaspe in 2005/06 was below its Cap target of 57 GL. The Valley has a cumulative credit of 112 GL since 1997/98.

State / Territory	2005/06 Cap Compliance
Wimmera-Mallee	An un-calibrated model is available. Though no Cap target for 2005/06 was available, the diversion of 75 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 2005/06 diversion of 1578 GL for the Murray/Kiewa/Ovens Cap valley was below its Cap target of 1615 GL. The Valley has a cumulative credit of 905 GL.
South Australia	
Metro-Adelaide & Associated Country Areas	With the 2005/06 diversion of 74 GL, the Metro-Adelaide & Associated Country Areas diversion was below the five-year rolling Cap up to and including 2005/06. Pending final decision, a separate 'first use license' has been created to accommodate growth in Metro Adelaide diversions. A temporary trade of 16 GL was made into that licence and was considered fully utilized. The Diversion of 16 GL is included in the total diversion of 74 GL.
Lower Murray Swamps	The 2005/06 diversion of 59 GL for the Lower Murray Swamp equalled its Cap of 59 GL for 2005/06. Diversions in the Lower Murray Swamps are determined to be equal to the licensed allocation held by a private irrigator and/or corporation.
Country Towns	The 2005/06 diversion of 40 GL for the Country Towns was below its Cap target of 42 GL. The Country Towns valley has a cumulative credit of 70 GL.
All Other Purposes	A regression model approved by the Commission is available to determine Cap compliance. The 2005/06 diversion of 417 GL for the <i>All Other Purposes</i> was below its Cap target of 458 GL. The Valley has a cumulative credit of 450 GL.
Queensland	
Condamine and Balonne	The Cap to be applied to the Condamine and Balonne valley will be determined following the completion of the water planning process. A Cap model will be available then. The 2005/06 diversion was 186 GL.
Border Rivers/Macintyre Brook	The Cap to be applied to the Border Rivers valley will be determined following the completion of the water planning process. A Cap model will be available then. The 2005/06 diversion was 125 GL.
Moonie	Queensland has proposed a Cap for the valley following the completion of the water planning process in early 2006. In anticipation of agreement on the Cap, a valley Cap model is being progressed for accreditation by the Commission. The 2005/06 diversion was 2 GL.
Nebine	Queensland has proposed a Cap for the valley following the completion of the water planning process in early 2006. In anticipation of agreement on the Cap, a valley Cap model is being progressed for accreditation by the Commission. The 2005/06 diversion was 0 GL.
Warrego	Queensland proposed a Cap for the valley following the completion of the water planning process in early 2006. In anticipation of agreement on the Cap, a valley Cap model is being progressed for accreditation by the Commission. The 2005/06 diversion was 3 GL.
Paroo	Queensland proposed a Cap for the valley following the completion of the water planning process in early 2006. In anticipation of agreement on the Cap, a valley Cap model is being progressed for accreditation by the Commission. The 2005/06 diversion was 0 GL.
Australian Capital Territory	ACT is working to establish a Cap which would provide a framework for trade between the ACT and other jurisdictions. A Cap model is not yet available to determine Cap compliance. The 2005/06 diversion was 32 GL.

2. Background

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

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

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

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

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

63% of the water that was permitted to be used was used. The audit found that average diversions could increase by a further 15% if all existing water entitlements were fully developed. Such an increase would reduce the security of supply to existing water users as well as exacerbating river health problems.

2.2 The Cap

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

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

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

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

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

This report is a part of the ongoing Cap monitoring 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 2005/06

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 2005/06 (*Review of Cap Implementation 2005/06*, published by the Murray-Darling Basin Ministerial Council, March 2006, Canberra).

The present report represents the tenth in a series of annual reports and complements the report of the IAG, however the data presented herein are the final figures for the 2005/06 water year and supersede the data reported by the IAG. Most notably, the Murray-Darling Basin diversions in 2005/06 reported in this present report (**Table 2**) supersede those reported by the IAG in March 2007 (**Table 12** of that report).

3. The Year in Review

3.1 Water Use

The data presented in this report has been collected by the relevant State agencies and collated by the MDBC. Accurate diversion data is difficult to obtain, as it requires the collection and collation of thousands of individual water use figures. **Table 2** presents the overall water usage figures for the Basin in 2005/06.

The figures indicate that Basin water use in 2005/06 was 9243 GL, representing the sixth lowest on record (23 years of record since 1983/84). Water use in New South Wales was the fourth lowest ever on record; in Victoria the seventh lowest; in South Australia the twelfth lowest, in Queensland the twelfth lowest, whilst diversions in the ACT were the twelfth lowest on record.

Figure 1 shows the water use (by State) for the period 1983/84 – 2005/06 which enables a comparison of 2005/06 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 2005/06

<i>System</i>	<i>Irrigation Diversion (GL)</i>	<i>Other Diversion¹ (GL)</i>	<i>Total Diversion (GL)</i>
New South Wales²			
Intersecting streams	3	0	3
Border Rivers	152	0	152
Gwydir	229	1	230
Namoi/Peel	227	8	234
Macquarie/Castlereagh/Bogan	208	16	224
Barwon-Darling	157	0	157
Lower Darling	35	6	41
Lachlan	112	15	128
Murrumbidgee ⁴	2135	65	2200
Murray	1631	36	1667
Total New South Wales³	4890	148	5038
Victoria			
Goulburn	1461	34	1495
Broken	21	9	29
Loddon	60	9	68
Campaspe	14	8	22
Wimmera-Mallee	0	75	75
Kiewa	3	1	4
Ovens	16	9	25
Murray	1477	72	1549
Total Victoria	3052	215	3267
South Australia			
Metro-Adelaide & Associated Country Areas	0	74	74
Lower Murray Swamps ⁵	59	0	59
Country Towns	0	40	40
All Other Purposes	409	8	417
Total South Australia	468	122	590
Queensland²			
Condamine and Balonne	180	7	186
Border Rivers	111	3	114
Macintyre Brook	10	0	11
Moonie	2	0	2
Nebine	0	0	0
Warrego	3	0	3
Paroo	0	0	0
Total Queensland⁶	306	10	316
Australian Capital Territory⁷	5	27	32
Total Basin	8721	521	9243

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 2005/06.
4. Lowbidgee diversions are included in the Murrumbidgee valley diversions.
5. Water use by Lower Murray Swamp irrigators is based on an estimate of water use. The metering of diversions is currently being implemented.
6. Floodplain diversions in Queensland of 72 GL are not included in valley totals.
- 7 ACT diversions are reported as a net figure. The primary usage in the ACT is for urban supply, which has a high return component (approximately 50%).

Figure 1. Murray-Darling Basin Diversions - 1983/84 to 2005/06

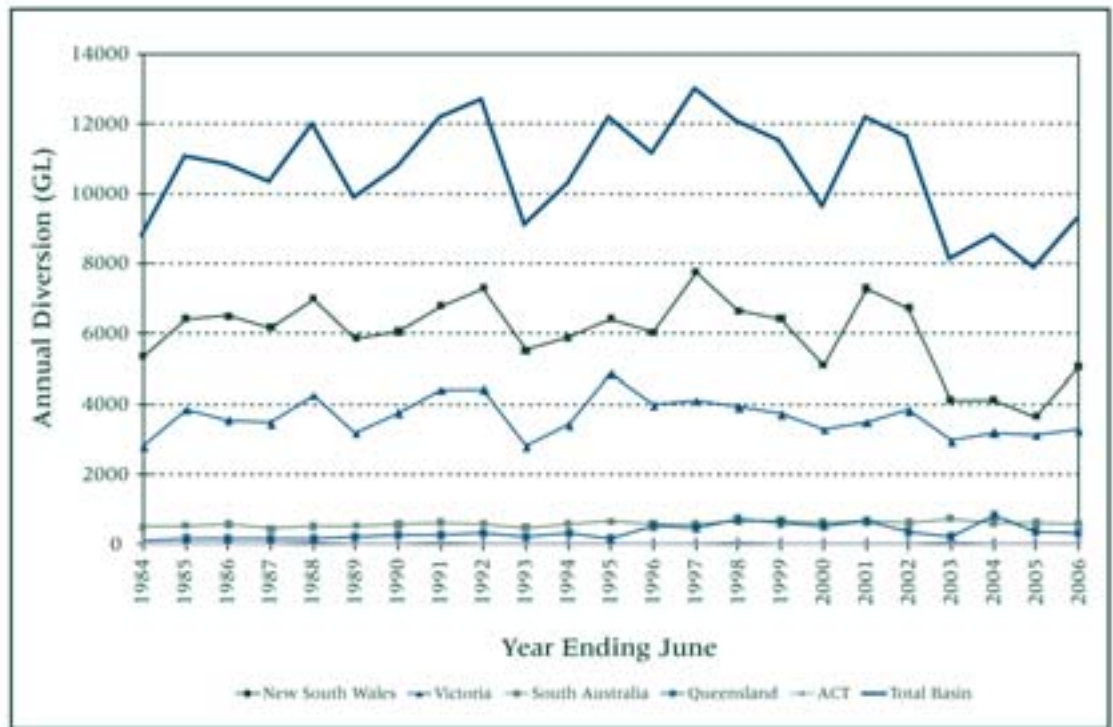
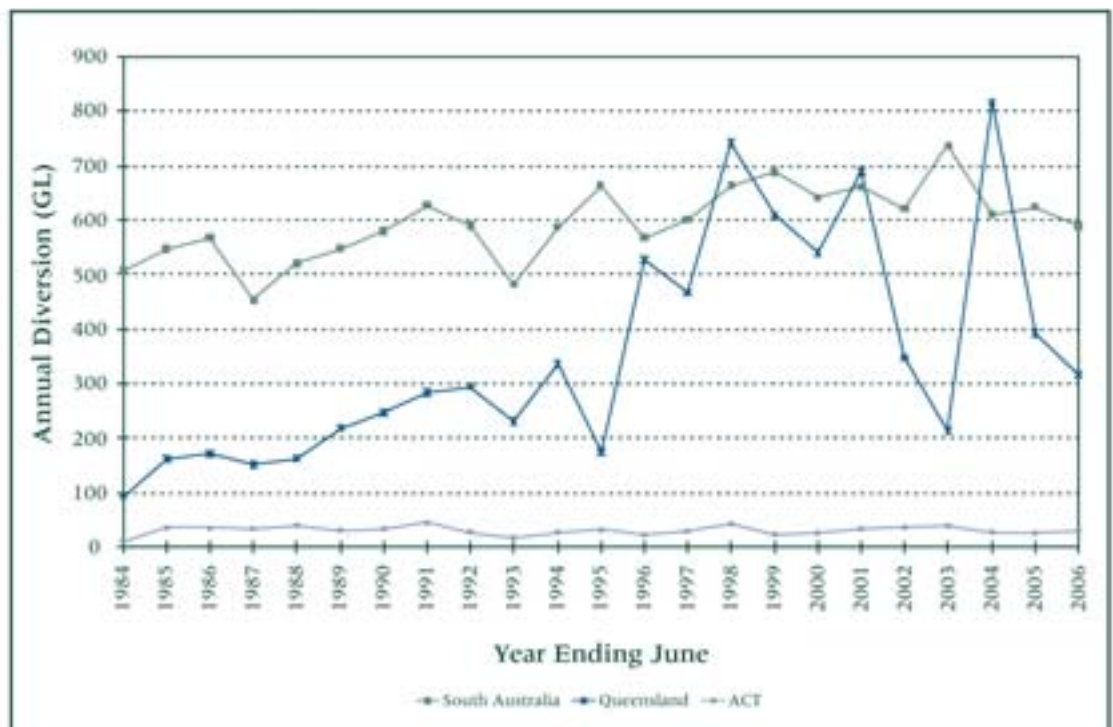


Figure 2. Murray-Darling Basin Diversions - 1983/84 to 2005/06 (usage under 1000 GL/yr)



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

Table 3 outlines the 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 2005/06 indicates that the accuracy of measurement has remained at 7%.

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

Table 3. Accuracy of Diversion Estimates in 2005/06

<i>System</i>	<i>Diversion (GL)</i>	<i>Accuracy \pm GL</i>	<i>Accuracy \pm %</i>
New South Wales			
Intersecting streams	3	1	40%
Border Rivers	152	12	8%
Gwydir	230	13	6%
Namoi/Peel	234	23	10%
Macquarie/Castlereagh/Bogan	224	17	8%
Barwon-Darling	157	16	10%
Lower Darling	41	2	5%
Lachlan	128	8	6%
Murrumbidgee	2200	145	7%
Murray	1667	82	5%
Total NSW	5038	319	6%
Victoria			
Goulburn	1495	83	6%
Broken	29	5	16%
Loddon	68	7	11%
Campaspe	22	1	6%
Wimmera-Mallee	75	7	10%
Kiewa	4	1	16%
Ovens	25	4	16%
Murray	1549	110	7%
Total Victoria	3267	219	7%
South Australia			
Metro-Adelaide & Associated Country Areas	74	4	5%
Lower Murray Swamps	59	23	40%
Country Towns	40	2	5%
All Other Purposes	417	29	7%
Total South Australia	590	58	10%
Queensland			
Condamine and Balonne	186	20	11%
Border Rivers	114	9	8%
Macintyre Brook	11	1	5%
Moonie	2	1	22%
Nebine	0	0	20%
Warrego	3	0	11%
Paroo	0	0	20%
Total Queensland	316	31	10%
Australian Capital Territory	32	3	10%
Total Basin	9243	630	7%

3.3 Climatic Overview 2005/06

- **Rainfall**

Figure 3 shows the rainfall deciles for July 2005 to June 2006 inclusive. Average rainfall was observed throughout most of the Basin in NSW, in half of the Basin in Victoria and SA and in a narrow strip in southeast Queensland near the NSW-Queensland border encompassing the towns of Hebel, Mungindi and Goondiwindi. Very much above average rainfall was received in a small pocket near Blanchetown in SA. Above average rainfall was recorded in almost half of the Basin area in SA spread on both sides of the River Murray encompassing most of its irrigation areas and major town water supply off-takes; and in a large area in southwest NSW near the town of Menindee encompassing the Menindee Lakes and the Lake Tandou. Below average rainfall was recorded in the southern half of the Basin in Victoria, in isolated pockets around Mt Beauty and the town of Benalla in Victoria; in a sizeable area around Tumut in southeast NSW and in a large area in northwest NSW encompassing the town of Bourke and stretching as far as Nyngan in central NSW; and in almost the whole of the Basin area in Queensland except for a narrow strip along the central and eastern border region with NSW. Very much below average rainfall was recorded in sizeable areas of the Basin in south-west and north-east Queensland.

Figure 4 shows the rainfall deciles for the period of November 2005 to April 2006 inclusive. Very much above average rainfall was received in a significant area around the south-western margin of the Basin near Blanchetown in SA. Above average rainfall was received in sizeable areas near the northeast margin of the Basin in the Border river catchments of NSW and Queensland and near the southwest margin of the Basin in SA. Nearly half of the Basin in the southwest and northeast received average rainfall. These areas of average rainfall were separated by a large area of below average rainfall in the centre of the Basin. Nearly half of the Basin stretching from southwest Queensland to southeast NSW and eastern Victoria, including an isolated pocket near the town of Hopetoun in western Victoria, recorded below average to very below average rainfall. Of this, the very below average rainfall areas were concentrated around the towns of West Wyalong and Bourke in central and northwest NSW and around the towns of Bollon and Charleville in southwest 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 2005 to June 2006 inclusive. With the exception of Basin areas in northern Victoria and SA around in the southeast of the Basin, where mildly higher (between 0.0° to + 0.5°C) than average temperature condition were experienced, significantly higher (between 0.5° to + 1.0°C and +1.0° to +1.5°C) than average temperature conditions were observed throughout the Basin for this period. Some areas in northeast and northwest of the Basin experienced temperature anomaly between +1.5° to +2.0°C.

Figure 6 shows the temperature anomaly for the period of December 2005 to February 2006 inclusive (the primary irrigation season).

The Basin was unusually warm area during the period. With the exception of the Basin area in Victoria and SA which experienced higher than average temperature in the range of +1.0° to +2.0°C the rest of the Basin experienced very higher than average temperature in the range of +2.0° to +4.0°C. The central part of the Basin in NSW and Queensland experienced severely higher than average temperature in the range of +3.0° to +4.0°C. The area around the town of Bourke in NSW experienced higher than average temperature in the range of +4.0° to +5.0°C. Unusually warmer temperature in the Basin during the growing season increased the irrigation demand as a result of increased evapo-transpiration. On the other hand, due to ongoing drought and consequent lesser water in storages, irrigation supply was restricted in many areas.

Figure 3. Rainfall Deciles for the Murray-Darling Basin for the July 2005 to June 2006 Period

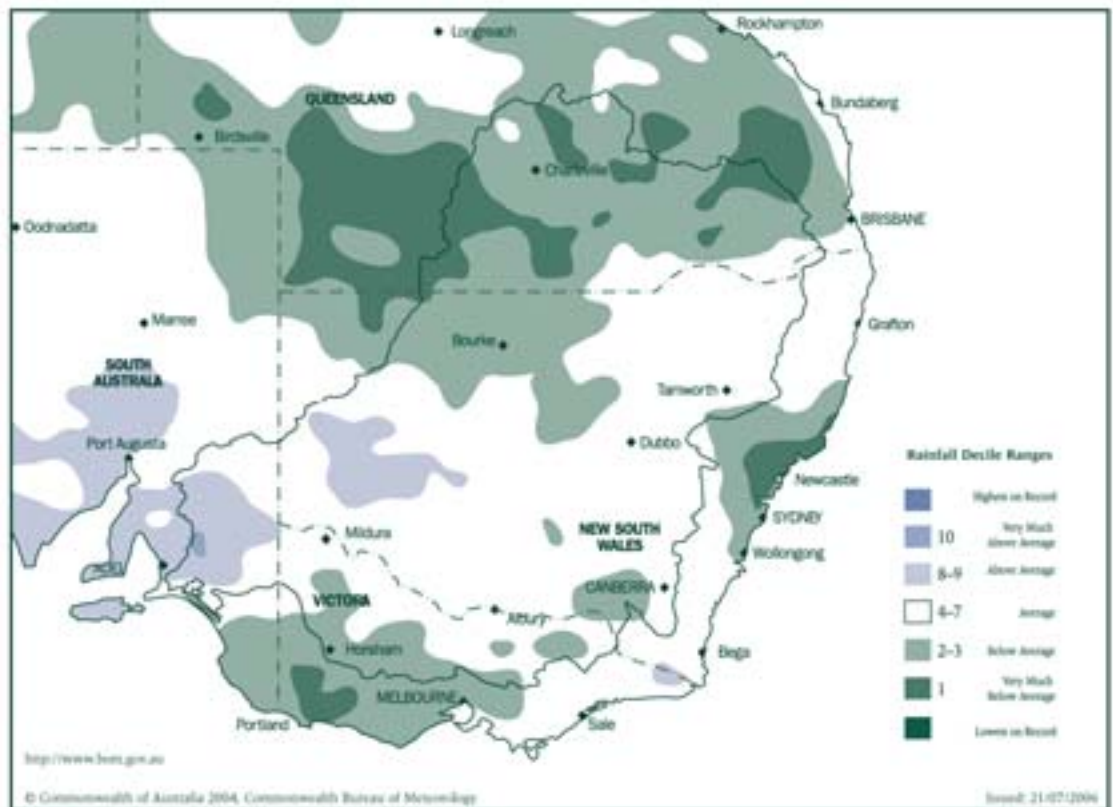


Figure 4. Rainfall Deciles for the Murray-Darling Basin for the November 2005 to April 2006 Period

