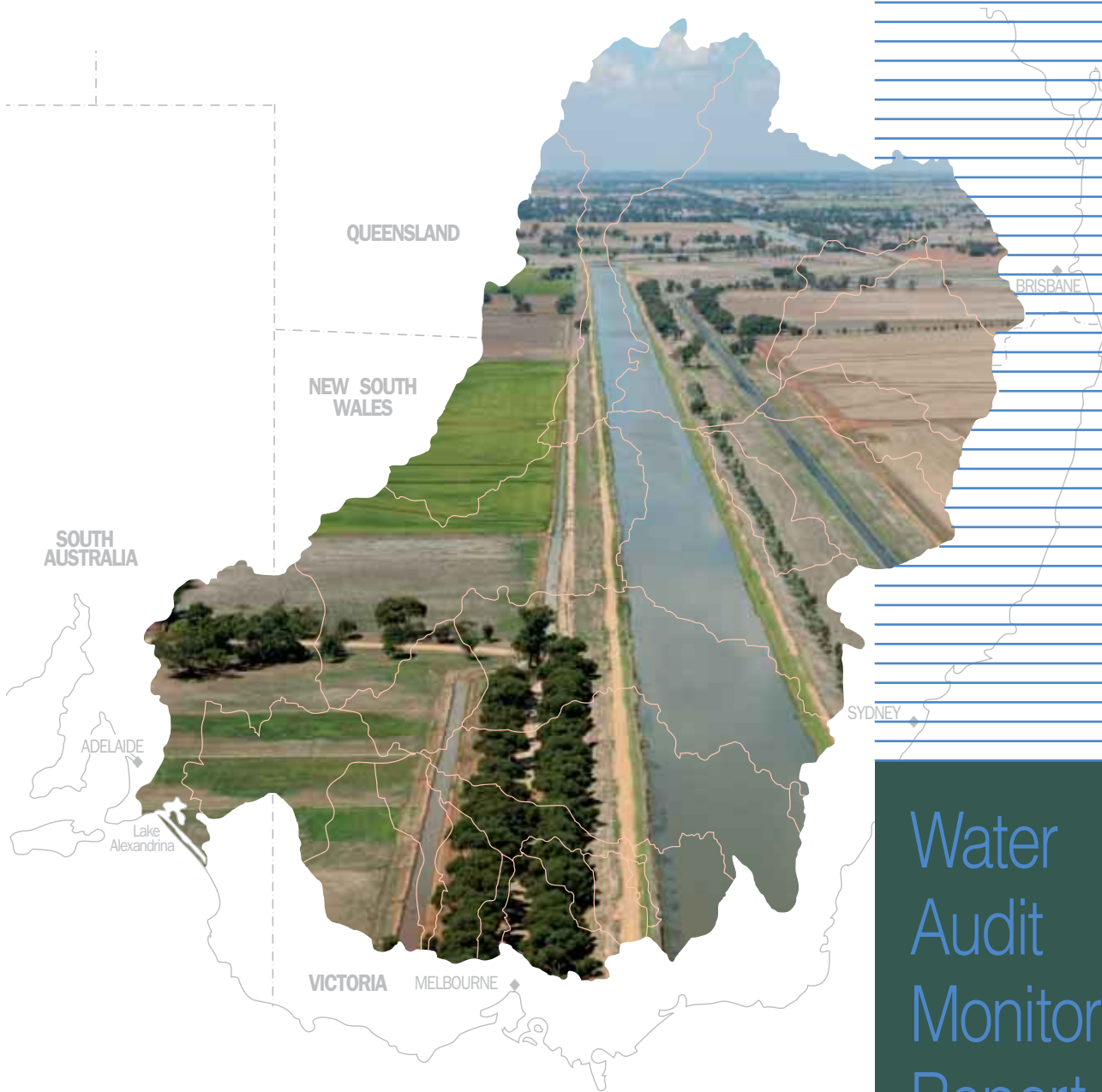


Water Audit Monitoring Report 2000/01

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



Water
Audit
Monitoring
Report
2000/01

September 2002

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 2000/01

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Murray-Darling Basin
Commission on the Cap
on Diversions*

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2000/01*

S E P T E M B E R 2 0 0 2

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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 an Water Audit Monitoring Report should be produced and published annually.

This report outlines the water usage within the Murray-Darling Basin for the 2000/01 water year, as per the requirements of Schedule F of the *Murray-Darling Basin Agreement*.

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

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

In addition to detailing water use, this report also contains information on the States implementation of management rules in designated river valleys that impact on water

use within the Basin. Each State has provided a description of their major activities occurring in 2000/01 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 as per the requirements of Schedule F and Barmah Millewa Forest environmental diversions, are reported in Appendix A – E and Appendix F, respectively.