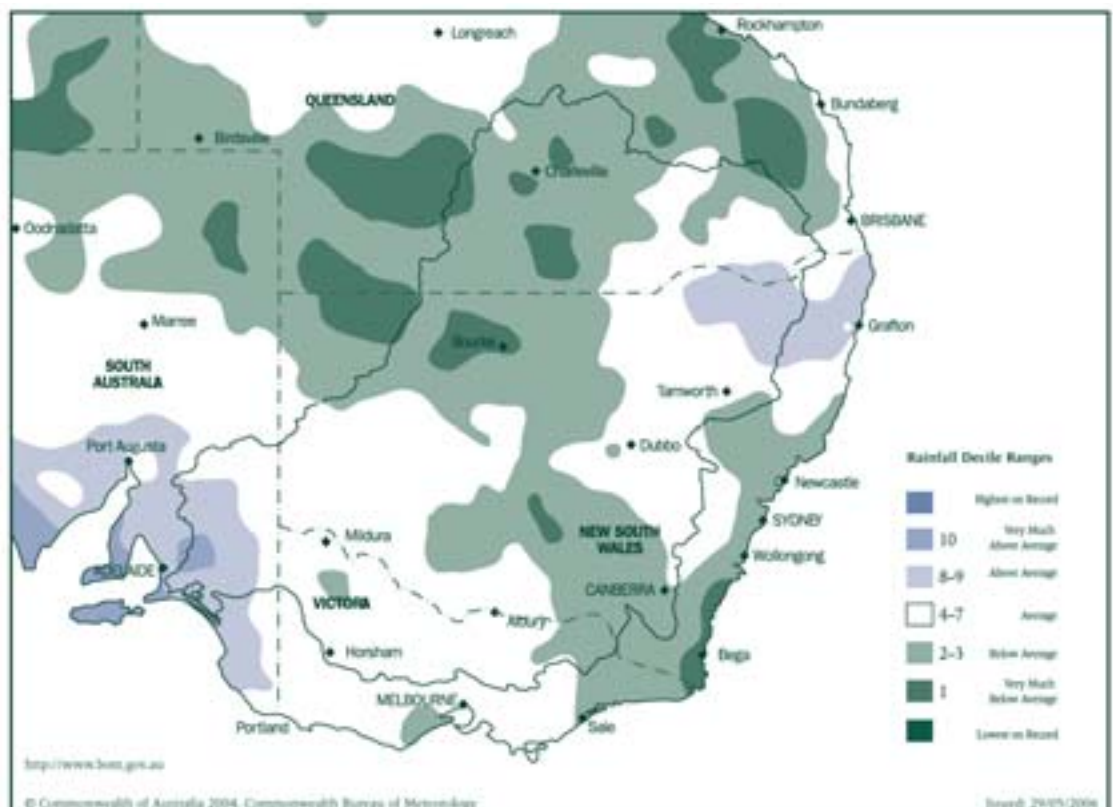
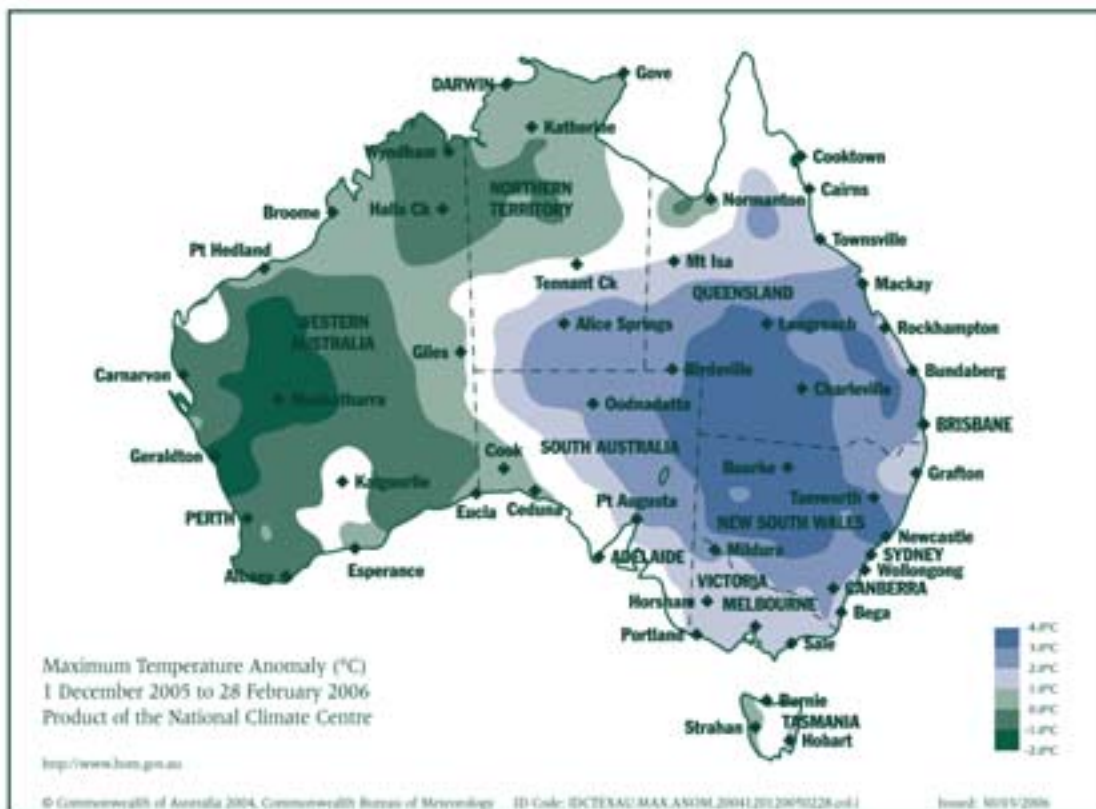


Figure 5. Temperature Anomaly for the 12 Month Period July 2005 to June 2006



Figure 6. Temperature Anomaly for the 3 Month Period December 2005 to February 2006



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 Purposes' 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 agreed that the Cap to be applied to Queensland will be determined following the completion of the water planning process in Queensland. Queensland has finalised Water Resource Plans (WRP) in all its Murray-Darling Basin valleys and consequently has provided a framework with a strong legislative basis to Cap. For the Warrego, Paroo, Nebine and Moonie valleys, where the water planning process has been completed and implementation is occurring through finalised Resource Operations Plans, Cap proposals were submitted in November 2006. These proposals were audited by the Independent Audit Group in February 2007 and recommended to the Commission. Subsequently, the Commission and the Council agreed to these Cap proposals. Caps for the Warrego, Paroo, Nebine and Moonie valleys will apply from 2006/07.

The ACT has agreed to participate in the Cap on diversions. It is working towards establishing the Cap.

The Cap in NSW and Victoria is not the volume of water that was used in 1993/94. Rather, the Cap in any year is the water that would have been used with the infrastructure (pumps, dams, channels, areas developed for irrigation, management rules, etc.) that existed in 1993/94, taking into account the climatic and hydrologic

conditions that were experienced during the year under consideration. A primary task in monitoring the Cap in these States is determining the size of the Cap target for each year. This calculation is done at the end of each year and uses the observed climatic and hydrologic data. In the south of the Basin this will tend to result in lower Cap targets in years when there is significant rainfall in the irrigation areas and larger Cap targets in years with less rainfall when demand is higher. However, the annual Cap target will also be affected by the availability of water. In very dry years in the south of the Basin, the annual Cap target will reflect the resource constraints. In the north of the Basin, the Cap target will be very much affected by the opportunities to harvest water into on-farm storages.

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

The calculation for the Cap in South Australia is relatively straight forward; although the Cap for the fourth category of South Australian diversions described above is a long-term climate-adjusted annual average of 440.6 GL. A regression-based accredited model calculates the annual Cap target, which is then adjusted for trade. In the calculation of the Metro-Adelaide Cap, the allocation of 650 GL over 5 years is designed to provide a water supply with 99% security to a major urban city of over 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 2005/06 are for the eleventh 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.

A slightly different approach for Queensland's Warrego, Paroo, Nebine and Moonie Cap valleys has been agreed by the Council. A special audit will be triggered if the annual diversions exceed the calculated Cap target for the water year. This is in response to the different climatic conditions in the upper Murray-Darling Basin and the rules-based approach to Cap setting agreed to for Queensland. Changes to schedule F are being made to give effect to this provision.

3.5 Comparison of 2005/06 Water Use with the Cap

A comparison of 2005/06 water use with the Cap for each State is as follows:

- **New South Wales**

Cap compliance in 2005/06 within New South Wales varied between valleys (**Table 4**).

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

The Cap debit for the combined Barwon-Darling/Lower Darling Cap valley at the end of 2005/06 was 143 GL. Consequently the valley again exceeded the Schedule F trigger of 62 GL for a Special Audit. Commission Meeting 91 – 5 December 2006 reiterated its earlier declaration that the combined Barwon-Darling/Lower Darling Cap valley continues to exceed the Cap and asked the IAG to conduct a Special Audit of the Valley. The Special Audit by the IAG conducted in March 2007, confirmed the Cap exceedence in the Valley. A Cap has not been defined for the Border Rivers, therefore the IAG was unable to audit the Cap in this valley.

Diversions in all other valleys were within the annual Cap target for 2005/06 and these valleys are in cumulative credit.

- **Victoria**

The 2005/06 diversions were within Cap targets for all Victorian designated Cap valleys except for the Goulburn/Broken/Loddon where diversions exceeded the Cap target by about 21 GL. All Victorian valleys, including the Goulburn/Broken/Loddon, were in cumulative credit (**Table 4**).

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 has been audited by an independent auditor and recommended for approval under Schedule F. Victoria remains committed to the ongoing development and improvement of Cap models and implementation of Bulk Entitlements to ensure compliance with the Cap.

- **South Australia**

South Australian diversions were within its Cap targets for 2005/06 for the Lower Murray Swamps, *All Other Purposes*, the Country Towns (**Table 4**) and the Metro-Adelaide and Associated Country Areas (**Table 5**). The Country Towns and the *All Other Purposes* valleys have substantial cumulative Cap credits.

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

- **Queensland**

Queensland submitted Cap proposals for four of its Cap valleys, Warrego, Paroo, Moonie and Nebine in November 2006. These were audited by the Independent Audit Group, and agreed by the Council in May 2007. The long-term Caps to these valleys will be applied from 2006/07. As the definition in Queensland was not completed during 2005/06, it was not possible to provide a statement pertaining to Cap performance for the Queensland catchments for 2005/06.

Water Resource Plan (WRP) for all Queensland Murray-Darling Basin valleys have been completed. These Plans will be operationalised through Resource Operations Plans (ROP), which will determine the Caps. The Resource Operations Plans for the Moonie and Warrego/Paroo/Bulloo/Nebine were gazetted in January 2006 and subsequently their Caps were finalised. A draft Resource Operations Plan for the Border Rivers was released for public comment in January 2007 and is expected to be finalised by late 2007. A draft Condamine and Balonne Resource Operations Plan was released in April 2007 and is expected to be finalised by early 2008. Cap proposals for these valleys will be developed within six months of the gazettal of the final ROPs and will be submitted to the Murray-Darling Basin Commission.

- **Australian Capital Territory**

Cap implementation in the ACT is yet to be completed.

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

Table 4 presents a comparison of actual diversions with the annual Cap targets for New South Wales, Victoria, South Australia (except Metropolitan Adelaide & Associated Country Areas), Queensland and the Australian Capital Territory. The last column in Table 4 is the difference between the modelled storage at the end of 2005/06.

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

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

Table 4. Comparison of Diversions with Cap Levels in 2005/06

<i>System¹</i>	<i>Cap Target from Cap Model (GL)</i>	<i>Adjustment to Cap Target for Trade¹ (GL)</i>	<i>Cap Target Adjusted for Trade (GL)</i>	<i>Annual Diversion (GL)</i>	<i>Cap Credit⁵ (GL)</i>	<i>Cumulative Cap Credit since 1997/985 (GL)</i>	<i>Cap Target Exceedence Trigger (20 per cent of Long-Term Diversion Cap)⁶ (GL)</i>	<i>(Modelled storage minus Observed storage) (GL)</i>
New South Wales								
Intersecting Streams	3	n/a	n/a	3	n/a	n/a	n/a	n/a
Border Rivers	n/a	-12	n/a	152	n/a	n/a	n/a	n/a
Gwydir	367	0	367	230	137	335	-69	-122
Namoi/Peel	285	0	285	234	51	60	-53	-29
Macquarie/Castlereagh/Bogan	421	0	421	224	196	782	-85	80
Barwon-Darling/Lower Darling	193	0	193	199	-6	-143	-62	-182
Lachlan	167	0	167	128	40	46	-64	50
Murrumbidgee	2457	-6	2451	2200	251	918	-460	87
Murray	1816	-1	1816	1667	148	799	-379	-431
Victoria								
Goulburn/Broken/Loddon ²	1586	-16	1571	1592	-21	83	-407	-317
Campaspe	57	0	57	22	36	112	-25	-5
Wimmera-Mallee ³	n/a	n/a	n/a	75	n/a	n/a	-32	n/a
Kiewa/Ovens/Murray	1614	0	1615	1578	37	905	-339	-509
South Australia								
Metro-Adelaide & Associated Country Areas ⁶								
Lower Murray Swamps	104	-45	59	59	0	0	-21	n/a
Country Towns	50	-8	42	40	2	70	-10	n/a
All Other Purposes	425	32	457	417	40	450	-88	n/a
Queensland								
Condamine and Balonne ³	n/a	n/a	n/a	186	n/a	n/a	n/a	n/a
Border Rivers ³	n/a	n/a	n/a	114	n/a	n/a	n/a	n/a
Macintyre Brook ³	n/a	n/a	n/a	11	n/a	n/a	n/a	n/a
Moonie ³	n/a	n/a	n/a	2	n/a	n/a	n/a	n/a
Nebine ³	n/a	n/a	n/a	0	n/a	n/a	n/a	n/a
Warrego ³	n/a	n/a	n/a	3	n/a	n/a	n/a	n/a
Paroo ³	n/a	n/a	n/a	0	n/a	n/a	n/a	n/a
Australian Capital Territory³								
	n/a	n/a	n/a	32	n/a	n/a	n/a	n/a

1. Adjustment to Cap target for trade includes exchange rate adjustments to permanent interstate trade.
2. Excludes Cap Target for Lake Mokoan.
3. n/a denotes Cap model is not completed or Cap target has not been able to be determined.
4. The sign convention is that a negative Cap credit value denotes an exceedence of the Cap target adjusted for trade in 2005/06. A negative cumulative Cap credit value indicates an exceedence of the Cap target adjusted for trade on a cumulative basis (since 1997/98).
5. Cap target exceedence trigger values are reported as negative values.
6. See Table 5.
7. See previous page for explanation on the last column.

Table 5. Comparison of diversions with Cap levels in 2005/06 for Metro-Adelaide & Associated Country Areas, South Australia

<i>System</i>	<i>Total Diversion in 2005/06 (GL)</i>	<i>Total Diversion – 5 Years to 2005/06 (GL)</i>	<i>5 Year Cap Diversion Target (GL)</i>	<i>Difference between Diversion and Cap (GL)</i>
South Australia				
Metro-Adelaide & Associated Country Areas	74	475	707	232

1. Temporary trades from the Country Towns/*All Other Purposes* Cap Valleys to the Metro-Adelaide of 12 GL during 2001/02, 11 GL during 2002/03, 9.4 GL during 2003/04, 8.4 GL during 2004/05 and 16 GL during 2005/06 were allowed as an interim measure increasing the 5-year rolling Cap from 650 GL to 707 GL. The rules for trade with Metro Adelaide are to be reviewed in 2005/06.

4. Review of 2005/06 Water Use in New South Wales

4.1 Water Management Overview

For most NSW major regulated rivers and some unregulated catchments, 2005/06 saw the continuation of the Water Sharing Plans (Plans) that began on 1 July 2004. The Plans will apply for a period of 10 years. During 2005/06 the extreme inflows to the Lachlan Valley saw some parts of the Plan impacting on water sharing suspended.

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

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

Current assessments using (in some cases, preliminary) computer simulation models indicate that 2005/06 diversions in all major NSW regulated valleys are below Cap levels, with the exception of the Barwon-Upper Darling Valley, where licensed water entitlements are being restructured to ensure future diversions in the Barwon-Upper Darling River above Menindee are within Cap.

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

4.2 Water Use Overview

Very dry climatic conditions during the previous four water years resulted in most NSW regulated valleys in the Murray-Darling Basin receiving very low effective general security allocations at the commencement of 2005/06 season. In all valleys, high security licences received their full allocations in 2005/06. Rainfall during the year resulted in modest increases in allocation during the year and helped to ease irrigation demand. Increases in water availability for many valleys allowed irrigation activity closer to normal than in previous years, with General Security allocations reaching the following levels: Lachlan (19%), Macquarie (44%), Gwydir (47%), Murray (63%), Namoi (69%) and Murrumbidgee (42%).

Assessment of Cap performance for the 2005/06 water year using preliminary computer simulation models indicated that diversions for seven NSW valleys were below Cap, one valley was above Cap, and one valley (NSW Border Rivers) did not have Cap targets to allow an assessment to be made. For the Barwon-Upper Darling valley, the cumulated annual Cap performances from the 1997/98 water year remained above Cap by more than 20% of the long-term average, breaching the trigger for a Special Audit. During 2005, NSW announced a restructure of entitlements along the Barwon-Darling River that will ensure diversions are within Cap.

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

4.3 Border Rivers

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

of 100%. In any particular season, the volume of water that each licensee can use from their account is limited to a maximum of 100%, which is equivalent to a diversion of 266 GL for the valley.

The NSW Border Rivers licensees commenced the season with an average of 48% of licensed entitlement in individual accounts, and received a further 38% of licensed entitlement as further resources became available during the water year. There was an inter-valley transfer of 12 GL allocated water out of the NSW Border Rivers to the Queensland Border Rivers. This provided a total resource availability of 221 GL (**Table 8**) for regulated river licences.

Within the regulated river system a total of 134 GL was diverted during 2005/06, with regulated river licences diverting 111 GL, and supplementary access licences diverting 23 GL during periods of high river flows.

Diversions in the unregulated sections of the catchment are not currently monitored in general. However, some users outside of the regulated system in the lower valley are metered, and a volume of 4 GL was diverted. For the majority of unregulated users without meters, a volume of 14 GL, representing estimated average use, has been included as an estimate of unregulated diversions in 2005/06. This provided a total diversion of 152 GL from the regulated section of the NSW Border Rivers (**Table 2**).

Cap accounting was not performed for the 2005/06 water year, as the Cap for the NSW Border Rivers is currently being determined.

4.4 Gwydir

A CA allocation system is used for general security licences in the regulated section of the Gwydir Valley which provides licensees with an individual account that can be credited with water up to 150% of entitlement and allows continuous carryover of any unused water. At any time they may receive a new allocation increment (dependent on resource availability) up to a maximum limit of 150%. In any

particular season, the volume of water that each licensee can use from their account is limited to a maximum of 125% of licensed entitlement with no more than 300% over any three years. This is equivalent to a maximum allocated diversion of 659 GL for the valley.

The Gwydir valley commenced the season with an average of 25% of licensed entitlement in individual accounts, and received a further 22% of allocation during the water year. This provided a total resource availability of 261 GL (**Table 8**) for regulated river licences.

Within the regulated river system a total of 219 GL was diverted during 2005/06, with regulated river licences diverting 141 GL, and supplementary access licences diverting 78 GL during periods of high river flows.

Diversions in the unregulated sections of the catchment are not currently monitored in general. However, some users outside of the regulated system in the lower valley are metered, and a volume of 1 GL was diverted. For the majority of unregulated users without meters, a volume of 10 GL, representing estimated average use, has been included as an estimate of unregulated diversions in 2005/06. This provided a total diversion of 230 GL for the Gwydir valley (**Table 2**).

The Gwydir IQQM has recently been recalibrated to include new on-farm storage information from a major irrigator survey and remote-sensing project, and the model has been submitted for accreditation by the MDB. The Cap target is estimated for the regulated system each year using the Gwydir Valley IQQM. This target is the diversion that would have occurred during 2005/06 with management rules and irrigation development at 1993/94 levels. It is not currently possible to assess a 2005/06 Cap target for the unregulated sections of the valley, and the estimated average annual unregulated diversion is also used to represent the unregulated Cap target each year. The preliminary combined Cap target for 2005/06 is 367 GL. Under the *Murray-Darling Basin Agreement*, annual Cap performances are cumulated from the 1997/98

water year. For the nine-year period from 1997/98, this indicates a cumulative Cap credit of 335 GL (**Table 4**).

4.5 Namoi/Peel

A CA allocation system is used for general security licences in the regulated section of the Namoi Valley, which provides licensees with an individual account that can be credited with up to 200% allocation and allows continuous carryover of any unused allocation. At any time they may receive a new allocation increment (dependent on resource availability) up to a maximum limit of 200%. In any particular season, the volume of water that each licensee can use from their account is limited to a maximum of 125% of licensed entitlement with a maximum of 300% over any 3 years. This is equivalent to a maximum diversion of 326 GL for the valley. All high security licences and general security licences in the regulated section of the Peel valley are managed using annual accounts, which are forfeited at the end of each water year. The maximum allocation is 100% of licensed entitlement, which is 48 GL.