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

Table 1. 2000/01 Cap Compliance by State

State / Territory	2000/01 Cap Compliance
New South Wales	
Border Rivers	An IQQM (Interim) model yet to be audited and approved by the Commission is available to determine the Cap compliance. The IAG could not audit, the NSW Border Rivers Cap as a Cap is yet to be defined. The Commission meeting 63 - 12 March 2002 directed NSW to submit a Cap proposal for the valley for assessment. The 2000/01 diversion was 248 GL.
Gwydir	An IQQM (Interim) model yet to be audited and approved by the Commission is available to determine the Cap compliance. No Cap target for the current year was available to compare the diversion against. Revised modelling of the 1999/00 water year has removed the need for a Ministerial statement on the Gwydir for that year as the results suggest that up to 1999/00 at least, the Cap had not been exceeded in that valley. The 2000/01 diversion was 425 GL.
Namoi/Peel	An IQQM (Interim) model yet to be audited and approved by the Commission is available to determine the Cap compliance for the Namoi. A climate-diversion relationship is available for Peel and an IQQM model is under development. The Namoi/Peel valley exceeded the Cap for 2000/01 and triggered Schedule F Special Audit provisions. A Special Audit by the IAG conducted in February 2002 confirmed the Cap exceedance. Subsequently, the Commission Meeting 63 – 12 March 2002 declared the Namoi/Peel valley in breach of Cap. The NSW Government is to report to the Council Meeting 32 – 1 November 2002 on proposed measures to bring diversions in the Namoi/Peel valley within Cap limits.
Macquarie/Castlereagh/Bogan	An IQQM (Interim) model yet to be audited and approved by the Commission is available to determine the Cap compliance. The 2000/01 diversion of 495 GL for the valley though was above its Cap target of 481 GL, but since 1997/98 the valley has a Cap credit.
Barwon-Darling/Lower Darling	The Council Meeting 29- 25 August 2000 decided to combine the Barwon Darling and Lower Darling into a single Designated River valley for Cap accounting purpose. An IQQM (interim) for the Barwon-Darling and MSM (interim) for the Lower Darling, both of which are yet to approved by the Commission, are available to determine the Cap compliance. The combined Barwon-Darling/Lower Darling Cap valley exceeded the Cap for 2000/01 and triggered Schedule F Special Audit provisions. A Special Audit by the IAG conducted in February 2002 confirmed the Cap exceedance. Subsequently, the Commission Meeting 63 – 12 March 2002 declared the combined Barwon-Darling/Lower Darling Cap valley in breach of Cap. The NSW Government is to report to the Council Meeting 32 – 1 November 2002 on proposed measures to bring diversions in the combined Barwon-Darling/Lower Darling Cap valley within Cap limits.
Lachlan	An IQQM model independently audited and recommended for approval by the Commission is available to determine the Cap compliance. The Lachlan valley exceeded the Cap for 2000/01 and triggered Schedule F Special Audit provisions. A Special Audit by the IAG conducted in February 2002 confirmed the Cap exceedance. Subsequently, the Commission Meeting 63 – 12 March 2002 declared the Lachlan valley in breach of Cap. The NSW Government is to report to the Council Meeting 32 – 1 November 2002 on proposed measures to bring diversions in the Lachlan valley within Cap limits.

Murrumbidgee An IQQM (Interim) model yet to be audited and approved by the Commission is available to determine the Cap compliance. The 2000/01 diversion of 2711 GL for the Murrumbidgee valley though was above its Cap target of 2652 GL, the cumulative debit in the valley did not exceed the 20% of the average long-term diversion trigger for the Special Audit.

Murray The MSM (Interim) model yet to be audited and approved by the Commission is available to determine the Cap compliance. The 2000/01 diversion of 2048 GL for the Murray valley was below its Cap of 2058 GL. The valley has a substantial cumulative Cap credit.

Victoria

Goulburn/ Broken/Loddon A computer model known as Goulburn Simulation model (GSM) which is yet to be audited and approved by the Commission is available to determine Cap compliance. The 2000/01 diversion of 1569 GL for the Goulburn/ Broken/Loddon system was within its Cap of 1631 GL and the valley is in credit.

Campaspe The GSM, which is yet to be audited and approved by the Commission, is available to determine the Cap compliance. The diversion of 113 GL for the Campaspe in 2000/01 was above its Cap target of 109 GL for the year. Despite this, the valley is still in cumulative credit.

Wimmera-Mallee An uncalibrated model is available. Though no Cap target for 2000/01 was available, the diversion of 98 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 2000/01 diversion of 1712 GL for the Murray/Kiewa/Ovens Cap valley though was above its Cap target of 1646 GL, but cumulatively the valley is still in credit.

South Australia

Metro-Adelaide & Associated Country Areas Metro-Adelaide & Associated Country Areas diversion was below the five-year rolling Cap up to and including 2000/01.

Lower Murray Swamps The 2000/01 diversion of 100 GL for the Lower Murray Swamp equalled its Cap of 100 GL for 2000/01.

Country Towns The 2000/01 diversion of 38 GL for Country Towns below the Cap target of 50 GL for 2000/01.

All Other Uses of Water from the River Murray The 2000/01 diversion of 421 GL for for the *All Other Uses of Water from the River Murray* was below its Cap target of 460 GL for 2000/01.

Queensland

Condamine/Balonne Queensland has not yet agreed to a Cap for the valley. A Cap model is also not yet available. The 2000/01 diversion was 360 GL.

Border Rivers/Macintyre Brook Queensland has not yet agreed to a Cap for the valley. A Cap model is also not yet available. The 2000/01 diversion was 288 GL.

Moonie Queensland has not yet agreed to a Cap for the valley. A Cap model is also not yet available. The 2000/01 diversion was 31 GL.

Warrego/Paroo Queensland has not yet agreed to a Cap for the valley. A Cap model is also not yet available. The 2000/01 diversion was 9 GL.

Australian Capital Territory

A Cap model is not yet available to determine Cap compliance. Negotiations are on to establish a Cap for the ACT and to establish a framework for trade between the ACT and New South Wales. The 2000/01 diversion was 34 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 10,800 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 instream uses of water in the rivers on the other. Council agreed that diversions in the Basin had to be capped. An Independent Audit Group (IAG) was appointed to report on the level at which diversions should be capped. In doing so the group took into account the equity issues between the States.

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

- For New South Wales and Victoria the Cap is the volume of water that would have been diverted under 1993/94 levels of development plus allowances in the Border Rivers for Pindari Dam (NSW) and in the Goulburn/Broken/Loddon system for Lake Mokoan (Victoria);
- For South Australia, highland irrigation diversions were capped at 90% of existing high security entitlements on licence in 1993/94. This represents a small increase in diversions over 1993/94 levels of development; and
- The Cap for Queensland would be determined after the independently audited Water Allocation and Management Planning (WAMP) and Water Management Planning (WMP) processes had been completed.

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

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

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

This report is a part of this ongoing Cap process. Given the major change in attitude to the

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

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

2.3 IAG Review of Cap Implementation 2000/01

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 2000/01 ('Review of Cap Implementation 2000/01', published by the Murray-Darling Basin Ministerial Council, March 2002, Canberra).

The present report represents the fifth in a series of annual reports and complements the report of the IAG, however the data presented herein are the final figures for the 2000/01 water year and supersede the data reported by the IAG. Most notably, the Murray-Darling Basin diversions in 2000/01 reported in the present report (Table 2) supersede those reported by the IAG in March 2002 (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 2000/01.

The figures indicate that Basin water use in 2000/01 was 12023 GL, representing the fifth highest on record (since 1983/84). Water use in South Australia was the fourth highest on record, Queensland the second highest, New South Wales the third highest, Victoria the twelfth

highest whilst diversions in the ACT were eighth highest on record.

Figure 1 shows the water use (by State) for the period 1983/84 – 2000/01 which enables a comparison of 2000/01 water use with that of previous years. Figure 2 shows the same data as Figure 1 but has the vertical axis re-scaled 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 2000/01

System	Irrigation Diversion (GL)	Other Diversion ¹ (GL)	Total Diversion (GL)
New South Wales²			
Border Rivers	247	0	248
Gwydir	425	0	425
Namoi/Peel	311	4	315
Macquarie/Castlereagh/Bogan	476	19	495
Barwon-Darling	239	3	242
Lower Darling	189	57	246
Lachlan	409	9	418
Murrumbidgee ⁴	2698	13	2711
Murray	1949	99	2048
Total NSW³	6943	204	7148
Victoria			
Goulburn	1414	37	1451
Broken	14	3	17
Loddon	94	8	101
Campaspe	78	35	113
Wimmera-Mallee	10	88	98
Kiewa	8	2	11
Ovens	14	10	23
Murray	1599	79	1678
Total Victoria	3230	261	3491
South Australia			
Metro-Adelaide & Associated Country Areas	0	04	104
Lower Murray Swamps ⁵	100	0	100
Country Towns	0	38	38
All Other Uses of Water from the River Murray	417	4	421
Total South Australia	517	146	662
Queensland²			
Condamine/Balonne	350	10	360
Border Rivers	270	3	273
Macintyre Brook	14	0	15
Moonie	30	0	31
Warrego	9	0	9
Paroo	0	0	0
Total Queensland⁶	674	14	688
Australian Capital Territory⁷	5	29	34
Total Basin	11369	654	12023

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 2000/01.
4. Murrumbidgee Valley diversions and Lowbidgee diversions are reported together.
5. Water use by Lower Murray Swamp irrigators is based on an estimate of water use. The metering of diversions is currently being implemented.
6. Floodplain diversions in Queensland of 72 GL are not included in valley totals.
7. ACT diversions are reported as a net figure. The primary usage in the ACT is for urban supply, which has a high return component (approximately 50%).