In 2005/06 Namoi Valley licensees commenced the season with an average of 38% of licensed entitlement in individual accounts, and general security licensees received a further 31% of allocation during the water year. The Peel valley licensees commenced the season with zero allocation and received a further 45% of allocation through the water year. The Upper Namoi/Manilla valley started the season with 100% allocation. This provided a total resource availability of 219 GL (**Table 8**) for regulated river licences.

Within the regulated river systems a total of 156 GL was diverted during 2005/06, with regulated river licences diverting 138 GL in the Namoi Valley, 3 GL in the Manilla/Upper Namoi Valley, and 15 GL in the Peel Valley. Supplementary access licences across the regulated systems diverted a total of 18 GL during periods of high river flows.

Diversions in the unregulated sections of the catchment are not currently monitored and, a volume of 78 GL, representing estimated average use, has been included as an estimate of unregulated diversions in the Namoi and Peel valleys. This provided a total diversion of 234 GL for the greater Namoi Valley (**Table 2**).

The Cap target is estimated for the regulated system each year using the Namoi Valley IQQM, which has been accredited for Cap purposes by the MDBC. This target is the estimated diversion that would have occurred during 2005/06 with management rules and irrigation development at 1993/94 levels. An IQQM for the Peel Valley regulated system has also been developed and used to assess preliminary Cap performance. It is not currently possible to assess a 2005/06 Cap target for the unregulated sections of the valley, and the estimated average annual unregulated diversion is also used to represent the unregulated Cap target each year. The combined Cap target for 2005/06 is 285 GL. Under the *Murray-Darling Basin Agreement*, annual Cap performances are cumulated from the 1997/98 water year. For the nine water years of Cap accounting, this indicates a cumulative Cap credit of 60 GL (**Table 4**).

4.6 Macquarie/Castlereagh/Bogan

In the 2005/06 water year, general security licences within the regulated section of the Macquarie valley received an initial allocation of 0% of licensed entitlement, combined with 7% (Macquarie) and 69% (Cudgegong) of licensed entitlement carried over from the 2004/05 water year. Further allocation announcements saw the announced allocation increase to 44% in February 2006. High security licences were allocated 100% of their licensed entitlements. These allocations combined to provide a total resource availability of 380 GL (**Table 8**) for regulated river licences.

Within the regulated river systems a total of 179 GL was diverted during 2005/06. Supplementary access licences diverted 9 GL of water during periods of high river flow.

Diversions in the unregulated sections of the catchment are not currently monitored in general. However, some users outside of the regulated system in the lower valley are metered, and a volume of 10 GL was diverted. For the majority of unregulated users without meters, a volume of 35 GL, representing estimated average use, has been included as an estimate of diversions in 2005/06. This provided a total diversion of 224 GL in the Macquarie valley (**Table 2**).

The Macquarie IQQM has recently been recalibrated to include new information arising from the extended drought in the valley during the past few years, and the model will be re-submitted for accreditation by the MDBC. The Cap target is estimated for the regulated system each year using the Macquarie Valley IQQM. This target is the diversion that would have occurred during 2005/06 with management rules and irrigation development at 1993/94 levels. It is not currently possible to assess a 2005/06 Cap target for the unregulated sections of the valley, and the estimated average annual unregulated diversion is also used to represent the unregulated Cap target each year. The preliminary combined Cap target for 2005/06 is 421 GL. Under the *Murray-Darling Basin Agreement*, annual Cap performances are cumulated from the 1997/98 water year. For the nine-year period from 1997/98 this indicates a cumulative Cap credit of 782 GL (**Table 4**).

4.7 Barwon-Upper Darling

The Barwon-Upper 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 524 GL.

Since June 2001, the Barwon-Upper Darling system has been experiencing the worst drought and flow sequence recorded in the past 150 years. The river at Wilcannia ceased to flow for long periods during the past few years, only broken by occasional flow events. During 2003/04, 2004/05 and 2005/06 there has been some relief with rainfall events in the north of the Murray-Darling Basin that have contributed to

flows in the Barwon-Darling river system. In July and August 2005, flow in the river in excess of basic needs allowed water diversions for irrigation. Diversions from the Barwon-Darling River system in the 2005/06 water year totalled 157 GL (**Table 2**).

The Cap target is estimated each year using the Barwon-Upper Darling Valley IQQM, which has not yet been presented for accreditation by the MDBC. This target is the diversion that would have occurred during 2005/06 with management rules and irrigation development at 1993/94 levels. The preliminary Cap target for 2005/06 is 179 GL. Under the *Murray-Darling Basin Agreement*, annual Cap performances are cumulated from the 1997/98 water year. For the nine water years of Cap accounting, this indicates a cumulative Cap debit of 277 GL, which exceeds the trigger for Special Auditing of 35 GL.

For Cap auditing purposes, the Barwon-Upper 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 nine-year period from 1997/98, this indicates a cumulative Cap debit of 143 GL, which also exceeds the trigger for Special Auditing of 62 GL (**Table 4**).

In recognition of above-Cap diversions, NSW has previously announced that it would act to bring diversions back within Cap. Whilst the extended drought conditions have delayed such action, NSW has announced a restructure of licensed water access licences such that entitlements will be limited to the long-term average diversion allowed under the Cap.

4.8 Lachlan

In the 2005/06 water year, there was continuation of the extreme dry conditions; however sufficient inflows were achieved to make an allocation of 19% for general security licensed entitlement. An allocation of 100% for high security entitlement and 100% for town water supplies was possible. These allocations were a slight increase over the allocations of the previous three years; however they combined

to provide a total resource availability of only 187 GL (**Table 8**) for regulated river licences.

Within the regulated river system a total of 113 GL was diverted during 2005/06, with regulated river licences accounting for all of the diversions. There are no supplementary access licences in the Lachlan regulated system.

Diversions in the unregulated sections of the catchment are not currently monitored and, a volume of 15 GL, representing estimated average use, has been included as an estimate of unregulated diversions in the Lachlan Valley. This provided a total diversion of 128 GL for the Lachlan Valley (**Table 2**).

The Cap target for the year is estimated for the regulated system each year using the Lachlan Valley IQQM, which was the first model to be accredited for Cap purposes by the MDBC. This target is the estimated diversion that would have occurred during 2005/06 with management rules and irrigation development at 1993/94 levels. It is not currently possible to assess a 2005/06 Cap target for the unregulated sections of the valley, and the estimated average annual unregulated diversion is also used to represent the unregulated Cap target each year. The combined Cap target for 2005/06 is 167 GL. Under the *Murray-Darling Basin Agreement*, annual Cap performances are cumulated from the 1997/98 water year. For the nine water years of Cap accounting, this indicates a cumulative Cap credit of 46 GL (**Table 4**).

4.9 Murrumbidgee

In the 2005/06 water year, general security licences within the regulated section of the Murrumbidgee Valley received an initial allocation of 12% of licensed entitlement, combined with 8% of licensed entitlement carried over from the 2004/05 water year. Further allocation announcements saw the announced allocation increase to 54% in March 2006. High security licences were allocated 95% of their licensed entitlements as required under the valley Water Sharing Plan, and 100% for other specific purpose high security licences. Due to the low

level of water availability across the Murray-Darling Basin, inter-valley trade of allocated water resulted in only 5 GL of water traded into the Murrumbidgee Valley during 2005/06. These allocations combined to provide a total resource availability of 2138 GL (**Table 8**) for regulated river licences. Users again advanced water from future Snowy Scheme releases at commercial rates, with a total of 185 GL being advanced.

Within the regulated river system a total of 1910 GL was diverted during 2005/06, with regulated river licences diverting 1650 GL, and supplementary access licences diverting 260 GL during periods of high river flows. The Lowbidgee Flood Control and Irrigation District also diverted 248 GL during periods of high river flows.

Diversions in the unregulated sections of the catchment are not currently monitored and, a volume of 42 GL, representing estimated average use, has been included as an estimate of unregulated diversions in the Murrumbidgee Valley. This provided a total diversion of 2200 GL for the Murrumbidgee Valley (**Table 2**).

The Cap target is estimated for the regulated system each year using the Murrumbidgee Valley IQQM, which has not yet been presented for accreditation by the MDBC. This target is the diversion that would have occurred during 2005/06 with management rules and irrigation development at 1993/94 levels. It is not currently possible to assess a 2005/06 Cap target for the unregulated sections of the valley, and the estimated average annual unregulated diversion is also used to represent the unregulated Cap target each year. The combined preliminary Cap target for 2005/06 is 2451 GL. Under the *Murray-Darling Basin Agreement*, annual Cap performances are cumulated from the 1997/98 water year. For the nine water years of Cap accounting, this indicates a cumulative Cap credit of 918 GL (**Table 4**).

4.10 Lower Darling

The Lower Darling system, below Menindee Lakes, has a small entitlement of 48 GL which, until 2003/04, had received a full allocation

every year since the volumetric allocation scheme commenced in 1981. However, inflows during 2005/2006 provided sufficient resources to allow a starting allocation of 100% for high security licences, and 50% for general security licences, increasing to 100% early in the water year. These allocations combined to provide a total water resource availability of 98 GL (**Table 8**) in the Lower Darling, for regulated river licences.

Within the regulated river systems a total of 41 GL was diverted during 2005/06, with regulated river licences accounting for all of the diversions. There was no supplementary access in the regulated system during 2005/06. There is no unregulated usage in the Lower Darling Valley.

The Cap target is estimated for the regulated system each year using the Murray Simulation Model, which has been presented for accreditation by the MDBC. This target is the diversion that would have occurred during 2005/06 with management rules and irrigation development at 1993/94 levels. The preliminary Cap target for 2005/06 is 14 GL. Under the *Murray-Darling Basin Agreement*, annual Cap performances are cumulated from the 1997/98 water year. For the nine water years of Cap accounting, this indicates a cumulative Cap credit of 134 GL.

For Cap auditing purposes, the Barwon-Darling and Lower Darling valleys are taken to be one valley, and the combined annual Cap performances are cumulated from the 1997/98 water year. For the nine-year period from 1997/98, this indicates a cumulative Cap debit of 143 GL, which also exceeds the trigger for Special Auditing of 62 GL (**Table 4**).

4.11 Murray

At the commencement of 2005/06, no allocation was possible for general security licences within the regulated section of the Murray Valley, and only 27% of licensed entitlement carried over from the 2004/05 water year was available. Further allocation announcements saw the announced allocation increase to 63%

by February 2006. High security licences were allocated 97% of their licensed entitlements as required under the valley Water Sharing Plan, and 100% for other specific purpose high security licences. Due to the low level of water availability across the Murray-Darling Basin, inter-valley trade of allocated water resulted in only 1 GL of water traded into the Murray Valley during 2005/06. These allocations combined to provide a total resource availability of 2034 GL (**Table 8**) for regulated river licences. Users within the NSW Murray Valley again advanced water from future Snowy Scheme releases at commercial rates, with a total of 99 GL being advanced.

Within the regulated river system a total of 1640 GL was diverted during 2005/06, with regulated river licences diverting 1572 GL, and supplementary access licences diverting 68 GL during periods of high river flows.

Diversions in the unregulated sections of the catchment are not currently monitored and, a volume of 28 GL, representing estimated average use, has been included as an estimate of unregulated diversions in the NSW Murray valley. This provided a total diversion of 1667 GL for the NSW Murray valley (**Table 2**).

The Cap target is estimated for the regulated system each year using the Murray Simulation Model, which has been presented for accreditation by the MDBC. This target is the diversion that would have occurred during 2005/06 with management rules and irrigation development at 1993/94 levels. It is not currently possible to assess a 2005/06 Cap target for the unregulated sections of the valley, and the estimated average annual unregulated diversion is also used to represent the unregulated Cap target each year. The combined preliminary Cap target for 2005/06 is 1816 GL. Under the *Murray-Darling Basin Agreement*, annual Cap performances are cumulated from the 1997/98 water year. For the nine water years of Cap accounting, this indicates a cumulative Cap credit of 799 GL (**Table 4**).

5. Review of 2005/06 Water Use in Victoria

5.1 Overview

Details of the factors influencing net water use in each of the Victorian river valleys during 2005/06 and proposed future water management activities are given below.

The 2005/06 season was characterised by low carryover storage volumes and below average inflows to all Goulburn Murray Water (GM-W) storages. This resulted in the opening allocation on the 1 July 2006 being zero for all systems except for the Murray, Broken and Bullarook Systems. The Murray allocation increased in small steps to a final allocation of 100% of high security entitlement plus 44% of lower security entitlement.

Campaspe Irrigation District and Campaspe River private diverters received 31% of high security entitlement, the lowest ever allocation on record. Broken Creek and Bullarook Creek private diverters received in addition to 100% of high security entitlement, an allocation of 70% and 90% of lower security entitlement respectively.

5.1.1 Water Use Capping Measures

Victoria has been implementing changes to water management policies under its water reform package since 1990/91. The effectiveness of the policies is continually monitored. Bulk Entitlements for the Goulburn, Murray, Ovens and Broken river systems are now in place. The Bulk Entitlement for the Ovens and Broken systems were introduced during 2005/06. The Bulk Entitlement for the Loddon System was implemented late in the spring of 2006.

Annual diversions are limited by Victoria's seasonal allocation process. The final allocation for supplies from the Goulburn, Murray and Loddon systems were all limited to 100% of high security entitlement. Maximum final allocations were made available for the Broken River and Bullarook Creek systems. The final allocation of 31% of high security entitlement for the Campaspe System was the lowest on record.

5.1.2 Volumes Diverted

The volumes diverted during 2005/06 were below the Cap targets in the Murray/Kiewa/Ovens, Goulburn/Broken/Loddon and Campaspe designated river valleys. A Cap target had not been determined for the Wimmera-Mallee valley as the model was not fully calibrated by the end of the 2005/06 reporting year.

Victorian systems diverted 3267 GL from the Murray-Darling Basin during 2005/06. The total volume authorised for use was 3910 GL, which included 763 GL of losses. Approximately 27.7 GL of net temporary trade went interstate from Victoria during 2005/06.

The Victorian diversions equated to 79.5% 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 2005/06. Spillage sales were available in the Ovens Valley during the spring.

5.1.4 Final Deliveries & Historical Comparison

Approximately 2460 GL was delivered by Victorian systems during 2005/06. Deliveries in the Murray system were 1549 GL in 2005/06, compared to 1463 GL the previous year.

5.1.5 Trading

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

Approximately 16 GL was permanently sold interstate and to other river systems by Victorian entitlement holders. South Australia purchased 2 GL of Victorian entitlements. There was no water sold back to Victoria from South Australia. A small volume of 0.6 GL of Victorian water was sold to New South Wales. No water was traded back to Victoria from

New South Wales. Active trading also occurred within systems.

Strong trading occurred on the temporary entitlement market, with 354.9 GL sold interstate and to other river systems within Victoria. Most interstate trading involved New South Wales, and resulted in an overall net inwards transfer to Victoria of 10 GL during 2005/06, including 5.1 GL from the Murrumbidgee River basin. There was a net transfer of 2.0 GL from Victoria to South Australia. The Goulburn system received a net inwards temporary trade of 8.1 GL from New South Wales and South Australia.

5.1.6 Environmental Flows

A total of 512 GL of water was supplied to the Barmah-Millewa Forest from the Victoria and New South Wales Environmental Water Allocations (EWA) during the spring. The provision of this water resulted in an effective watering of the forest and a successful bird breeding event. At the 30 June 2006, the Victorian EWA had been overdrawn by 6 GL and New South Wales EWA account held 44 GL.

The Northern Victorian wetlands allocation of 27.6 GL was fully utilised for Gunbower Forest, Torrumbarry and Mildura wetlands and the Lower Murray red gum forest. A further 25.1 GL from surplus River Murray flows was supplied during the spring to Gunbower Forest, Torrumbarry System and Mildura wetlands.

A further 2.9 GL and 5.6 GL was supplied from the Snowy account and water donated by irrigators respectively, to water Lower Murray forests.

5.2 Goulburn

Gravity irrigation customers and private diverters in the Goulburn system of the Goulburn/Broken/Loddon designated river valley were given an initial allocation of 0% of high security entitlement in July 2005. The allocation reached a maximum of 100% of high security entitlement on 1 November 2005. Limited resources

prevented the allocation of any Sales Water again for the eighth consecutive year in the Goulburn system. No off-quota allocation was made available on the Goulburn system during 2005/06.

Lake Eildon held 28% of capacity at the start of the Victorian irrigation season. The Goulburn system's primary storage peaked at 49% of capacity in mid December 2005, and by end of June 2006 it had been drawn down to 22%. It held only 19% at the start of the previous irrigation season. Waranga Basin failed to fill to capacity in late spring by just 6 GL ML or about 1.5% of capacity. At the end of the irrigation season, the Waranga Basin had been drawn down to 33% without recourse to pumping.

The volume authorised for use in the Goulburn was 970.1 GL, which comprised the seasonal allocation for irrigation, urban, industrial and stock entitlement holders (703.1 GL), temporary trade (29.4 GL) and system losses (237.6 GL). The irrigation entitlements referred to the Shepparton Irrigation Area, the Central Goulburn Irrigation Area and private diverters. The Goulburn diversions equated to 89.7% utilisation of the total allocated volume.

Approximately 600.3 GL was transferred to the Murray, Campaspe, Loddon and Wimmera-Mallee systems and the Melbourne Water supply system. Diversions during 2005/06 for the Goulburn system were 1494.9 GL which was below the ten-year average. The total volume transferred from north to south of the Great Dividing Range was 3.1 GL comprising 2.8 GL to Melbourne Water from the Silver and Wallaby creeks which are tributaries of the Goulburn River. A further 0.3 GL was transferred to Western Water from the Campaspe system.

The Goulburn system is included in the Goulburn/Broken/Loddon designated river valley for the assessment of Cap compliance and diversions from this designated valley were above the 2005/06 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 at the start of July 2005 of 66% of high security entitlement. The maximum allocation of 100% of high security entitlement plus 70% of low security entitlement was announced on the 1 September 2005. No off-quota allocations were announced for the Broken River.

After filling to capacity in late winter 2005, Lake Nillahcootie was holding 58% of capacity by the end of June 2006.

There was a blue-green algae (BGA) event at Lake Mokoan during the summer and as a result, releases were suspended from the 17 January to 24 February 2006.

High releases were experienced from Lake Mokoan in November to quickly reduce the Lake level as it had risen above the maximum target filling level allowed under the 2005/06 operating guidelines.

The Broken diversions equated to 39.3% utilisation of the total allocated volume.

The Broken system is included in the Goulburn/Broken/Loddon designated river valley for the assessment of Cap compliance, and diversions from this designated valley were above the 2005/06 Cap target. However the valley is within Cap and has a cumulative Cap credit.

5.4 Loddon

Private diverters from the Loddon system were initially allocated 0% of Licensed Volume and reached a maximum of 100% of high security entitlement on 15 February 2006 (same as Goulburn system).

A combination of very low carryover volumes and low inflows resulted in Cairn Curran and Tullaroop reservoirs both reaching only 22% of capacity in November 2005. Newlyn and Hepburn's Lagoon reservoirs filled to capacity in the spring, which enabled maximum allocations to be announced for the Bullarook Creek System.

Customers of the Pyramid-Boort Irrigation Area are located in the Loddon basin, but are predominantly supplied from the Goulburn system via the Waranga Western Channel. In view of the poor resource position, there was no planned supplement available from the Loddon storages to the Boort area. As such, this is the third successive year when supply to the Boort area has been solely reliant on the Goulburn System.

Irrigation usage by private diverters, extraction for domestic and stock, commercial, industrial and urban purposes, and approximately 302.5 GL diverted to the Pyramid-Boort Irrigation Area and the Wimmera-Mallee system accounted for total Loddon system diversions of 345 GL. The total diversion passed to the Pyramid-Boort Irrigation Area from the Goulburn system in 2005/06 was 298.6 GL.

The total Loddon system usage was 96.8% of the allocated volume. The allocated volume comprised entitlements for gravity irrigators Pyramid-Boort Irrigation Area of the private diverters, and urban, industrial and stock purposes. Although supplied largely from the Goulburn system, the Pyramid-Boort Irrigation Area is included as part of the total Loddon system entitlements.

The Loddon system is included in the Goulburn/Broken/Loddon designated river valley for the assessment of Cap compliance. Diversions from this designated valley were above the 2005/06 Cap target. However the valley is within Cap and has a cumulative Cap credit.