Figure 1. Murray-Darling Basin Diversions - 1983/84 to 2000/01

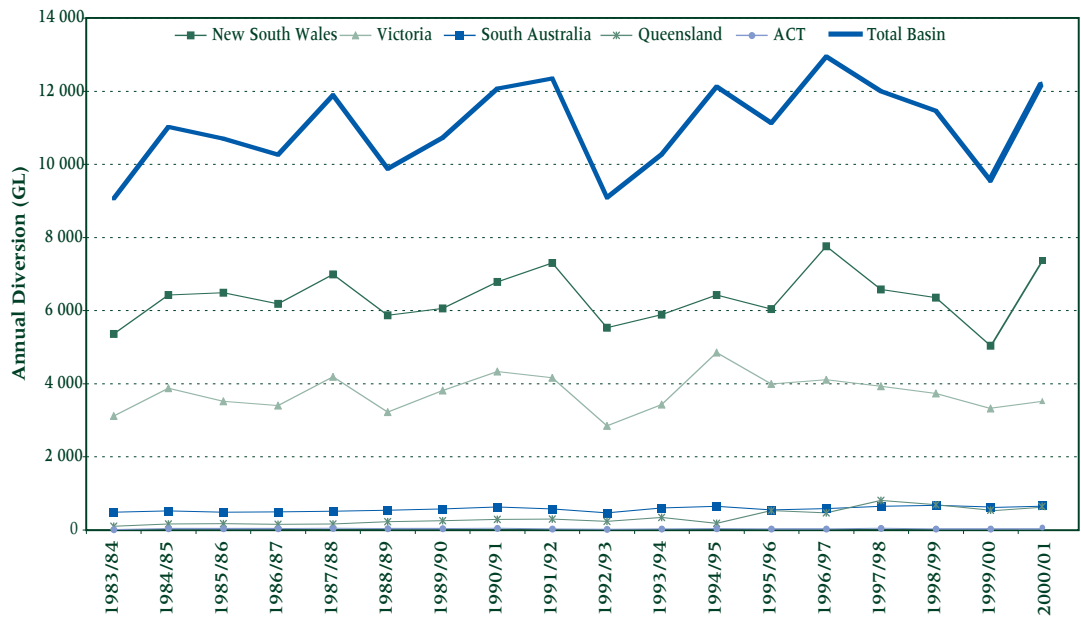
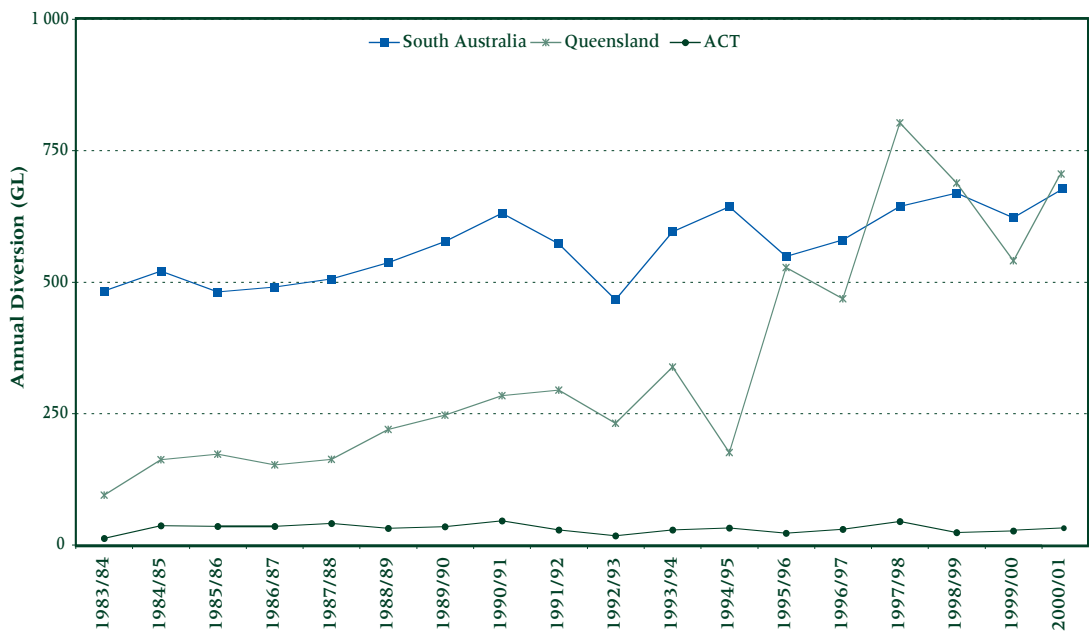


Figure 2. Murray-Darling Basin Diversions - 1983/84 to 2000/01 (usage under 1000 GL/yr)



3.2 Accuracy of Measurement

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

Table 3 outlines the confidence the States have in their diversion estimates as reported in Table 2. To develop the figures in Table 3, metered

diversions have been assumed to have an accuracy of $\pm 5\%$, regional surveys $\pm 20\%$ and user returns $\pm 40\%$.

Analysis of reported diversions for 1996/97 to 2000/01 indicates that the accuracy of measurement has remained at 7%.

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

Table 3. Accuracy of Diversion Estimates in 2000/01

System (GL)	Diversion \pm GL	Accuracy \pm %	Accuracy
New South Wales			
Border Rivers	248	19	8%
Gwydir	425	25	6%
Namoi/Peel	315	31	10%
Macquarie/Castlereagh/Bogan	495	37	8%
Barwon-Darling	242	24	10%
Lower Darling	246	12	5%
Lachlan	418	26	6%
Murrumbidgee	2711	178	7%
Murray	2048	101	5%
Total NSW	7148	454	6%
Victoria			
Goulburn	1451	80	6%
Broken	17	2	12%
Loddon	101	7	7%
Campaspe	113	6	5%
Wimmera-Mallee	98	5	5%
Kiewa	11	2	18%
Ovens	23	4	16%
Murray	1678	105	6%
Total Victoria	3491	212	6%
South Australia			
Metro-Adelaide & Associated Country Areas	104	5	5%
Lower Murray Swamps	100	40	40%
Country Towns	38	2	5%
All Other Uses of Water from the River Murray	421	25	6%
Total South Australia	662	72	11%
Queensland			
Condamine/Balonne	360	54	15%
Border Rivers	273	49	18%
Macintyre Brook	15	1	6%
Moonie	31	6	20%
Warrego	9	2	19%
Paroo	0	0	29%
Total Queensland	688	112	16%
Australian Capital Territory	34	3	10%
Total Basin	12023	853	7%

3.3 Climatic Overview 2000/01

• Rainfall

Figure 3 shows the rainfall deciles for July 2000 to June 2001 inclusive. Average rainfall was observed throughout most of the Basin. Above average rainfall was recorded in the north-eastern NSW valleys and in some isolated pockets in the centre of Queensland valleys, in Victoria near Victoria - NSW border and in South Australia on the western margin of the Basin. A very small area in the north-eastern NSW near Queensland - NSW border received very much above average rainfall. Below average rainfall was received in small isolated areas in north-west NSW and on the southern margin of the Basin in South Australia and Victoria.

Figure 4 shows the rainfall deciles for the period of November 2000 to April 2001 inclusive. Average rainfall was observed throughout most of the Basin. Above average rainfall was recorded in the north-eastern NSW and southern Queensland valleys and in some areas in south-central NSW and north-central Victoria. Very much above average rainfall was received in a small area in the north-eastern NSW near

Queensland - NSW border. A very small area near Queensland - NSW border received highest rainfall on record. Some areas in the north-west NSW and on the south west margin of the Basin in South Australia received below average rainfall.

• Temperature

Figure 5 shows the temperature anomaly (the difference between the recorded temperatures and the long-term average temperatures) for the period of July 2000 to June 2001 inclusive. Mildly higher (+0.5° - +1.0°C) than average temperature conditions were observed throughout most of the Basin for this period, although some areas in north-west NSW recorded temperatures 1.5°C above long-term average.

Figure 6 shows the temperature anomaly for the period of December 2000 to February 2001 inclusive (the primary irrigation season). Higher (+1.0° - +3.0°C) than average temperature conditions were observed throughout most of the Basin with some areas on NSW Queensland Border experiencing average temperature conditions.

Figure 3. Rainfall Deciles for the Murray-Darling Basin for the July 2000 to June 2001 Period

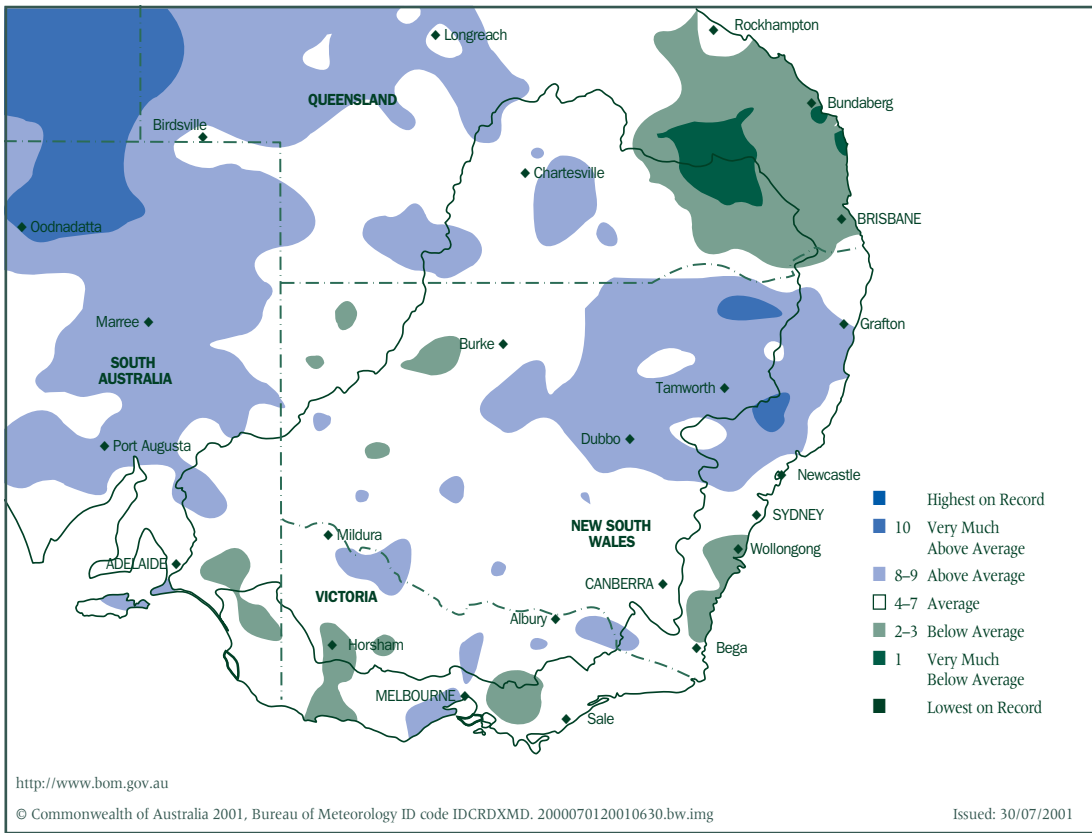


Figure 4. Rainfall Deciles for the Murray-Darling Basin for the November 2000 to April 2001 Period