The bulk entitlements process for the Loddon was completed in November 2005.

5.5 Campaspe

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

Allocations in the Campaspe system opened at 0% of high security entitlement and reached a maximum of only 31% on 1 December 2006, which is the lowest ever on record. Allocations for gravity irrigators in the Rochester Irrigation Area were aligned with the Goulburn system, and reached 100% of high security entitlement.

In the early part of the year, when there was no allocation for irrigators, the Minister qualified special rights to provide a limited supply to domestic and stock, urban and other special customers. An allocation of 2% of high security entitlement was announced on 15 September 2005. As was the case for 2004/05, a significant volume of Goulburn water was traded to Campaspe Irrigation District customers who were supplied by a privately installed pump on the Waranga Western Channel. The practice in recent years of operating the Campaspe Weir pool below full supply level again assisted in the conservation of water.

Eppalock Reservoir reached only 12% of capacity in mid-November 2005. By the end of June 2006, the reservoir had been drawn down to 4.7% of capacity, only slightly more than the record low of 4.6% in June 2004.

The 2005/06 Campaspe system authorised volume was 366.6 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 69.5% of the allocated volume. There was no water harvested from the Campaspe River to the Waranga Western Channel via the Campaspe Irrigation District channels apart from 0.4 GL of unregulated channel outfalls. There was no harvesting of unregulated flows to the Waranga Western Channel using the Campaspe Pumps. There was also no regulated supplement to Waranga Western Channel because of the very low Campaspe allocation. Woodend was supplied with 0.32 GL from the Campaspe system.

A net volume of 0.76 GL of temporary water was traded from the Campaspe River to the Campaspe Irrigation District. A volume of 0.33 GL was permanently traded from the Campaspe Irrigation District to the Campaspe River. A total of 4.52 GL was permanently sold from the Campaspe system to other water authorities comprising 3.66 GL from the Rochester Irrigation District and the balance from the Campaspe Irrigation District.

Bulk Entitlements for the Campaspe system have been in force since May 2000. From the 1 July 2005, the Campaspe Bulk Entitlement was fully implemented. This required the provision of specified minimum flow requirements downstream of Eppalock Reservoir and Campaspe Siphon. Compliance with the Bulk Entitlement requires close monitoring of flows upstream and downstream of Eppalock Reservoir and taking action as required based on an assessment of these flows.

Diversions from the Campaspe designated river valley were below Cap target in 2005/06. The Campaspe valley has a cumulative Cap credit.

5.6 Wimmera-Mallee

The low inflows of the previous nine years continued in 2005/06. In mid-June 2005, the storages were at 11% (compared to 9% for 2004), resulting in the winter channel run starting on 15 June 2005. This volume, combined with a low allocation from the Waranga system, allowed an allocation of one dam per 400 ha to be made (approximately one third of dams). This winter stock and domestic supply concluded in mid-November.

The initial allocation for the Wimmera-Glenelg Bulk Entitlements on 1 November 2005 was based on available water of 48.3 GL. By the end of June this had increased to 61.8 GL. (Maximum allocations are available at 208 GL).

The volume available only allowed a supply in the summer run area to one dam per 400 ha, which was equivalent to approximately one third of dams throughout the area.

The irrigation area received no allocation during the 2005/06 Bulk Entitlement year.

Initial total allocations to the environment under the Bulk Entitlement were 3.4 GL plus an additional 4.4 GL of carryover from the previous year. By the end of June, this increased to 11.6 GL. The Wimmera and Mackenzie River systems received 0.4 GL, of this total to the end of June 2005.

By mid-June 2006 the storages were at 6%. For the 2006 winter channel run, this enabled water to be delivered to town storages only in the area not able to be commanded by the Waranga Western Channel. The farms in most of the Wimmera-Mallee channel system received no domestic and stock supply.

The area of the southern Mallee supplied from the Waranga channel benefited from Grampians Wimmera Mallee Water's allocation of approx 18 GL in 2006. In this area customers received the same allocation as the previous year; one dam per 400 ha, all town storages were filled.

Total diversions in the Wimmera-Mallee designated river valley for 2005/06 were 75 GL, which is well below the estimated long-term Cap of 162 GL.

Development of the Cap model for the Wimmera-Mallee valley is still in progress, a formal annual Cap target for this valley is not available. It has been proposed that the Bulk Entitlement model may be able to be used for this purpose. Diversions have been within Bulk Entitlement limits since the introduction of the Bulk Entitlements.

5.7 Kiewa

Total Kiewa diversions were 21% of the allocated volume. 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 2005/06 Cap target.

5.8 Ovens

Buffalo Reservoir was at full capacity by late October 2005 and by mid June 2006 had been drawn down to 27.3% of capacity. William Hovell Reservoir filled to capacity by early July 2005 and was drawn down to 29.8% of capacity by late June.

Once in-valley commitments had been assured, both Buffalo and William Hovell reservoirs were drawn down at an accelerated rate late in the autumn to maximise the Ovens River tributary credit for the Murray System.

Total Ovens system diversions were 37.8% of the allocated volume. A regression model has been developed to calculate Cap targets for the regulated Ovens system. The Ovens system is included in the Murray/Kiewa/Ovens designated river valley for the assessment of Cap compliance and diversions from this valley were less than the 2005/06 Cap target.

5.9 Murray (including Mitta Mitta)

The initial allocation at the start of July 2005 for Murray System gravity irrigation customers and Mitta private diverters was 82% of high security entitlement. By 15 August 2005, the allocation had increased to 100% of high security entitlement. By 15 April 2006, a final allocation of 100% of high security entitlement plus 44% of lower security entitlement was available.

River Murray Water (RMW) did not need to specifically transfer large volumes of water from Dartmouth reservoir to Hume reservoir during 2005/06. Releases were therefore confined to providing the minimum flow in the Mitta Mitta river and discretionary releases by AGL Hydro specifically for electricity production.

Dartmouth reservoir filled to 65% of capacity in January 2006 while Hume reservoir reached

92.5% of capacity in mid-November 2005. By the end of June, Dartmouth and Hume reservoirs were holding 64.7% and 21% respectively. Victoria's share of Dartmouth and Hume reservoirs as of 30 June 2006 was 65.8% and 71.5% respectively.

No regulated supplement to the River Murray was available from the Menindee Lakes for 2005/06.

The total diversion of 1549 GL for Victorian component of the River Murray valley was 83% of the allocated volume.

For the purposes of Cap compliance, the Murray System is included in the Murray/Kiewa/Ovens designated river valley. Diversions from this valley were below the 2005/06 Cap target because of the seasonal allocation. Bulk Entitlements for the Murray system have applied since July 1999.

6. Review of 2005/06 Water Use in South Australia

6.1 Overview

South Australia reports River Murray diversions (including some small licensed environmental diversions) under the following four Cap components:

- Metropolitan Adelaide and Associated Country Areas (through the Mannum-Adelaide, Murray Bridge-Onkaparinga pipelines);
- Country Towns (through the Morgan-Whyalla, Swan Reach-Stockwell, Tailem Bend to Keith pipelines and to a number of regional water filtration plants along the River Murray);
- Lower Murray Swamps (reclaimed area from Mannum to Wellington); and
- *All Other Purposes* of Water from the River Murray (Irrigation, Stock, Domestic and Environmental Allocations).

All of the Cap valleys were within the trade-adjusted annual Cap targets and the total River Murray water diversion in South Australia for the above components was only 590 GL compared to 623.5 GL in 2004/05. Diversions were significantly lower than for the 2004/05 water year due to higher rainfall and cooler weather conditions. A number of rainfall events during spring and summer helped to reduce demand in the major irrigation areas and also Metropolitan Adelaide.

The amount of temporary interstate trade, particularly to NSW, increased due to the large amount of unused water entitlements available for trade and the ability of NSW to carryover unused entitlements.

6.2 River Murray Water Management 2005/06

The South Australian Government from 1 July 2005 continued with water restrictions to ensure equitable access to supplies for all South Australian River Murray water users including irrigators and the environment. This was the third consecutive year that restrictions were placed on irrigators. The initial allocation was 70% of

licensed entitlement and due to improved rainfall and unregulated flow conditions restrictions were lifted in November 2005 entitling River Murray water users to 100% of licensed entitlement for the whole year.

Rainfall improved across the Murray-Darling Basin during 2005/06 compared to the previous few years. Inflows during winter and spring were close to the long-term median inflow replenishing storages and triggering the release of the Barmah-Millewa Forest Environmental Allocation under the current rules for release. The good rainfalls across the Upper Murray catchment also led to South Australia receiving approximately 460 GL of unregulated flow that could not be stored in Lake Victoria due to the flows along the River Murray exceeding the inlet channel capacity.

Localised rainfall over Lakes Alexandrina and Albert and inflows from the Eastern Mount Lofty Ranges tributaries such as the Angas Bremer and Finniss Rivers combined with the unregulated flows allowed approximately 770 GL to flow over the barrages providing very welcome freshwater flows into the Coorong.

6.3 Impacts on River Murray Water Use

The 2005/06 water year was a below average use year for South Australia (average since 1997/98 to 2005/06 is 648 GL). Weather conditions in South Australia were favourable for irrigators and some good rainfalls occurred during summer leading to reduced irrigation diversions.

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

Most irrigation areas supplied from the River Murray in South Australia receive annual average rainfall of less than 300 mm and most of this usually falls in the winter months. However, in 2005/06 summer rainfalls in the Riverland region exceeded the long term average summer rainfall.

Adelaide and its surrounds are supplied with water from the Mount Lofty Ranges Catchment and the River Murray. The total amount of water that is diverted from the River from year to year is influenced by runoff from the Mount Lofty Ranges. Inflows to storages from local catchments in the Ranges were above average in 2005/06 leading to lower extractions from the River Murray for Metropolitan Adelaide supply.

6.4 Metropolitan Adelaide and Associated Country Areas

A total of 73.8 GL for 2005/06 was diverted for Metropolitan Adelaide, which is significantly below the long-term average diversion of approximately 100 GL/year. The diversion of 73.8 GL included a diversion of 16 GL accounted for on a separate *All Other Purposes* licence therefore 57.8 GL is the reportable figure for use under the Metropolitan Adelaide Cap. The Cap for Metropolitan Adelaide is reported over a five-year rolling period of not more than 650 GL.

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

- 71.6 GL in 2004/05, including 8.8 GL of temporary trade accounted on a separate *First Use* Licence;
- 82 GL in 2003/04, including 9.4 GL of temporary trade accounted on a separate *First Use* Licence;
- 164.7 GL in 2002/03, including 11 GL of temporary trade accounted on a separate *First Use* Licence; and
- 82.5 GL in 2001/02, including 12 GL of temporary trade accounted on a separate *First Use* Licence.

The cumulative total for the five years to 30 June 2006 is 474.6 GL, not including the temporary trade. This volume of water supplied to Metropolitan Adelaide and Associated Country Areas Cap through the Swan Reach-Stockwell, Mannum-Adelaide, and Murray Bridge-Onkaparinga pipelines includes 45.8 GL accounted on a separate *First Use* Licence to maintain the integrity and level of security of the Metropolitan Adelaide Cap. This *First Use* Licence is being maintained within the *All Other Purposes* Cap component for Cap accounting purposes as an interim measure until final arrangements are agreed with the MDBC.

6.5 Country Towns

Water use for Country Towns in 2005/06 was 40 GL, being 2 GL below the trade adjusted Cap of 42 GL. In 2005/06, 8 GL was transferred to the *First Use* Licence. This licence is fully tradeable unlike the Metropolitan Adelaide Cap.

6.6 Lower Murray Swamps

In 2005/06 the total trade adjusted allocation for the Lower Murray Swamps was 55.5 GL including the 22.2 GL Environmental Land Management Allocation (ELMA). There has been a significant amount of permanent trade from the Lower Murray Swamps over the last three years in response to the rehabilitation project.

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

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

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

The 9.3 GL/year “Highland” irrigation entitlement has now been transferred to the *All Other Purposes* Cap as agreed by the Independent Audit Group. This transfer is to be made official and Schedule F adjusted to reflect the decision.

6.7 Lower Murray Swamps Rehabilitation Progress Update

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

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

The environmental compliance program within the project commencing late 2004 has an operational on-farm Environmental Management Impact Plan (EIMP) system comprising an exemption regime administered by the Environment Protection Agency (EPA) pursuant to the *Environmental Protection Policy (Water Quality)*. This accords to the deadline of mid-2008, when irrigators require an operational reuse water system, which captures the first 5 ML of stormwater per 100 ha of irrigation bay. In 2005/06, 60% of EIMP’s were instituted.

6.8 All Other Purposes of Water from the River Murray (Highland Irrigation)

A total of 417 GL was diverted for the 2005/06 water year including a metered diversion of 375.7 GL and a non-metered diversion of 41.3 GL. The diversion of 417 GL was 40 GL below the climate-and-trade (both permanent and temporary interstate and intrastate trade) adjusted annual Cap target of 457 GL. Highland diversions during 2005/06 were the fourth highest since the Cap was introduced. The *All Other Purposes* Cap has a significant cumulative Cap credit of 450 GL.

A large amount of temporary trade was observed during 2005/06. South Australia traded 9.8 GL to Victoria and 37.4 GL to New South Wales, totalling 47.2 GL. A large proportion of this trade was carried out late in the season due to the New South Wales Government policy of carryover for unused water. South Australia intends to address this issue of late season trade.

New South Wales temporarily traded 11 GL and Victoria 11.8 GL to South Australia, totalling 22.9 GL. There was a net outwards trade of 24.3 GL.

A total of 8.1 GL was permanently traded into the *All Other Purposes* Cap, with 2.58 GL from Victoria and 5.54 GL from the Lower Murray Swamps.

6.9 River Murray Drought Water Allocation Policy

In response to the predicted outlook early in the season the Department of Water, Land and Biodiversity Conservation (DWLBC) implemented its River Murray Drought Water Allocation Policy.

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

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

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

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

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

6.10 Water Information Management in South Australia

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

WILMA provides a robust auditable platform for licence and permit application processing, revenue collection, water trade, managing legal interests and water accounting of both water access entitlements and use, to meet legislative requirements.

6.11 River Murray Environmental Management and Watering Opportunities in 2005/06

In the absence of a *Living Murray* Account in South Australia, a number of key environmental watering projects were undertaken using water from Ministerial, wetland and environmental allocations, irrigator donations and unregulated flows.

A number of environmental watering activities were undertaken at the following locations, principally using unregulated flows for multi-purpose objectives:

- Chowilla-Lindsay Wallpolla Complex;
- River Murray Main Channel; and
- Lower Lakes and Coorong.

In the Chowilla-Lindsay Wallpolla Complex a total of 2.4 GL has been pumped at 13 locations for the River Red Gum rescue project. The 2.4 GL includes the pumped use of 0.96 GL from unregulated flows accessed during the event and also from water held behind weir pools during the weir pool manipulation project.

In response to the small increase in flows to South Australia, a number of weir pool raisings commenced 19 September 2005. In this event:

- Lock 6 weir pool – raised by 15 cm;
- Lock 5 weir pool – raised by 50 cm;
- Lock 4 weir pool – raised by 30 cm; and
- Lock 1 weir pool – raised 10 cm.

The estimates of water use between 19 September 2005 to 3 February 2006 is based on the Flood Inundation Model (FIM). A total of 4.97 GL including 1.35 GL use on entitlement flow conditions is the best estimate of water use.

Local heavy rainfall during July 2005 across the Eastern Mount Lofty Ranges and Lower Lakes resulted in elevated water levels in the Lakes that exceeded 0.85m AHD commencing late July 2005 and the barrages were opened to allow freshwater to flow into the Coorong.

The volume of water discharged through the barrages and fishways was approximately 770 GL at the following locations:

- Goolwa Barrage: 223 GL plus 8.7 GL at the vertical slot fishway;
- Boundary Creek Barrage: 54 GL;

- Ewe Island Barrage: 70 GL; and
- Tauwitchere Barrage: 403 GL, plus 6.8 GL vertical slot fishway and 5.3 GL rock ramp fishway.

The releases through the barrages and fishways in 2005/06 are the most significant in the last four years and have been particularly important during the continued period of reduced water resource availability to South Australia by allowing fresh water to flow into the Coorong, which is suffering significant ecological health problems under current low flow conditions.

7. Review of 2005/06 Water Use in Queensland

7.1 Water Planning and Management Overview

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

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

Resource Operations Plans (ROPs) will implement the provisions of the WRPs. Following consideration of the issues raised in the submissions by an independent referral panel, Queensland has now finalised the ROPs for the Warrego, Paroo, Bulloo, Nebine and the Moonie catchments. Final ROPs were released on 20 January 2006. The draft ROP for the Border Rivers was released for public submission in January 2007. The draft ROP for the Condamine and Balonne was released in April 2007. While the finalised WRPs provide the legislative framework that limits water diversions, the long-term diversion Cap figure for each river valley will be determined once ROPs are finalised.

Caps have been set for the Moonie, Warrego, Paroo and Nebine valleys and Cap proposals for the Border Rivers and Condamine and Balonne will be submitted to the Commission within six months of the gazettal of the final ROPs.

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

Consultation is an integral part of development of the WRPs and ROPs with community, water users and stakeholder groups in each catchment engaged both through consultative groups and individually to work through various issues.

Queensland has been controlling the development of new infrastructure to take water during the development of the WRPs and ROPs. A moratorium on new works has existed in all Queensland Murray-Darling valleys since 20 September 2000. The WRPs continue the moratorium on the development of infrastructure related to waterharvesting licenses until the ROPs are finalised. The WRPs also continued the moratorium on works that would increase the take of overland flow. Works that allow taking of overland flow water are now managed as assessable developments under the *Integrated Planning Act* and any growth in take by those works is prohibited unless it is for stock and domestic purposes or a restricted range of facilities to meet environmental compliance requirements. When implemented, the management rules under the corresponding ROPs will replace the moratorium to control take from watercourses through either entitlement, controls on infrastructure or a combination of both.

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

Condamine and Balonne

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

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

The Condamine and Balonne WRP makes provisions for:

- Event-based flow management rules to enhance low and medium flow events in the Lower Balonne with benefits for the Narran Lakes and Culgoa floodplain;
- The continuation of the moratorium on new works to take water from a watercourse pending finalisation of the ROP for the catchment;
- The regulation of the take of overland flow water throughout the catchment, ensuring more water for the environment and downstream users;
- Performance indicators to ensure that decisions made under the ROP do not further adversely affect the amount of water available to the environment or existing water users including stock and domestic users; and
- The WRP specifically provides for a special five year assessment and report (over and above the normal annual reporting required for plans) that will enable any significant developments in scientific knowledge relating to the region to be identified and taken into account in reviewing the effectiveness of the WRP. For example, the Narran Lakes Research project and the Lower Balonne floodplain study outcomes will provide input to the five year report.

Development of the ROP has been a priority since release of the WRP. Extensive community consultation continues to occur and the draft ROP was released for public review in April 2007. Submissions on the draft ROP will be sought from the community. The issues raised in the submissions will then be reviewed by an independent referral panel, made up of members from outside the plan area who will then make recommendations to the Department on finalising the plan.

It is expected that the ROP will be finalised by early 2008.

Lower Balonne Ministerial Water Resources Advisory Council ('the Council')

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

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

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

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

The Lower Balonne Ministerial Water Resources Advisory Council and other groups in the middle and upper reaches of the Condamine Balonne are providing advice to the Department in developing the ROP.

Border Rivers

In the Border Rivers catchment, an Intergovernmental Agreement (IGA) is being developed jointly with New South Wales and in consultation with stakeholders. The development of the IGA has been broken down to discrete elements, including:

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

An interim IGA covering the first three elements has been completed and endorsed by respective State Ministers. The interim IGA sets out how water will be shared between the states, and its endorsement has enabled development of the ROP to proceed.

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

The final ROP will default to the IGA in relation to joint management of the water resources of the shared streams of the Border Rivers (including, for example, environmental flow rules, water-sharing or access rules) but will

provide the framework for allocation and management of water in Queensland to achieve agreed IGA outcomes.

A draft ROP has been developed in consultation with stakeholder groups such as the Stanthorpe Community Reference Panel, Border Rivers Food and Fibre, and irrigator sub groups. The draft ROP was released on 8 January 2007 with written submissions closing on 28 February 2007.

It is expected that the final ROP will be completed by late 2007.