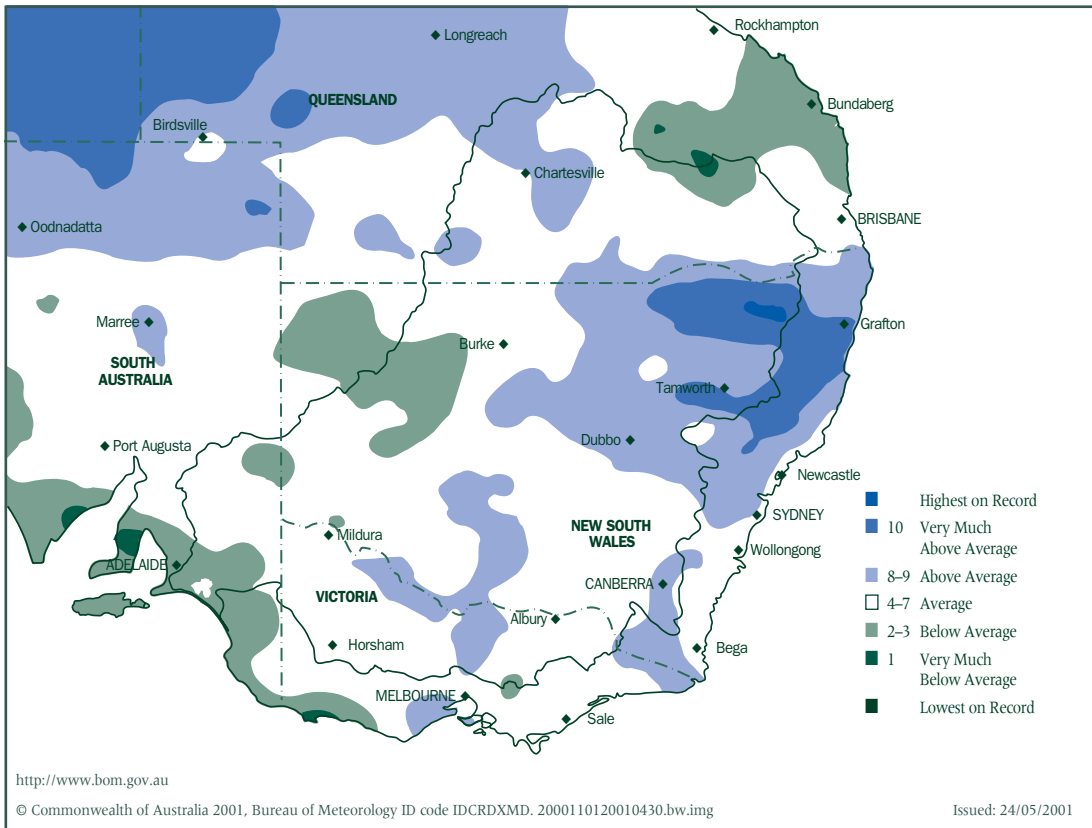


Figure 5. Temperature Anomaly for the 12 Month Period July 2000 to June 2001

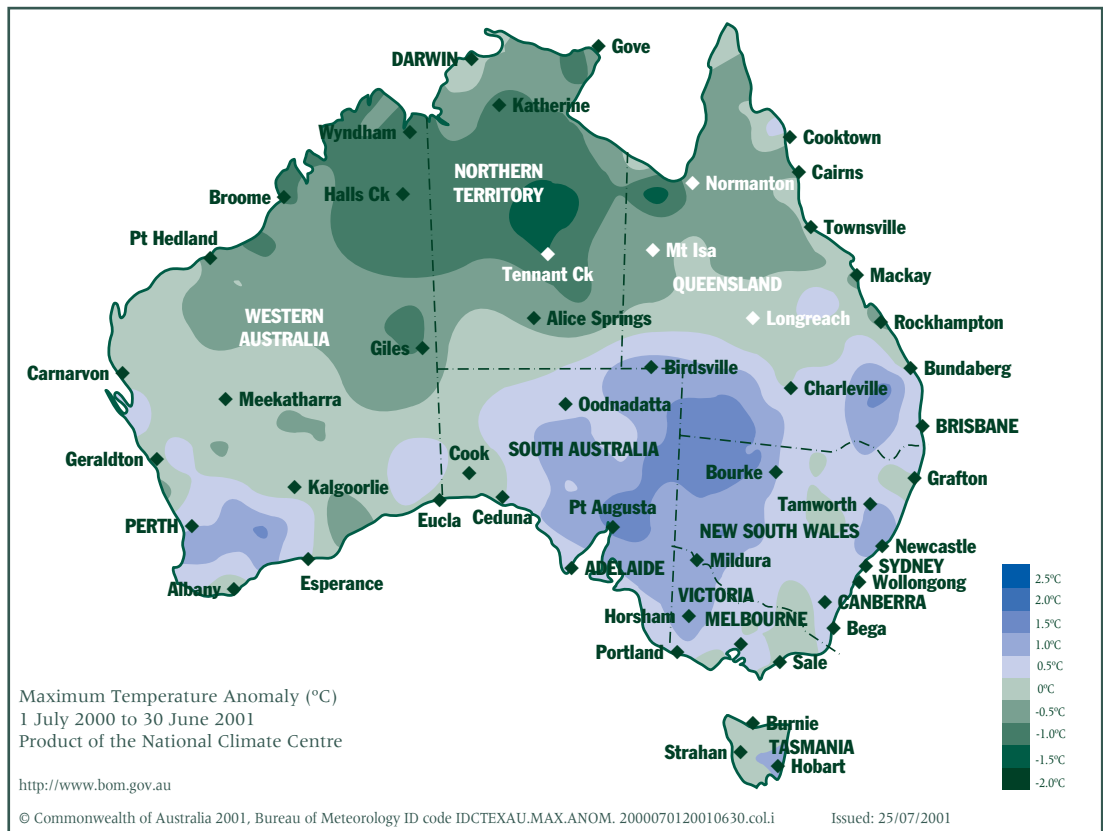
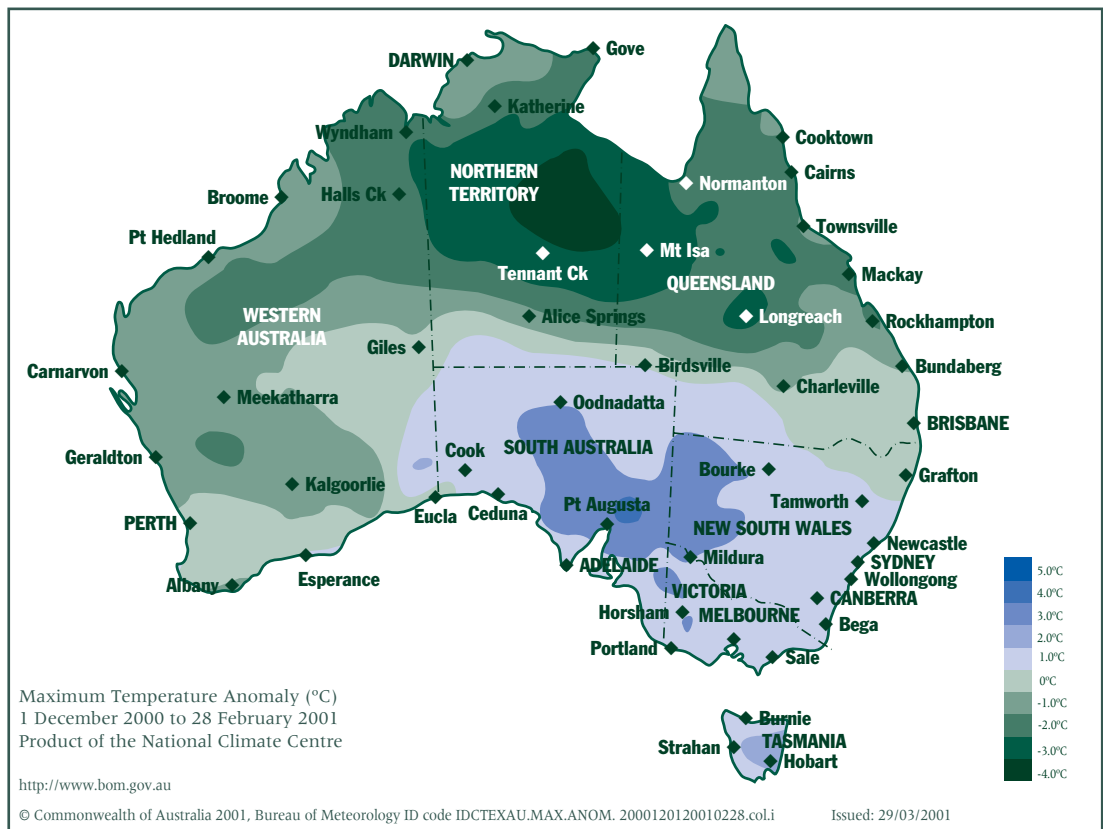


Figure 6. Temperature Anomaly for the 3 Month Period December 2000 to February 2001



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-tradeable environmental entitlement); and
 - a long-term average diversion for 'All Other Uses of Water from the River Murray' of 440.6 GL/year.

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

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

The Cap in NSW and Victoria is not the volume of water that was used in 1993/94. Rather the Cap in any year is the water that would have been used with the infrastructure (pumps, dams,

channels, areas developed for irrigation, management rules, etc.) that existed in 1993/94 taking into account the climatic and hydrologic conditions that were experienced during the year under consideration. A primary task in monitoring the Cap in these States is determining the size of the Cap target for each year. This calculation is done at the end of each year and uses the observed climatic and hydrologic data. In the south of the Basin this will tend to result in lower Cap targets in years when there is significant rainfall in the irrigation areas and larger Cap targets in years with less rainfall when demand is higher. However the annual Cap target will also be affected by the availability of water. In very dry years in the south of the Basin, the annual Cap target will reflect the resource constraints. In the north of the Basin, the Cap target will be very much affected by the opportunities to harvest water into on-farm storages.