Moonie River and Warrego, Paroo and Nebine Rivers

ROPs for the Warrego, Paroo and Nebine and Moonie catchments were gazetted on 20 January 2006.

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

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

Metering

Queensland released a policy on metering water extractions in May 2005, providing a framework for metering across the State. The policy includes metering standards, details of ownership, maintenance and reading of meters, and proposed charging arrangements. In brief, the Department

of Natural Resources and Water will organise the supply, installation and maintenance of water meters in accordance with standards provided in the policy. Ownership of water meters will remain with the Department with costs associated with metering recovered from water users through an annual metering service charge.

The metering project will see the staged introduction of water metering for all un-supplemented water extractions across Queensland over the coming years. The development of a ROP in each WRP area will generally trigger implementation of metering. As far as possible, metering will be scheduled to be completed in each ROP area at or near the finalisation of the ROP.

To date in the Queensland section of the Murray-Darling Basin, metering projects have commenced in the Moonie, Warrego, Paroo and Nebine ROP areas. Approximately 60% of sites within these areas have been metered with the remainder to be metered during the 2006/07 financial year.

The 2006/07 financial year will also see the commencement of metering projects in the Granite Belt section of the Border Rivers and the middle and lower sections of the Condamine and Balonne WRP Area.

Water Use Efficiency (WUE)

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

The third stage of the Rural Water Use Efficiency Initiative (RWUEI) has commenced with funds made available by the Queensland Government for a continuation through until mid-2009. This new phase will continue the improvements in on-farm water resource management and within

the context of broader catchment issues such as sediment and nutrient control, salinity and protection of the environment. Broader natural resource and environmental management outcomes, such as the *National Action Plan for Salinity and Water Quality*, and Queensland's commitment to the Murray-Darling Basin are included in this third phase.

Funds continue to be provided to the fruit and vegetable, dairy-lucerne-pasture, and cotton and grains industries to support agreed proposals for efficiency of water use. RWUEI includes three new industry groups in production nurseries, turf and cut flowers. The industry proposals will concentrate mainly on farm management systems, extension and adoption activities, and limited financial incentives to be made available to water users by some of the industries.

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

The Environmental Protection Agency and Queensland Rural Adjustment Authority provide financial support for water-efficiency programs aimed at innovative measures for water savings and water-efficiency outcomes.

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

7.2 Stream Flow and Water Use Overview

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

The Queensland section of the Murray-Darling Basin has again recorded below average rainfall across the area generally and near record lows in many areas. The only near average rainfall recorded occurred in the October to December (2005) period though the intensity was variable and did not result in any significant runoff. All catchments recorded passing flows well below long-term average annual flow volumes, and most were amongst the lowest recorded. The western (Warrego and Paroo) catchments benefited from a slightly above average June 2006 rainfall event which generated flow in both streams.

The poor rainfall across the basin in early to mid-2005 saw most major 'in stream' storages entering the 2005/06 water year at or below 30% of storage capacity. The exception was Beardmore Dam on the Balonne River which was at around 75%. The fluctuations in percentage storage volumes in the relatively smaller weirs prevent any worthwhile comparison. The major storages have ended the year much as they started it – at or below 30% of storage capacity – with the exception of Coolmunda Dam (filled to 98.6% in December 05) which recorded a moderate increase to finish the year at 50%. Leslie Dam (at 11%) in the Upper Condamine remains at critical levels of supply for the fourth consecutive year.

The well below average rainfall in 2005/06 provided equally limited waterharvesting opportunity, and off-stream storages (ring tanks) generally started and finished the year near empty.

Overland flow storages also generally started and finished the year near empty. In both cases, some water was taken during the December/January period and used to save crops.

Stream flow during the year across the catchments has been uniformly low. There was little variability in flows as a consequence of a severe lack of runoff. Flow patterns within each catchment though are still proving variable from year to year with some western streams recording flows in the traditionally dry (winter) period

of the year and none during the (normally) wetter summer months. Flow information is summarised for each catchment below:

- Flows in the Border Rivers at Goondiwindi were around 30% of the long-term average of 827 GL. The flow in the lower section of the Border Rivers was supplemented by a 28 GL flow from the Weir River;
- Flows in the Condamine and Balonne were overall well below average and were only recorded in the period from October 2005 to January 2006. There were no flows recorded in the subsequent months through to September 2006. Twenty four GL was recorded passing Chinchilla Weir and only 123 GL through St George, i.e., around 10% of the long term average of 1150 GL;
- Flows in the Moonie River were amongst the lowest recorded and well below average with just 5 GL recorded at Fenton just upstream of the NSW border. This is around 3% of the long-term average annual flow through Fenton of 165 GL;
- Flows in the Nebine catchment were also limited and were under 40% of the average of 10 GL for the Wallam Creek part of the catchment;
- Flows in the Warrego River were also amongst the lowest recorded with less than 7% of the long-term average of 375 GL flowing past Cunnamulla; and
- Paroo River flows were equally limited with only 33 GL (around 6%) recorded past Caiwarro where the average annual volume of flow is 538 GL.

Flows and related waterharvesting are described in detail for the various valleys as follows.

7.3 Condamine-Balonne

7.3.1 Condamine

The Condamine River catchment area benefited from moderate rainfall in November 2005 which resulted in a number of flows and some opportunity for waterharvesting. Rainfall post January 2006 was extremely low and there were no significant flows recorded over this period.

Flows in the upper Condamine were limited with only 6 GL passing Warwick and 21 GL passing Cecil Weir during the year. In the central Condamine area, Chinchilla Weir filled twice during the year (early December 2005 and late January 2006). The Charleys Creek system contributed over 21 GL to the lower Condamine River in December 2005. This inflow point is immediately downstream of Chinchilla Weir. There was 24 GL recorded passing through Chinchilla for the year. Average annual flow is estimated at 587 GL at this point.

Waterharvesting diversions for the Condamine section (upstream of Nangram) are estimated at 15 GL. All diversion occurred in the period up to January 2006 with no diversion opportunity since that date.

The major storage for the Upper Condamine Water Supply Scheme, Leslie Dam, again fluctuated between 10% and 15% over this period. Despite the lack of storage, allocation water was made available from flows in the system during the summer events with approximately 13 GL of allocation water used. The usage for the year from the Chinchilla Weir Water Supply Scheme was just over 2 GL. The scheme started the year with a 25% announced allocation which was revised to 80% after the November/December 2005 inflow filled the storage. It filled again in mid-January though the announced allocation was not altered at this time.

The Gowrie/Oakey Creek system which is currently supplemented by Toowoomba City Council effluent discharge and hence displays a permanent baseflow supplied 50% of area-based irrigation diversion in the valley. Area-based

irrigation in this system totalled some 6.6 GL compared to the total Condamine area-based diversions of just over 13 GL.

The prolonged drought conditions have continued to affect water available from flows in the naturally flowing streams and from waterholes, principally on the western slopes of the Great Dividing Range, in this catchment. Many streams were subject to total irrigation bans throughout the 1st October 2005 to 30th September 2006 period.

Urban, industrial and stock use totalled nearly 6.6 GL.

7.3.2 Balonne

There was only one significant flow event in the Balonne during the year. Good rainfall in the Lower Condamine catchment and Upper Balonne areas in December 2005 followed on from lighter 'soaking' rainfall in the month preceding. This produced the only significant runoff event for the Balonne River for the year. The flow in December 2005 resulted in Beardmore Dam filling with waterharvesting allowed downstream. Some 123 GL passed St George with the flow peaking at around 14 GL/day.

Total diversion for waterharvesting for the year was 55 GL, 5 GL between Chinchilla (Nangram) and Beardmore storage, and 50 GL from Beardmore storage downstream.

Over 45 GL was passed downstream for stock, domestic and environmental needs.

Total flow through St George was 123 GL for the year. This is similar to last year's figure and well below the long-term average annual volume of flow at St George of 1152 GL.

The majority of the storage in Beardmore Dam is managed on an individual capacity share basis where users hold individual accounts with only smaller allocation holders managed on an announced allocation basis. Water availability was high for the year with total supplemented diversions of 69 GL, 58 GL of which was taken through the channel system.

There is very little area-based irrigation in the Balonne and diversions were limited to around 1.3 GL, mostly upstream of Beardmore Dam. Urban, industrial and stock usage is estimated at around 2.6 GL. No estimate is available for floodplain harvesting in the Balonne for this period.

7.4 Border Rivers/Macintyre Brook

While there were no major flow events in the Macintyre River during the reporting period, there were a number of small to moderate flows over the period from late-November 2005 to early-March 2006. Three of these flows reached a peak just over 7 GL/day at Goondiwindi. A total of 2.5 days of access was provided over the duration of these events.

Total waterharvesting within the Queensland section of the Border catchment was 50 GL. The Border catchment includes the Severn River, MacIntyre Brook (see details below) and Weir River catchments, and the Queensland portion of the Dumaresq/MacIntyre/Barwon system.

Total volume of flow through Goondiwindi for the year was 247 GL (852 GL average annual volume) with the Weir River contributing a further 28 GL (160 GL average annual volume at Talwood) to the system.

The Dumaresq Water Management Area operates on a continuous accounting arrangement rather than announced allocations. The major storage for this scheme, Glenlyon Dam near Stanthorpe, started the year at 23% capacity with 22 GL available for Queensland irrigators. Inflows in late November/early December 2005 and again in mid-January to mid-February 2006 increased capacity to over 29%. The storage finished the year at over 26% capacity. Approximately 50 GL or 61% of allocation was available for use during the year. Total water use by Queensland irrigators for the year was 58 GL including 8 GL transferred in from the Macintyre Brook system and an additional 12 GL of temporarily transferred water from NSW.

The major storage for the Macintyre Brook Water Supply Scheme, Coolmunda Dam near Inglewood, started the year at 36% capacity and 17% announced allocation. The announced allocation was revised to 34% in November 2005. The situation improved with dam capacity reaching over 70% and announced allocation revised to 95% following the inflows up to early December. The dam overtopped mid-December 2005 and the announced allocation was revised again to 100%. Water use for the Macintyre Brook Scheme was nearly 10 GL for the year of which 8.6 GL was transferred to the Border system.

The balance of diversions for the combined Border Rivers/Macintyre Brook catchments were made up of approximately 2.8 GL for area-based irrigation and nearly 4 GL for urban, industrial and stock. The current dry conditions have nearly halved the use for area-based irrigation (from last year's figures), the majority of which is in the Granite Belt at the upstream end of the catchment.

It is estimated that floodplain harvesting in Border Rivers/Macintyre Brook was approximately 6.6 GL, the majority of this (6.5 GL) occurring in the Border Rivers.

7.5 Moonie

The ROP for the Moonie catchment (with 1 July to 30 June water year) was finalised on 20 January 2006. As such this report is for the period 1 October 2005 to 30 June 2006.

The Moonie River experienced a number of small flows in the October 2005 to March 2006 period with no flow from March 2006 to end of June 2006. The volume passing the Fenton gauge during the period was 5 GL. This is less than 5% of the long-term average annual flow at this gauging station of 165 GL, and contrasts with the near average flows received over the last 2 years.

The small flows provided very limited opportunity for waterharvesting along the system. Estimated waterharvesting extraction for the period is 3 GL.

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

7.6 Nebine

Water use and flow figures for the Nebine catchment have previously been included in the Condamine and Balonne data. The ROP for the Warrego, Paroo Bulloo and Nebine catchment (with 1 July to 30 June water year) was finalised on 20 January 2006. As such this report is for the period 1 October 2005 to 30 June 2006.

The Nebine catchment consists of Nebine, Mungallala and Wallam Creeks. Streamflow is currently only recorded on Wallam Creek. A site for a new gauge on Nebine Creek is currently being investigated. There were a number of small flows recorded throughout the period. The total volume passing the Cardiff gauge during the period was less than 4 GL. This is a relatively new station and the average annual volume of flow is currently 10 GL, based on 5 years of record. This figure is likely to vary over time.

There is very limited waterharvesting, irrigation and overland flow development in the Nebine catchment.

7.7 Warrego

As for the Nebine catchment with the finalisation of the ROP and the change of water year, this report is for the period 1 October 2005 to 30 June 2006.

The Warrego River system's familiar summer flow pattern failed to eventuate this year.

Total flow recorded through the Cunnamulla gauge for the period was 25 GL compared to the average of 375 GL.

Waterharvesting diversion is estimated at less than 1 GL for the period into an estimated 13 GL of offstream storage.

The Cunnamulla Water Supply Scheme started the year with an announced allocation of 85% and this was revised to 100% following the flow in June 2006. Total diversion from the scheme was just under 2 GL out of a total entitlement of 2.6 GL.

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

7.8 Paroo

Again this report is for the period 1 October 2005 to 30 June 2006 to bring reporting into line with a new water year established through the ROP.

Flows in the Paroo were relatively small though well distributed throughout the period. Unlike the Warrego system, a number of small flows were recorded during the summer period though the peak flow recorded for the reporting period was in June at just over 2500 ML/day. Diversions since 1993/94 are given in **Table 6**.

Table 6: Water diversions in Queensland since 1993/94

<i>Year</i>	<i>Diversion (GL)</i>
2005/06	316
2004/05	392
2003/04	815
2002/03	214
2001/02	341
2000/01	688
1999/00	541
1998/99	608
1997/98	741
1996/97	467
1995/96	520
1994/95	176
1993/94	338

8. Review of 2005/06 Water Use in ACT

8.1 Review of Water Use in the ACT

Water storages supplying the Canberra and Queanbeyan urban water supply fell slightly over the year to just under 50% of capacity at the end of June 2006. Rainfall in Canberra (airport) was close to average but below average in the main water catchments. Demand management measures imposed to conserve the security of future supply in 2005/06 were continued throughout the year. Permanent water conservation measures were legislated in March 2006.

As a result of a hotter-than-average summer and water restrictions, use in the ACT was close to average during 2005/06. Extractions from storages for the urban supply were close to 59 GL, an increase on recent years with returns from sewage treatment plants slightly below recent years at 32 GL. Net urban consumption was 27 GL and non-urban consumption continues to be estimated at 5 GL giving a total net consumption of 32 GL. Consumption was significantly lower than would have been expected for the climatic conditions due to the continuing imposition of demand-management arrangements.

8.2 Progress of Water Reforms in the ACT

Water management in the ACT is implemented through the *Water Resources Act 1998*. The *Water Resources Act* was drafted after the introduction of the 1994 COAG water reforms and effectively implements the intent of 1994 COAG water reforms and almost all relevant aspects of the *National Water Initiative*. The Act will be reviewed in 2006/07 to ensure the ACT is able to fully comply with all *National Water Initiative* objectives. Interim rural allocations were made based on crop/area relationships and estimates with accuracy to be tested against metered use before confirmation. The continuing drought has delayed the finalisations of interim allocations and confirmation of metered information.

8.3 ACT Water Resources Strategy

In recognition of the importance of sustainable water management, the ACT Government released a water resources strategy, *Think water, act water*, in April 2004. The objectives of *Think water, act water* include the provision of a long-term, reliable source of water for the ACT and region, increasing the efficiency of water use, development and implementation of an integrated regional approach to ACT/New South Wales cross-border water supply and management, protection of water quality in the ACT rivers and down river and the incorporation of water-sensitive urban design principles into urban, commercial and industrial development.

The strategy includes demand reduction targets of 12% *per capita* by 2013 and 25% *per capita* by 2023 and increased use of reclaimed water from 5% to 20% by 2013.

Implementation of the Strategy is on target. Over \$1.1m has been provided to householders and businesses as subsidies or incentives to audit water use and or install water-efficient appliances. ACTEW has implemented the Cotter to Googong bulk water transfer scheme to improve the reliability of the existing water supply infrastructure. Water-sensitive Urban Design guidelines were released for community consultation prior to finalisation and implementation in 2006/07.

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 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 2005/06 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 Table that compared to the total volumes of water traded, the inter-valley trades in 2005/06 were small and the interstate trades were smaller. Permanent inter-valley trades will result in permanent changes to the valley Caps, usually calculated as the volume of entitlement traded multiplied by an agreed transfer factor. Temporary trades will alter the annual Cap targets, usually on a one-for-one basis. Trade will therefore affect the Caps for individual valleys but will not result in an increase in the overall Cap for the Basin.

Interstate water trading between New South Wales, Victoria and South Australia continued to develop in 2005/06. 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 2005/06

System	Permanent Entitlement Transfer				Temporary Entitlement Transfer				Adjustment to 2005/06 Cap Target for Temporary and unused Permanent Trade ² (ML)
	Total Permanent Entitlement Sold (ML)	Net Inter-valley trade Inwards excluding Inter-State Trade ³ (ML)	Net Inter-State Trade Inwards ³ (ML)	Future Adjustment to Cap from this year's Permanent Trade ¹ (ML)	Total Temporary Allocation Sold (ML)	Net Inter-valley trade Inwards excluding Inter-State Trade ³ (ML)	Net Inter-state Inwards ³ (ML)	Adjustment to 2005/06 Cap Target for Temporary Trade (ML)	
New South Wales									
Intersecting Streams	n/a	0	0	0	0	0	0	0	0
Border Rivers	n/a	0	0	0	11628	0	-11628	-11628	-11628
Gwydir	n/a	0	0	0	45326	0	0	0	0
Namoi/Peel	n/a	0	0	0	20888	0	0	0	0
Macquarie/Castlereagh/ Bogan	n/a	0	0	0	47380	0	0	0	0
Barwon-Darling	n/a	0	0	0	0	0	0	0	0
Lower Darling	n/a	0	0	0	21892	0	0	0	0
Lachlan	n/a	0	0	0	35838	0	0	0	0
Murrumbidgee	n/a	0	0	0	103437	-397	-5499	-5896	-5896
Murray	n/a	0	665	599	154417	397	2248	2645	3310
Total NSW	n/a	0	665	599	440806	0	-14879	-14879	-14214
Victoria⁴									
Goulburn	6313	-17842	0	-23016	114029	39194	8050	47244	n/a
Broken	128	0	0	0	1130	0	0	0	n/a
Loddon	5495	14	0	18	35498	8792	9608	18400	
Goulburn Broken Loddon	11936	-17828	0	-22998	150657	47986	17658	65644	66004
Campaspe	1228	-175	0	-226	28785	11176	7187	18363	0
Wimmera-Mallee	0	0	0	0	0	0	0	0	0
Kiewa	150	0	0	0	640	0	0	0	n/a
Ovens	153	0	0	0	1864	0	0	0	n/a
Murray	17732	18003	-2800	20704	172928	-59162	2899	-56264	n/a
Kiewa Ovens Murray	18035	18003	-2800	20704	175432	-59162	2899	-56264	-41061
Total Victoria	31199	0	-2800	-2520	354874	0	27743	27743	24943
South Australia									
Metro-Adelaide & Associated Country Areas ⁵	0	0	0	0	0	16000	0	16000	16000
Lower Murray Swamps	5540	-5540	0	-5540	1990	-2000	0	-2000	-7540
Country Towns	0	0	0	0	0	-8000	0	-8000	-8000
All Other Purposes	0	5540	2135	7461	47200	-6000	-24290	-30290	-22615
Total South Australia	5540	0	2135	1921	49190	0	-24290	-24290	-22155
Queensland									
Condamine and Balonne	0	0	0	0	11828	0	0	0	0
Border Rivers	0	0	0	0	3920	8605	11800	20405	20405
Macintyre Brook	0	0	0	0	10472	-8605	0	-8605	-8605
Moonie	0	0	0	0	0	0	0	0	0
Nebine	0	0	0	0	0	0	0	0	0
Warrego	3620	0	0	0	853	0	0	0	0
Paroo	0	0	0	0	0	0	0	0	0
Total Queensland	3620	0	0	0	27073	0	11800	11800	11800
Australian Capital Territory									
	0	0	0	0	0	0	0	0	0
Total Basin	40359	0	0	0	871943	0	374	374	375

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 2005/06

10.1 Water Availability

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

A key step in the process to implement the Cap is adjusting the States' allocation systems. To make Cap implementation more transparent, the water used in each valley has been compared with the quantity of water that has been allocated for use in that valley in 2005/06 (see **Table 11**).

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

10.1.1 Volumetric Allocations

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

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

10.1.2 Continuous Accounting

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

10.1.3 Allocation Transferred into Valley

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

10.1.4 Carryover from the Previous Year

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

10.2 Allocated Water

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

10.3 Access to Water Not in the Allocation System

10.3.1 Supplementary Access (Off-allocation) and Waterharvesting

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. In NSW, the off-allocation has been redesignated as supplementary access and requires separate licence.

Water-harvesting licences have been issued in most Queensland streams and are presently being converted into tradable water allocations. Irrigators with these licences are limited by their diversion capacity (pump size) and by the flow at which they can commence to pump. The total volume able to be pumped is also limited in those areas where a resource operations plan has been finalised. In September 2000, Queensland placed a moratorium on the construction of storages and other works to divert water from streams. The moratorium on the construction of further infrastructure effectively caps the volume of waterharvest water able to be taken in any particular event.

10.3.2 Area Licences on Unregulated Streams

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

10.3.3 Irrigation System Losses

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

10.4 Comparison of Use of Allocated Water with the Allocated Volume

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

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

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

working out this volume was too difficult, and an assumption was made that usage under these three categories equalled the volume authorised for use. This led to an overestimation of the utilisation of authorised water. This system has now been replaced with a new system of comparison of the use of allocated water with the volume of allocation. This gives a better measure of the degree of utilisation but covers only three quarters of the total diversion. The use percentages from 1997/98 to 2003/04 have been recalculated according to the new system. **Figure 7** shows the utilisation of allocations in the Basin since 1997/98.

The 2005/06 utilisation of 74% is fourth lowest since Cap accounting started in 1997/98. This appears a bit surprising given dry conditions continuing during 2005/06 and maybe partly due to tightening of allocation system. Some part of the Basin received average rains and as a consequence water availability improved, but that improvement in the resource availability

may have come too late to be utilised. Due to the continuing dry spell irrigators may be reluctant to carry risk and not planting in anticipation of improvement in water availability. This may partly explain comparatively low utilisation.

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

Figure 7. Utilisation of allocated water as percentage of the allocated volume since 1997/98

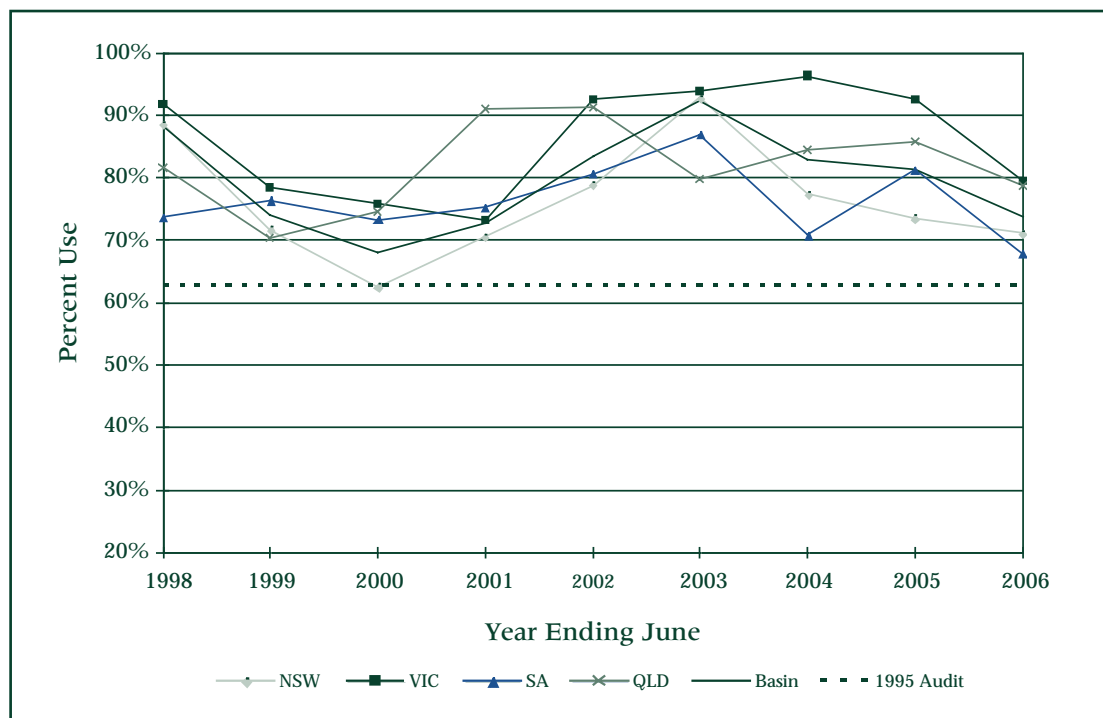


Table 8. Water Allocated in 2005/06

<i>System</i>	<i>Base Valley Water Entitlement¹ (GL)</i>	<i>Announced Allocation² (GL)</i>	<i>Net Carryover from 2004/05 (GL)</i>	<i>Water available under continuous accounting³ (GL)</i>	<i>Allocation Transferred into Valley⁴ (GL)</i>	<i>Total Allocated Water in Valley⁶ (GL)</i>
New South Wales						
Intersecting Streams	17	0	0	0	0	0
Border Rivers ³	293	117	116	233	-12	221
Gwydir ³	754	134	127	261	0	261
Namoi/Peel ³	551	126	94	219	0	219
Macquarie/Castlereagh/ Bogan	777	320	60	-	0	380
Barwon-Darling	524	0	0	-	0	0
Lower Darling	348	98	0	-	0	98
Lachlan	708	182	5	-	0	187
Murrumbidgee	3015	1814	330	-	-6	2138
Murray	2523	1477	554	-	3	2034
Total NSW	9511	4267	1286	713	-14	5539
Victoria						
Goulburn	703	703	0	-	29	733
Broken	45	63	0	-	0	63
Loddon	292	292	0	-	18	311
Campaspe	285	259	0	-	18	278
Wimmera-Mallee	182	155	0	-	0	155
Kiewa	20	20	0	-	0	20
Ovens	63	63	0	-	0	63
Murray	1272	1567	0	-	-41	1526
Total Victoria	2861	3121	0	0	25	3146
South Australia						
Metro-Adelaide & Associated Country Areas ^{7,8}	130	249	0	-	16	265
Lower Murray Swamps	66	66	0	-	-8	59
Country Towns	50	50	0	-	-8	42
All Other Purposes	526	526	0	-	-23	503
Total South Australia	772	891	0	0	-22	869
Queensland						
Condamine and Balonne	127	22	0	98	0	120
Border Rivers	87	4	0	51	20	75
Macintyre Brook	19	19	0	0	-9	11
Moonie	0	0	0	0	0	0
Nebine	0	0	0	0	0	0
Warrego	3	3	0	0	0	3
Paroo	0	0	0	0	0	0
Total Queensland	236	48	0	149	12	209
Aust. Capital Territory⁹	0	0	0	0	0	0
Total Basin	13380	8327	1287	862	0	9763

1. Sum of the volumetric entitlements in valley (in NSW this is the sum of general and high security entitlements). Includes unregulated stream entitlements where these are expressed volumetrically (e.g. in Victoria).
2. The base entitlements multiplied, where appropriate, by the largest announced percentage allocation in the season. In NSW this includes high security entitlements. Includes allocation for high security entitlement.
3. In continuous accounting, individual accounts can accumulate up to a specified percentage of entitlements but use can be limited to a specified percentage of entitlements during a season.
4. Net temporary inter-valley entitlement transfer from **Table 7**.
5. Net Carryover from Previous Year (see **Table 9**).
6. Allocated water = announced allocation or permitted use under continuous accounting + inter-valley trade + net carryover from last season (in NSW the addition of high security entitlements are also included).
7. Indicative average annual allocation from 5-year rolling total of 650 GL.
8. Volume that could be diverted before the 5-year Cap would be exceeded in 2005/06.
9. There is no formal entitlement in ACT to date.

Table 9. Carryovers for 2005/06

<i>System</i>	<i>Carryover from 2004/05 (GL)</i>	<i>Less Carryover Cancelled in 2005/06¹ (GL)</i>	<i>Less Overdraw used in 2004/05 (GL)</i>	<i>Plus Overdraw cancelled in 2005/06 (GL)</i>	<i>Plus Overdraw from 2006/07 (GL)</i>	<i>Net Carryover² for 2005/06 (GL)</i>
New South Wales						
Intersecting Streams	0	0	0	0	0	0
Border Rivers	116	0	0	0	0	116
Gwydir	127	0	0	0	0	127
Namoi/Peel	94	0	0	0	0	94
Macquarie/Castlereagh/Bogan	60	0	0	0	0	60
Barwon-Darling	0	0	0	0	0	0
Lower Darling	0	0	0	0	0	0
Lachlan	5	0	0	0	0	5
Murrumbidgee	145	0	0	0	1853	330
Murray	455	0	0	0	993	554
Total NSW	1002	0	0	0	284	1286
Victoria						
Goulburn	0	0	0	0	0	0
Broken	0	0	0	0	0	0
Loddon	0	0	0	0	0	0
Campaspe	0	0	0	0	0	0
Wimmera-Mallee	0	0	0	0	0	0
Kiewa	0	0	0	0	0	0
Ovens	0	0	0	0	0	0
Murray	0	0	0	0	0	0
Total Victoria	0	0	0	0	0	0
South Australia						
Metro-Adelaide & Associated Country Areas	0	0	0	0	0	0
Lower Murray Swamps	0	0	0	0	0	0
Country Towns	0	0	0	0	0	0
All Other Purposes	0	0	0	0	0	0
Total South Australia	0	0	0	0	0	0
Queensland						
Condamine and Balonne	0	0	0	0	0	0
Border Rivers	0	0	0	0	0	0
Macintyre Brook	1	1	0	0	0	0
Moonie	0	0	0	0	0	0
Nebine	0	0	0	0	0	0
Warrego	0	0	0	0	0	0
Paroo	0	0	0	0	0	0
Total Queensland	1	1	0	0	0	0
Aust. Capital Territory	0	0	0	0	0	0
Total Basin	1003	1	0	0	284	1287

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

Table 10. Use of Allocated Water in 2005/06

<i>System</i>	<i>Diversion from Valley (GL)</i>	<i>Diverted from other valleys (GL)</i>	<i>Less Supplementary Access & Water harvesting Use (GL)</i>	<i>Less Unregulated Stream Use not in Allocation (GL)</i>	<i>Less System Losses not in Allocation (GL)</i>	<i>Use of Allocated Water in Valley (GL)</i>
New South Wales						
Intersecting Streams	3	0	0	3	0	0
Border Rivers	152	0	23	18	0	111
Gwydir	230	0	78	11	0	141
Namoi/Peel	234	0	18	78	0	138
Macquarie/Castlereagh/Bogan	224	0	9	45	0	171
Barwon-Darling	157	0	0	157	0	0
Lower Darling	41	0	0	0	0	41
Lachlan	128	0	0	15	0	112
Murrumbidgee	2200	0	508	42	0	1650
Murray	1667	0	68	28	0	1572
Total NSW	5038	0	704	398	0	3936
Victoria						
Goulburn	1495	-600	0	0	238	657
Broken	29	0	0	0	4	25
Loddon	68	289	0	0	56	301
Campaspe	22	260	0	0	89	193
Wimmera-Mallee	75	10	0	0	54	31
Kiewa	4	0	0	0	0	4
Ovens	25	0	1	0	0	24
Murray	1549	38	0	0	321	1266
Total Victoria	3267	-3	1	0	763	2500
South Australia						
Metro-Adelaide & Associated Country Areas	74	0	0	0	0	74
Lower Murray Swamps	59	0	0	0	0	59
Country Towns	40	0	0	0	0	40
All Other Purposes	417	0	0	0	0	417
Total South Australia	590	0	0	0	0	590
Queensland						
Condamine and Balonne	186	0	82	13	0	91
Border Rivers	114	0	50	3	0	52
Macintyre Brook	11	0	0	0	0	19
Moonie	2	0	2	0	0	0
Nebine	0	0	0	0	0	0
Warrego	3	0	1	0	0	2
Paroo	0	0	0	0	0	0
Total Queensland	316	0	135	17	0	165
Aust. Capital Territory	32	0	0	0	0	0
Total Basin	9243	-3	840	415	763	7190

1. The volume of off-allocation water used and water harvested has been reported for NSW, Queensland and Victoria.
2. Unregulated stream entitlement in Victoria is included in the base entitlement.
3. 'System Losses not in Allocation' are losses in those irrigation systems where the entitlement is defined at the farm gate and losses in the distribution system are not covered by an entitlement.
4. The water allocated for Metro-Adelaide & Associated Country Areas in 2005/06 is based upon the usage in the previous four years against the five-year rolling total of 650 GL.

Table 11. Use of Valley Allocations in 2005/06

<i>System</i>	<i>Total Allocated Water in Valley³ (GL)</i>	<i>Use of Allocated Water in Valley (GL)</i>	<i>Use as a percentage of Total Allocation (%)</i>
New South Wales			
Intersecting Streams ¹	0	0	n/a
Border Rivers ¹	221	111	50%
Gwydir ¹	261	141	54%
Namoi/Peel ¹	219	138	63%
Macquarie/Castlereagh/Bogan	380	171	45%
Barwon-Darling ¹	0	0	n/a
Lower Darling ¹	98	41	42%
Lachlan	187	112	60%
Murrumbidgee	2138	1650	77%
Murray	2034	1572	77%
Total NSW	5539	3936	71%
Victoria			
Goulburn	733	657	90%
Broken	63	25	39%
Loddon	311	301	97%
Campaspe	278	193	70%
Wimmera-Mallee	155	31	20%
Kiewa	20	4	21%
Ovens	63	24	38%
Murray	1526	1266	83%
Total Victoria	3146	2500	79%
South Australia			
Metro-Adelaide & Associated Country Areas ²	265	74	28%
Lower Murray Swamps	59	59	100%
Country Towns	42	40	96%
All Other Purposes	503	417	83%
Total South Australia	869	590	68%
Queensland			
Condamine and Balonne ¹	120	91	76%
Border Rivers ¹	75	61	81%
Macintyre Brook ¹	11	11	100%
Moonie ¹	0	0	4%
Nebine ¹	0	0	n/a
Warrego ¹	3	2	68%
Paroo ¹	0	0	58%
Total Queensland	209	165	79%
Aust. Capital Territory	0	0	n/a
Total Basin	9763	7190	74%

1. The use of water not covered by allocations (e.g. water harvesting, off-allocations/ supplementary water, unregulated stream licenses) constitutes a large percentage of the use in these valleys.
2. The volume authorised for use for Metro-Adelaide & Associated Country Areas for 2005/06 is the amount that could be used before the 5-year Cap of 650 GL would be exceeded.
3. Allocated water from **Table 8**.

11. Comparison of Actual Flows with Natural Flows

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

The natural flows are estimated from computer modelling studies. Many of the river models are incomplete, or not yet modified, to allow these numbers to be readily calculated for 2005/06. **Table 12** presents the 2005/06 annual flow volumes recorded and the natural flows at a number of selected key sites within the Murray-Darling Basin, whilst the impact of development can be seen graphically in **Figure 8**.

Table 12. Comparison of 2005/06 Actual and Natural Annual Flows for Key Sites within the Murray-Darling Basin.

<i>System</i>	<i>Actual Flow (GL)</i>	<i>Natural Flow (GL)</i>	<i>Actual/Natural (%)</i>
Inter-Basin Transfers			
Snowy Mountain Scheme to Murrumbidgee River	81	0	-
Snowy Mountain Scheme to Murray River	622	0	-
Glenelg River Catchment to Wimmera-Mallee	n/a	n/a	-
Wannon River Catchment to Wimmera-Mallee	n/a	n/a	-
New South Wales Tributaries²			
Barwon River at Mungindi + Boomi River	n/a	n/a	n/a
Inflows to Gwydir Wetland	n/a	n/a	n/a
Gwydir System Outflows to Barwon River	n/a	n/a	n/a
Namoi System Outflows to Barwon River	n/a	n/a	n/a
Inflows to Macquarie Marshes	n/a	n/a	n/a
Macquarie/Castlereagh/Bogan Outflows	n/a	n/a	n/a
Darling River Inflows to Menindee Lakes	n/a	n/a	n/a
Lachlan River at Corrong	n/a	n/a	n/a
Lachlan River at Booligal	n/a	n/a	n/a
Murrumbidgee River at Balranald	n/a	n/a	n/a
Lower Darling River at Burtundy	n/a	n/a	n/a
Victorian Tributaries			
Kiewa River at Bandiana	792	796	99%
Ovens River at Wangaratta	1413	1419	100%
Goulburn River at McCoys Bridge	470	1833	26%
Campaspe River at Rochester	9	40	22%
Loddon River at Appin South	5	61	8%
Wimmera River at Horsham	n/a	n/a	n/a
Queensland Tributaries			
Condamine and Balonne/Culgoa Flows at NSW Border	36	n/a	n/a
Macintyre River at Goondiwindi	244	n/a	n/a
Moonie River at Fenton	5	n/a	n/a
Warrego River at Cunnamulla	25	n/a	n/a
Paroo River at Caiwarro	33	n/a	n/a
River Murray			
Albury (Doctors Point)	4533	4435	102%
Downstream of Yarrawonga Weir	3998	n/a	n/a
Euston	3209	n/a	n/a
South Australian Border	2311	n/a	n/a
Barrages	782	n/a	n/a

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

Figure 8. Plots of Flows at Selected Sites Showing 2005/06 Actual and Natural (Modelled) Flows in Victoria

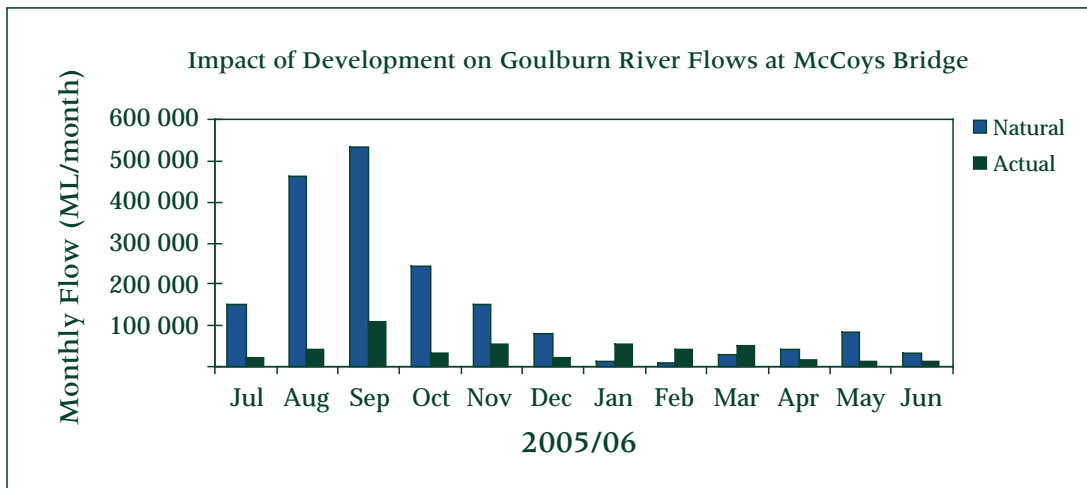
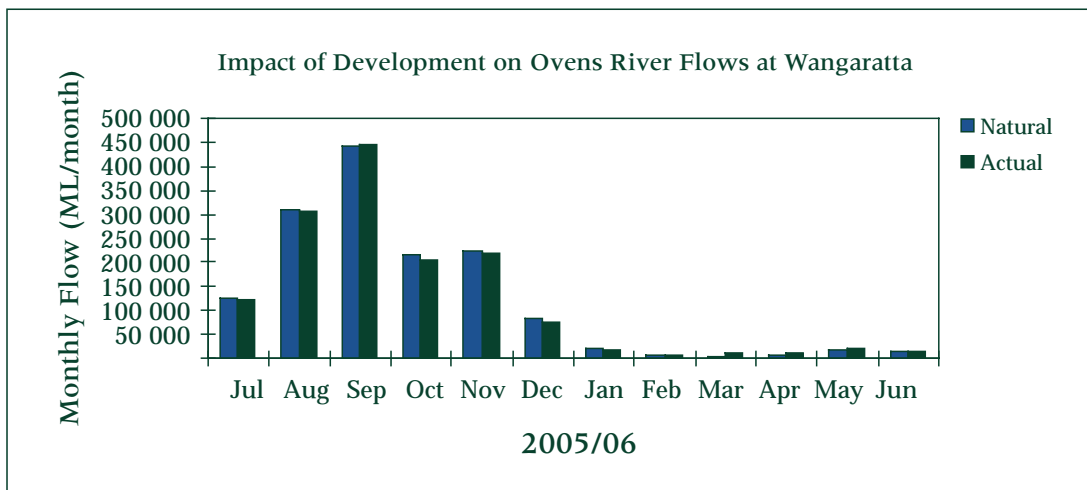
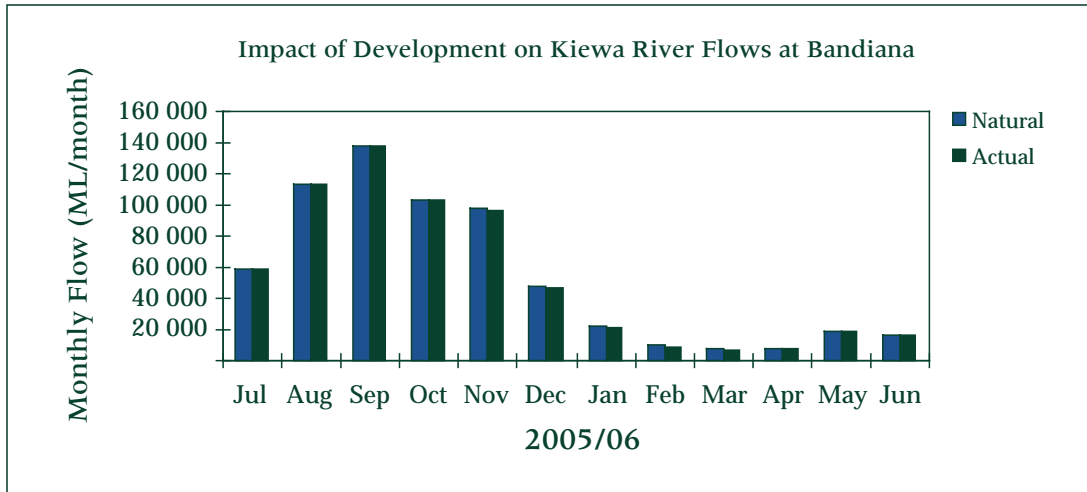
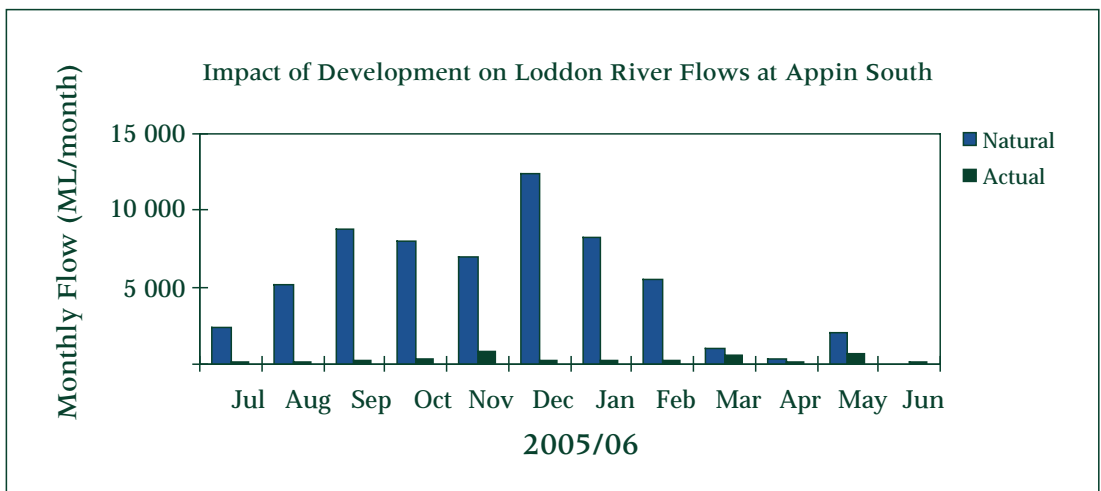
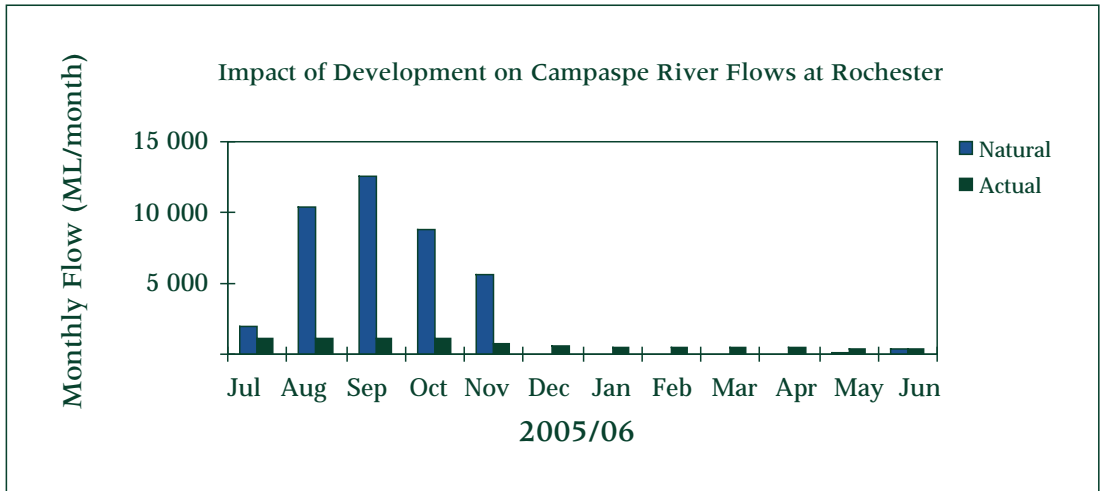


Figure 8. Plots of Flows at Selected Sites Showing 2005/06 Actual and Natural (Modelled) Flows in Victoria (continued)



12. Impoundments and Losses in Major On-Stream Storages

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

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

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

The impoundments and losses in major on-stream storages (above 10 GL capacity) within the Basin are reported in **Table 13**. The volumes reported indicate that the total volume in storage in the Basin in 2005/06 has increased from 7573 GL to 8753 GL (35% full). Total evaporative losses for major storages within the Basin were calculated by the respective States and are reported at 675 GL, representing 3% of total storage capacity and 7% of total diversion from the Basin. The total decrease in flow of 1855 GL due to impoundment and evaporative losses was 20% of total Basin diversion.

Table 13. Impoundments and Losses in Major On-Stream Storages (greater than 10 GL capacity) in 2005/06

Major On-Stream Storage		Completion Date	Storage Capacity (GL)	Volume of Storage at Beginning of Water Year (GL)	Volume of Storage at End of Water Year (GL)	Percentage of Storage Full at End of Year (%)	Increase in Volume of Storage (GL)	Evaporation Losses (GL)	Net Reduction in Flow due to Storage (GL)
Murray-Darling Basin Commission									
<i>Lower Darling</i>	Menindee Lakes ¹	1960	2050	330	269	13%	-61	164	103
<i>Murray</i>	Dartmouth Reservoir	1979	3906	1748	2527	65%	779	13	792
	Hume Reservoir	1936-61	3038	913	637	21%	-276	82	-194
	Lake Victoria	1928	677	345	415	61%	70	120	190
Total Murray-Darling Basin Commission			9671	3336	3848	40%	512	379	891
Snowy Mountains Scheme in Murray-Darling Basin									
<i>Murrumbidgee River Valley</i>	Jounama Pondage	1968	44	20	17	39%	-3	0	-3
	Talbingo Reservoir	1971	921	916	894	97%	-22	6	-16
	Tantangara Reservoir	1960	254	17	16	6%	-1	-0.09	-1
	Tumut Pondage	1958	53	12	15	28%	3	0	3
<i>Murray River Valley</i>	Geehi Reservoir	1966	21	18	14	66%	-4	0	-4
	Tooma Reservoir	1961	28	4	7	25%	3	0	3
	Khancoban Pondage	1965	22	9	12	56%	3	0	3
Total Snowy Mountains Scheme			1342	996	975	73%	-21	6	-15
Borders Rivers Commission									
<i>Border Rivers</i>	Glenlyon Dam	1976	254	61	71	28%	10	8	18
Total Border Rivers Commission			254	61	71	28%	10	8	18
New South Wales									
<i>Border Rivers</i>	Pindari Reservoir	1962-96	312	203	206	66%	3	7	10
<i>Gwydir</i>	Copeton Reservoir	1976	1364	324	333	24%	9	20	29
<i>Namoi/Peel</i>	Chaffey Reservoir	1979	62	27	24	39%	-3	4	1
	Keepit Reservoir	1960	423	109	76	18%	-32	20	-12
	Split Rock Reservoir	1987	397	109	79	20%	-31	7	-23

Table 13. Impoundments and Losses in Major On-Stream Storages (greater than 10 GL capacity) in 2005/06 (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>Macquarie/Castlereagh/Bogan</i>	Burrundong Reservoir	1967	1678	182	351	21%	169	26	195
	Windamere Reservoir	1984	368	127	109	30%	-18	0	-18
<i>Lachlan</i>	Carcoar Reservoir	1970	36	3	7	20%	4	0	4
	Lake Brewster	1952	153	3	5	3%	2	21	22
<i>Murrumbidgee</i>	Lake Cargelligo	1902	36	6	18	51%	13	0	13
	Wyangala Reservoir	1936-71	1220	87	251	21%	165	30	195
	Blowering Reservoir	1968	1631	287	872	53%	584	7	591
	Burrinjuck Dam	1907-56	1028	249	345	34%	97	5	102
	Tombullen Off-River Storage	1980	11	6	0	3%	-6	0	-6
	Hay Weir	1981	14	13	3	26%	-9	0	-9
Total NSW			8733	1735	2682	31%	947	147	1094
Victoria									
<i>Goulburn/Broken/Loddon</i>	Eildon Reservoir	1956	3390	942	748	22%	-194	-4	-197
	Lake Mokoan	1971	365	88	106	29%	18	40	59
<i>Campaspe</i>	Lake Nillahcootie	1967	40	34	23	58%	-11	0	-11
	Cairn Curran Reservoir	1956	148	21	8	5%	-13	2	-11
	Tullaroop Reservoir	1959	74	13	11	14%	-3	2	-1
	Lake Eppalock	1964	312	17	15	5%	-2	3	1
	Lauriston Reservoir	1941	20	14	11	57%	-2	1	-1
	Malmsbury Reservoir	1870	18	4	2	9%	-3	0	-2
	Upper Coliban Reservoir	1903	37	7	2	4%	-5	1	-4
<i>Wimmera-Mallee</i>	Lake Bellfield	1966	79	12	8	10%	-5	2	-3
	Lake Fyans	1916	18	4	3	14%	-2	3	1
	Lake Lonsdale	1903	65	0	0	0%	0	0	0
	Lake Taylor	1923	34	20	16	47%	-5	4	0
	Pine Lake	1928	62	0	0	0%	0	0	0
<i>Murray/Kiewa/Ovens</i>	Tooloondo Reservoir	1953	92	0	0	0%	0	0	0
	Wartook Reservoir	1887	29	19	12	42%	-7	9	3
	Rocky Valley Reservoir	1959	28	6	8	27%	2	0	2
	Lake Buffalo	1965	24	14	8	32%	-7	0	-7
	Lake William Hovell	1973	14	14	4	31%	-9	-1	-10
Total Victoria			4850	1229	983	20%	-246	64	-182
Queensland									
<i>Condamine and Balonne</i>	Beardmore Dam	1972	82	65	27	34%	-37	31	-6
	Chinchilla Weir	1974	10	5	4	36%	-1	5	4
	Cooby Dam	1942	21	6	7	35%	1	2	3
	Jack Taylor Weir	1953-59	10	9	8	76%	-1	4	2
	Leslie Dam	1985	106	13	12	12%	-1	5	4
<i>Macintyre Brook</i>	Coolmunda Dam	1968	75	25	33	44%	8	20	28
Total Queensland			304	123	92	30%	-31	67	36
Australian Capital Territory									
<i>Murrumbidgee</i>	Bendora Reservoir	1961	12	8	9	79%	1	1	2
	Corin Reservoir	1968	71	45	34	49%	-11	0	-11
	Googong Reservoir	1979	125	39	59	47%	19	3	22
Total ACT			207	92	102	49%	10	3	13
Total Basin			25362	7573	8753	35%	1180	675	1855

1. Menindee Lakes capacity revised based upon 2003 survey.

13. Groundwater use in the Basin

13.1 Context

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

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

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

13.2 Groundwater Data for 2005/06

The GTRG supplied the estimated data for sustainable yield (SY), allocation and usage of groundwater in 2005/06 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 1652 GL (note Victorian SY values

are not available). Out of this, 2115 GL was already allocated in 2005/06, which constituted 128% of SY. The total usage of groundwater in the Basin was 1149 GL, which was 54% of allocation and 70% of SY. The groundwater usage was 12% of surface water diversion in the Basin. This reinforces the fact that groundwater is an important resource in which there is a considerable scope for future development within the current allocation. A report by Sinclair Knight Merz (2003) estimated that there is strong linkage between groundwater use and surface water flows, with an average reduction in surface water flow of 600 ML for every 1000 ML of groundwater use. This highlights the importance of management of groundwater to the Cap on diversions.

13.3 Groundwater Use since 1999/00

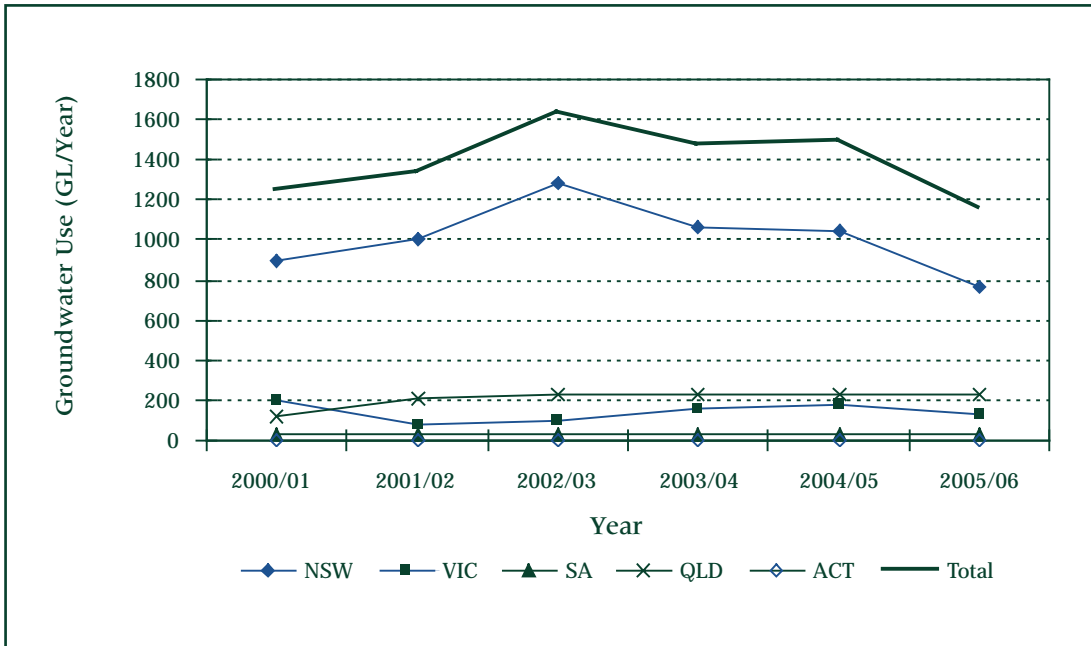
Figure 9 shows the use of groundwater in the Basin since 1999/00, when groundwater reporting started. It is evident from this figure that groundwater use has been steadily rising until 2002/03 and since then falling, though the continuing drought spell may suggest an increase in dependency on groundwater hence an increase in groundwater use. This is more likely due to deficiency in data rather than any physical reasons. Several factors account for this deficiency in data: including changes in groundwater systems names, their boundaries and policies for determining sustainable yield. The translation factors for converting groundwater data based upon GMUs to that based upon Cap valleys were worked out in 1999/00 based upon the GMU layer analysis facilitated by the data provided by National Land and Water Resources Audit that year. However, these translational factors have not been able to cope with the changes since then. So the groundwater data depicted in **Table 14** and **Figure 9** need to be viewed with extreme caution.

Table 14. Basin-wide groundwater data for 2005/06 aligned along the designated Cap valleys

<i>Designated River Valley System</i>	<i>Estimated Sustainable Yield (GL/yr)</i>	<i>2005/06 Allocation (GL)</i>	<i>2005/06 Use (GL)</i>	<i>Surface Water Use (GL)¹</i>
New South Wales				
Intersecting Streams	n/a	n/a	n/a	3
Border Rivers	36	7	6	152
Moonie	25	8	4	n/a
Gwydir	72	64	61	230
Namoi/Peel	197	212	165	234
Macquarie/Castlereagh/Bogan	160	183	67	224
Barwon-Darling	9	5	2	157
Lower Darling	n/a	n/a	n/a	41
Lachlan	388	400	192	128
Murrumbidgee	323	326	197	2200
Murray	136	288	68	1667
Total NSW²	1346	1493	762	5038
Victoria				
Goulburn/Broken/Loddon	n/a	218	71	1592
Campaspe	n/a	52	28	22
Wimmera-Mallee	n/a	13	7	75
Kiewa/Ovens/Murray	n/a	31	22	1578
Total Victoria ²	n/a	313	127	3267
South Australia				
South Australian Murray Basin ³	53	52	26	590
Total South Australia	53	52	26	590
Queensland				
Condamine and Balonne	220	232	220	186
Border Rivers	19	21	10	105
Macintyre Brook	n/a	1	1	19
Moonie	1	0	0	2
Nebine	0	0	0	0
Warrego	5	2	1	3
Paroo	n/a	0	0	0
Total Queensland²	245	256	232	316
Australian Capital Territory	7	1	1	32
Total Basin	1652	2115	1149	9243

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

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



14. Conclusion

The information and data contained within this report provides a comprehensive review of consumptive water use and management for the 2005/06 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 2005/06 was 9243 GL and groundwater use was 1149 GL.

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

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

The use of allocated water in the 2005/06 water year represents an utilisation of 74% of the water allocated throughout the Basin. This was fourth lowest utilisation since 1997/98.

The accuracy of diversion measurements remained static at $\pm 7\%$ in the 2005/06 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 and Queensland, 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 2005/06.

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 2005/06 increased from 7573 GL to 8753 GL (35% full). Total evaporative losses for major storages within the Basin were 675 GL, representing 3% of total storage capacity and 7% of total Basin diversion.

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

The groundwater information in 2005/06 was not completely available. Based upon the limited information, the allocation of groundwater in the Basin was 2115 GL and usage was 1149 GL.

Environmental releases of 512 GL were diverted to the Barmah-Millewa Forest in 2005/06.

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

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

Glossary

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

GL	Gigalitre: one thousand million or 10 ⁹ litres.
G-MW	Goulburn-Murray Water (of Victoria).
gravity districts	Districts which use gravity to divert the flow of water from the river.
high security entitlement	An entitlement which does not vary from year to year and is expected to be available in all but the worst droughts.
IAG	Independent Audit Group.
LV	Licensed Volume.
impoundment	The storage of water diverted from a water course.
irrigation	Supplying land or crops with water by means of streams, channels or pipes.
MDBC	Murray-Darling Basin Commission.
MDBMC	Murray-Darling Basin Ministerial Council.
Megalitre (ML)	One million or 10 ⁶ litres.
ML (ML)	One Mega (million) litres. One ML is approximately the volume of an Olympic swimming pool.
Ministerial Council, the	Murray-Darling Basin Ministerial Council.
Murray-Darling Basin Agreement	The Agreement between the Governments of the four Basin States and the Commonwealth. The current Agreement is the 1992 Agreement.
off-allocation	When unregulated tributary inflows or spills are sufficient to supply irrigation needs and downstream obligations.
on-farm storage	Privately owned storages used to harvest surplus flows or to store unused allocations for use in the following season.
overdraw	Water diverted in one season against a prospective allocation in the subsequent year.
overland flow	Water that runs off the land following rainfall, before it enters a watercourse, and floodwater that erupts from a watercourse or lake onto a floodplain.
permanent transfer	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.
private diverters	Licensed to operate privately owned pumps or diversion channels; includes river pumpers and diverters as well as town water supplies.
property right	In this context, the right to ownership of allocated volumes of water.

<i>RAMSAR wetland</i>	A wetland listed on the register of internationally significant wetlands established by the Convention at Ramsar.
<i>regulated streams/waterways</i>	Streams where users are supplied by releases from a storage. A water licence for a regulated stream specifies a base water entitlement defining the licence holder's share of the resources from a stream.
<i>riparian</i>	Of, inhabiting or situated on the bank and floodplain of a river.
<i>RIT</i>	Renmark Irrigation Trust.
<i>sales water</i>	In Victoria, water that may be purchased by an irrigator in addition to the basic water right. Access to sales water is announced each season as a percentage of water right, depending on the available resource.
<i>salinity</i>	The concentration of dissolved salts in groundwater or river water usually expressed in EC units.
<i>sleeper allocation</i>	An allocation that does not have a history of water usage.
<i>temporary transfer</i>	Water entitlements transferred on an annual basis.
<i>unregulated streams</i>	Streams that are not controlled or regulated by releases from major storages.
<i>utilisation</i>	The amount of water available for diversion that is actually diverted.
<i>water entitlement</i>	The legal right of a user to access a specified amount of water in a given period.
<i>waterharvesting</i>	The diversion of water from an unregulated stream in Queensland in which the access to water is defined by a diversion rate and a starting flow in the stream; and also a volumetric limit where resource operations plans have been implemented.
<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
New South Wales					
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	13017	8986	21934	7816
Lachlan	0	0	0	0	0
Murrumbidgee	-33444	-38022	-113650	-21416	31487
Murray	30207	6782	105811	-12898	-33387
Total NSW	2156	-19816	-2358	-20854	-2779
Victoria					
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
Total Victoria	14615	15192	-7103	-2404	-9589
South Australia					
Metro-Adelaide & Associated Country Areas	0	0	0	0	12000
Lower Murray Swamps	-3301	-4051	-5128	-5392	-4754
Country Towns	0	0	0	0	-12000
All Other Purposes	-13470	7632	12351	20617	10495
Total South Australia	-16771	3581	7223	15225	5741
Queensland¹					
Condamine and Balonne	0	0	0	0	0
Border Rivers / Macintyre Brook	0	1593	3505	8474	8695
Moonie	0	0	0	0	0
Nebine	0	0	0	0	0
Warrego	0	0	0	0	0
Paroo	0	0	0	0	0
Total Queensland¹	0	1593	3505	8474	8695
Australian Capital Territory¹					
	0	0	0	0	0
Total Basin	0	550	1267	441	2069

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

<i>System</i>	<i>2002/03</i>	<i>2003/04</i>	<i>2004/05</i>	<i>2005/06</i>
New South Wales				
Intersecting Streams	0	0	0	0
Border Rivers	-13499	-3403	-6368	-11628
Gwydir	0	0	0	0
Namoi/Peel	0	0	0	0
Macquarie/Castlereagh/Bogan	0	0	0	0
Barwon-Darling/Lower Darling	0	0	-1139	0
Lachlan	0	0	0	0
Murrumbidgee	-14489	-34708	8026	-5896
Murray	30768	34678	-1130	-576
Total NSW	2780	-3433	-611	-18100
Victoria				
Goulburn/Broken/Loddon Cap valley	-8243	-63323	-87232	2563
Campaspe	0	0	0	0
Wimmera-Mallee	750	700	-350	0
Murray/Kiewa/Ovens Cap valley	-13492	38626	65216	8823
Total Victoria	-20985	-23997	-22367	11386
South Australia				
Metro-Adelaide & Associated Country Areas	11000	9405	8360	16000
Lower Murray Swamps	-5434	-23131	-43458	-44989
Country Towns	-11000	-9405	-4750	-8000
All Other Purposes	10130	42251	56156	32294
Total South Australia	4696	19120	16308	-4695
Queensland¹				
Condamine and Balonne	0	0	0	0
Border Rivers / Macintyre Brook	13499	3495	6368	11628
Moonie	0	0	0	0
Nebine	0	0	0	0
Warrego	0	0	0	0
Paroo	0	0	0	0
Total Queensland¹	13499	3495	6368	11628
Australian Capital Territory¹	0	0	0	0
Total Basin	-9	-4816	-302	304

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

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

<i>System</i>	<i>1997/98</i>	<i>1998/99</i>	<i>1999/00</i>	<i>2000/01</i>	<i>2001/02</i>
New South Wales					
Intersecting Streams	n/a	n/a	n/a	n/a	n/a
Border Rivers	166	181	146	n/a	n/a
Gwydir	612	267	489	316	435
Namoi/Peel	325	308	336	331	326
Macquarie/Castlereagh/Bogan	400	590	448	578	588
Barwon-Darling/Lower Darling	266	472	292	449	187
Lachlan	424	324	270	397	448
Murrumbidgee	2518	2518	2038	2752	2606
Murray	1948	1956	1944	2085	1653
Total NSW	6660	6617	5964	6908	6243
Victoria					
Goulburn/Broken/Loddon Cap valley	1983	1653	1591	1677	1586
Campaspe	133	81	77	102	106
Wimmera-Mallee	n/a	n/a	n/a	n/a	n/a
Murray/Kiewa/Ovens Cap valley	1927	1847	1517	1866	1986
Total Victoria	4042	3582	3185	3645	3678
South Australia					
Metro-Adelaide & Associated Country Areas ¹	n/a	n/a	n/a	n/a	n/a
Lower Murray Swamps	100	99	98	98	99
Country Towns	50	50	50	50	38
All Other Purposes	416	450	444	465	448
Total South Australia²	566	599	592	613	585
Queensland					
Condamine and Balonne	n/a	n/a	n/a	n/a	n/a
Border Rivers / Macintyre Brook	n/a	n/a	n/a	n/a	n/a
Moonie	n/a	n/a	n/a	n/a	n/a
Nebine	n/a	n/a	n/a	n/a	n/a
Warrego	n/a	n/a	n/a	n/a	n/a
Paroo	n/a	n/a	n/a	n/a	n/a
Total Queensland	n/a	n/a	n/a	n/a	n/a
Australian Capital Territory	n/a	n/a	n/a	n/a	n/a
Total Basin	11268	10798	9741	11166	10506

1. See appendix E.

2. Excludes Metro Adelaide.

<i>System</i>	<i>2002/03</i>	<i>2003/04</i>	<i>2004/05</i>	<i>2005/06</i>
New South Wales				
Intersecting Streams	n/a	n/a	n/a	n/a
Border Rivers	n/a	n/a	n/a	n/a
Gwydir	419	149	253	367
Namoi/Peel	272	195	247	285
Macquarie/Castlereagh/Bogan	317	434	355	420
Barwon-Darling/Lower Darling	112	219	114	193
Lachlan	243	91	60	167
Murrumbidgee	2153	1899	1429	2451
Murray	553	1627	1621	1816
Total NSW	4069	4615	4081	5700
Victoria				
Goulburn/Broken/Loddon Cap valley	1001	1618	1650	1571
Campaspe	85	80	80	57
Wimmera-Mallee	n/a	n/a	n/a	n/a
Murray/Kiewa/Ovens Cap valley	1976	1522	1665	1615
Total Victoria	3061	3221	3395	3243
South Australia				
Metro-Adelaide & Associated Country Areas ¹	n/a	n/a	n/a	n/a
Lower Murray Swamps	98	80	60	59
Country Towns	39	41	45	42
All Other Purposes	478	509	469	457
Total South Australia²	616	630	574	558
Queensland				
Condamine and Balonne	n/a	n/a	n/a	n/a
Border Rivers / Macintyre Brook	n/a	n/a	n/a	n/a
Moonie	n/a	n/a	n/a	n/a
Nebine	n/a	n/a	n/a	n/a
Warrego	n/a	n/a	n/a	n/a
Paroo	n/a	n/a	n/a	n/a
Total Queensland	n/a	n/a	n/a	n/a
Australian Capital Territory	n/a	n/a	n/a	n/a
Total Basin	7746	8465	8050	9501

1. See appendix E.

2. Excludes Metro Adelaide.

Appendix C: Cap Register – Annual Diversions (GL)

<i>System</i>	<i>1997/98</i>	<i>1998/99</i>	<i>1999/00</i>	<i>2000/01</i>	<i>2001/02</i>
New South Wales					
Intersecting Streams	n/a	n/a	n/a	n/a	n/a
Border Rivers	202	182	197	247	198
Gwydir	532	306	448	424	462
Namoi/Peel	303	317	343	353	359
Macquarie/Castlereagh/Bogan	442	396	437	522	597
Barwon-Darling/Lower Darling	266	428	260	487	202
Lachlan	429	293	301	423	457
Murrumbidgee	2585	2505	1875	2747	2348
Murray	1890	2000	1234	2070	2113
Total NSW	6649	6427	5095	7274	6737
Victoria					
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
Total Victoria	3932	3731	3299	3491	3834
South Australia					
Metro-Adelaide & Associated Country Areas	153	153	139	104	82
Lower Murray Swamps	100	99	98	98	99
Country Towns	35	36	37	38	36
All Other Purposes	375	400	368	421	403
Total South Australia	663	689	642	661	620
Queensland					
Condamine and Balonne	545	467	366	360	162
Border Rivers / Macintyre Brook	186	123	163	288	170
Moonie	8	8	8	31	6
Nebine	n/a	n/a	n/a	n/a	n/a
Warrego	2	10	3	9	10
Paroo	0	0	0	0	0
Total Queensland	741	609	541	688	348
Australian Capital Territory					
	44	23	27	34	36
Total Basin	12029	11479	9603	12148	11575

<i>System</i>	<i>2002/03</i>	<i>2003/04</i>	<i>2004/05</i>	<i>2005/06</i>
New South Wales				
Intersecting Streams	n/a	n/a	3	3
Border Rivers	137	119	124	152
Gwydir	238	170	165	230
Namoi/Peel	294	173	190	234
Macquarie/Castlereagh/Bogan	411	219	102	224
Barwon-Darling/Lower Darling	127	293	186	199
Lachlan	253	59	36	128
Murrumbidgee	1793	1776	1616	2200
Murray	879	1311	1241	1667
Total NSW	4132	4120	3664	5038
Victoria				
Goulburn/Broken/Loddon Cap valley	1076	1596	1553	1592
Campaspe	74	73	40	22
Wimmera-Mallee	63	70	53	75
Murray/Kiewa/Ovens Cap valley	1744	1472	1491	1578
Total Victoria	2957	3210	3137	3267
South Australia				
Metro-Adelaide & Associated Country Areas	165	82	72	74
Lower Murray Swamps	98	80	60	59
Country Towns	39	35	39	40
All Other Purposes	434	413	453	417
Total South Australia	736	611	623	590
Queensland				
Condamine and Balonne	123	575	167	186
Border Rivers / Macintyre Brook	78	204	192	125
Moonie	6	26	23	2
Nebine	n/a	n/a	n/a	0
Warrego	7	11	11	3
Paroo	0	0	0	0
Total Queensland	214	815	392	316
Australian Capital Territory	40	28	27	32
Total Basin	8080	8784	7844	9243

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

<i>System</i>	<i>Long Term Cap</i>	<i>Schedule F Trigger</i>	<i>1997/98</i>	<i>1998/99</i>	<i>1999/00</i>	<i>2000/01</i>	<i>2001/02</i>
New South Wales							
Intersecting Streams	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Border Rivers	n/a	n/a	-36	-1	-51	n/a	n/a
Gwydir	344	-69	80	-39	42	-108	-27
Namoi/Peel	264	-53	22	-9	-7	-22	-33
Macquarie/Castlereagh/Bogan	424	-85	-42	195	11	57	-9
Barwon-Darling/Lower Darling	310	-62	0	44	31	-38	-15
Lachlan	319	-64	-5	31	-30	-27	-9
Murrumbidgee	2299	-460	-67	13	163	5	258
Murray	1896	-379	59	-44	710	15	-460
Total NSW	5856	-1171	11	190	869	-118	-295
Victoria							
Goulburn/Broken/Loddon Cap valley	2035	-407	74	-45	38	109	-115
Campaspe	125	-25	37	5	4	-10	-18
Wimmera-Mallee	162	-32	n/a	n/a	n/a	n/a	n/a
Murray/Kiewa/Ovens Cap valley	1695	-339	184	43	-39	154	70
Total Victoria	4017	-803	295	4	2	252	-63
South Australia							
Metro-Adelaide & Associated Country Areas ¹	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 Purposes	441	-88	41	50	76	43	45
Total South Australia	594	-119	56	64	89	56	47
Queensland							
Condamine and 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
Nebine	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
Total Queensland	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Australian Capital Territory	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Total Basin	10467	2093	361	258	961	190	-310

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

<i>System</i>	<i>Long Term Cap</i>	<i>Schedule F Trigger</i>	<i>2002/03</i>	<i>2003/04</i>	<i>2004/05</i>	<i>2005/06</i>
New South Wales						
Intersecting Streams	n/a	n/a	n/a	n/a	n/a	n/a
Border Rivers	n/a	n/a	n/a	n/a	n/a	n/a
Gwydir	344	-69	181	-20	88	137
Namoi/Peel	264	-53	-21	22	57	51
Macquarie/Castlereagh/Bogan	424	-85	-94	215	253	196
Barwon-Darling/Lower Darling	310	-62	-15	-73	-72	-6
Lachlan	319	-64	-10	32	24	40
Murrumbidgee	2299	-460	359	123	-187	251
Murray	1896	-379	-326	316	381	148
Total NSW	5856	-1171	75	614	544	817
Victoria						
Goulburn/Broken/Loddon Cap valley	2035	-407	-75	23	97	-21
Campaspe	125	-25	10	8	40	36
Wimmera-Mallee	162	-32	n/a	n/a	n/a	n/a
Murray/Kiewa/Ovens Cap valley	1695	-339	231	50	174	37
Total Victoria	4017	-803	167	80	311	51
South Australia						
Metro-Adelaide & Associated Country Areas ¹	n/a	n/a	n/a	n/a	n/a	n/a
Lower Murray Swamps	-104	-21	0	0	0	0
Country Towns	50	-10	0	5	7	2
All Other Purposes	441	-88	44	95	15	40
Total South Australia	594	-119	44	101	22	42
Queensland						
Condamine and Balonne	n/a	n/a	n/a	n/a	n/a	n/a
Border Rivers / Macintyre Brook	n/a	n/a	n/a	n/a	n/a	n/a
Moonie	n/a	n/a	n/a	n/a	n/a	n/a
Nebine	n/a	n/a	n/a	n/a	n/a	n/a
Warrego	n/a	n/a	n/a	n/a	n/a	n/a
Paroo	n/a	n/a	n/a	n/a	n/a	n/a
Total Queensland	n/a	n/a	n/a	n/a	n/a	n/a
Australian Capital Territory	n/a	n/a	n/a	n/a	n/a	n/a
Total Basin	10467	2093	286	795	877	911

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

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

<i>System</i>	<i>Long Term Cap</i>	<i>Schedule F Trigger</i>	<i>1997/98</i>	<i>1998/99</i>	<i>1999/00</i>	<i>2000/01</i>	<i>2001/02</i>
New South Wales							
Intersecting Streams	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Border Rivers	n/a	n/a	-36	-38	-89	n/a	n/a
Gwydir	344	-69	80	42	83	-25	-51
Namoi/Peel	264	-53	22	13	7	-15	-48
Macquarie/Castlereagh/Bogan	424	-85	-42	153	164	221	212
Barwon-Darling/Lower Darling	310	-62	0	44	76	37	22
Lachlan	319	-64	-5	26	-5	-31	-41
Murrumbidgee	2299	-460	-67	-54	109	113	372
Murray	1896	-379	59	15	725	741	280
Total NSW	5856	-1171	11	201	1070	1041	746
Victoria							
Goulburn/Broken/Loddon Cap valley	2035	-407	74	29	66	175	60
Campaspe	125	-25	37	43	46	36	18
Wimmera-Mallee	162	-32	n/a	n/a	n/a	n/a	n/a
Murray/Kiewa/Ovens Cap valley	1695	-339	184	228	189	342	412
Total Victoria	4017	-803	295	299	301	553	490
South Australia							
Metro-Adelaide & Associated Country Areas ¹	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 Purposes	441	-88	41	91	167	210	255
Total South Australia	594	-119	56	119	209	264	312
Queensland							
Condamine and 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
Nebine	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
Total Queensland	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Australian Capital Territory	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Total Basin	10467	2093	361	619	1580	1858	1548

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

<i>System</i>	<i>Long Term Cap</i>	<i>Schedule F Trigger</i>	<i>2002/03</i>	<i>2003/04</i>	<i>2004/05</i>	<i>2005/06</i>
New South Wales						
Intersecting Streams	n/a	n/a	n/a	n/a	n/a	n/a
Border Rivers	n/a	n/a	n/a	n/a	n/a	n/a
Gwydir	344	-69	130	110	198	335
Namoi/Peel	264	-53	-70	-48	9	60
Macquarie/Castlereagh/Bogan	424	-85	118	333	585	782
Barwon-Darling/Lower Darling	310	-62	7	-66	-137	-143
Lachlan	319	-64	-50	-18	6	46
Murrumbidgee	2299	-460	731	854	667	918
Murray	1896	-379	-46	270	650	799
Total NSW	5856	-1171	821	1435	1979	2796
Victoria						
Goulburn/Broken/Loddon Cap valley	2035	-407	-15	8	105	83
Campaspe	125	-25	28	36	76	112
Wimmera-Mallee	162	-32	n/a	n/a	n/a	n/a
Murray/Kiewa/Ovens Cap valley	1695	-339	643	693	868	905
Total Victoria	4017	-803	657	738	1048	1100
South Australia						
Metro-Adelaide & Associated Country Areas ¹	n/a	n/a	n/a	n/a	n/a	n/a
Lower Murray Swamps	-104	-21	0	0	0	0
Country Towns	50	-10	56	61	68	70
All Other Purposes	441	-88	299	395	410	450
Total South Australia	594	-119	356	456	478	520
Queensland						
Condamine and Balonne	n/a	n/a	n/a	n/a	n/a	n/a
Border Rivers / Macintyre Brook	n/a	n/a	n/a	n/a	n/a	n/a
Moonie	n/a	n/a	n/a	n/a	n/a	n/a
Nebine	n/a	n/a	n/a	n/a	n/a	n/a
Warrego	n/a	n/a	n/a	n/a	n/a	n/a
Paroo	n/a	n/a	n/a	n/a	n/a	n/a
Total Queensland	n/a	n/a	n/a	n/a	n/a	n/a
Australian Capital Territory	n/a	n/a	n/a	n/a	n/a	n/a
Total Basin	10467	2093	1833	2629	3505	4416

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

Appendix F: Cap Register for Metropolitan Adelaide

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

	<i>2002/03</i>		<i>2003/04</i>		<i>2004/05</i>		<i>2005/06</i>	
<i>Designated River Valley and Cap</i>	Annual Diversion	Diversion - 5 Years to 2002/03	Annual Diversion	Diversion - 5 Years to 2003/04	Annual Diversion	Diversion - 5 Years to 2004/05	Annual Diversion	Diversion - 5 Years to 2005/06
South Australia Metro-Adelaide & Associated Country Areas ¹ (rolling 5-year Cap is 650 GL)	165	642	82	572	72	504	74	475

1. Metro Adelaide has a five-year rolling Cap of 650 GL and does not accumulate credit. Temporary trades of 12 GL in 2001/02, 11 GL during 2002/03, 9.4 GL during 2003/04, 8.4 GL during 2004/05 and 16 GL during 2005/06 were allowed as an interim measure to maintain diversions within Cap increasing the 5-year rolling Cap to 707 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 2005/06 is shown in the following table.

<i>State</i>	<i>Opening Account Balance (GL)</i>	<i>Borrow by Water users (GL)</i>	<i>New Allocation this year¹ (GL)</i>	<i>Account Spills² (GL)</i>	<i>Usage of Allocation this year (GL)</i>	<i>Pay back by Water users (GL)</i>	<i>Closing Account Balance³ (GL)</i>	<i>Additional Release this year⁴ (GL)</i>	<i>Total Release this year (GL)</i>
NSW	225	225	75	0	256	225	44	0	256
Victoria	175	175	75	0	256	175	-6	0	256
TOTAL	400	400	150	0	512	400	38	0	512

1. Comprises 50 GL high security plus 25 GL low security when Victorian irrigation allocations reaching 100% water right plus 30% sales.
2. 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.
3. 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.
4. From other allocations e.g. NSW Murray Environmental Allocation and Victorian Murray Wetlands Environmental Allocation.

Lined area for notes or data entry.