Because of these complexities, the calculation of the Cap targets is made by use of computer models with relationships for water use that includes a range of climatic factors and detailed modelling of flows and storage behaviour. Auditing and approving these models is a major task. Although interim Cap models have been developed for most valleys, only three have been subject to independent audit and none has been approved by the Commission.

The calculation for the Cap in South Australia is relatively straight forward, although the Cap for the fourth category of South Australian diversions described above is a long-term climate adjusted annual average of 440.6 GL and in extremely dry or wet years may deviate substantially from this value. In the calculation of the Metro-Adelaide Cap, the allocation of 650 GL over 5 years is designed to provide a water supply with 99% security to a major urban city of over 1 million people. This allocation has been based on a 200 year simulation of the amount needed from the River Murray to supplement the primary source from the Mount Lofty Ranges.

Actual demand will vary from between about 20 GL (or 10% of Adelaide's needs) to about 190 GL (or about 95% of demand).

Water diversions for 2000/01 are for the seventh 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 (Table 4; Appendix D). If that difference exceeds the trigger provisions specified in Schedule F to the *Murray-Darling Basin Agreement*, the Commission must direct the IAG to conduct a special audit of the performance of that State Government in implementing the long-term diversion Cap in the relevant designated river valley. Upon receiving a special audit report from the IAG, which contains a determination that a State has exceeded the long-term diversion Cap in a designated river valley, the Commission must then declare that the State has exceeded the Murray-Darling Basin diversion Cap and must report the matter to the next meeting of the Ministerial Council.

3.5 Comparison of 2000/01 Water Use with the Cap

A comparison of 2000/01 water use with the Cap for each State is as follows:

- **New South Wales**

Cap compliance in 2000/01 within New South Wales varied between valleys (Table 4).

The interim Cap models for most of New South Wales valleys are available now. However none of these models have been accredited by the Commission. The Lachlan model after an independent audit has been recommended for approval under Schedule F. The Macquarie model is soon to be audited. The Lachlan and Macquarie models are expected to be accredited by the Commission during 2001/02.

Water use in the Namoi, Lachlan and Barwon-Darling/Lower Darling designated river valleys exceeded Cap for 2000/01 and triggered Schedule F exceedance provisions. A supplementary audit by the IAG was conducted in February 2002, which confirmed Cap exceedance in these valleys. Subsequently, the Murray-Darling Basin Commission Meeting 63 – 12 March 2002 declared the Namoi, Lachlan and Barwon-Darling/Lower Darling Cap valleys in breach of Cap. The New South Wales Government is scheduled to report to Ministerial Council Meeting 32 – 1 November 2002 on the reasons of Cap exceedance and the proposed measures to bring diversions in these valleys within Cap limits. No annual Cap targets were available for the Border Rivers and the Gwydir valley and therefore the IAG was unable to audit the Cap in these valleys.

The diversions in the Macquarie and Murrumbidgee although they exceeded annual Cap target, remained within the 20% of the average long-term diversion trigger for the Special Audit. The diversion in the Murray valley was below the annual Cap target.

- **Victoria**

Victorian diversions were within Cap target for 2000/01 for the Goulburn/Broken/Loddon and Wimmera-Mallee designated Cap valleys. The diversions in the Murray/Kiewa/Ovens and Campaspe Cap valleys although exceeded the annual Cap targets, these valleys remained in cumulative credit.

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

Table 4. Comparison of Diversions with Cap Levels in 2000/01

System	Cap Target from Cap Model (GL)	Adjustment to Cap Target for Trade ² (GL)	Cap Target Adjusted for Trade (GL)	Annual Diversion (GL)	Cap Credit ⁶ (GL)	Cumulative Cap Credit since 1997/98 ⁶ (GL)	Cap Target Exceedance Trigger (20 per cent of Long-Term Diversion Cap) ⁷ (GL)
New South Wales							
Border Rivers ^{3,5}	n/a	-8	n/a	248	n/a	n/a	-41
Gwydir ⁵	n/a	0	n/a	425	n/a	n/a	-70
Namoi/Peel ⁵	251	0	251	315	-64	-61	-51
Macquarie/ Castlereagh/Bogan ⁵	512	0	512	495	17	199	-96
Barwon-Darling							
Lower Darling	337	20	357	488	-131	-155	-70
Lachlan	389	0	389	418	-29	-69	-68
Murrumbidgee	2688	-30	2658	2711	-53	44	-504
Murray	2061	-3	2058	2048	10	871	-374
Victoria							
Goulburn Broken Loddon	1633	-2	1631	1569	62	142	-417
Campaspe	109	0	109	113	-4	39	-24
Wimmera-Mallee ⁵	n/a	0	n/a	98	n/a	n/a	-32
Kiewa Ovens Murray	1646	0	1646	1712	-66	72	-331
South Australia							
Metro-Adelaide & Associated Country Areas ⁹							
Lower Murray Swamps	104	-5	99	99	0	0	-17
Country Towns ⁸	50	0	50	38	12	54	-10
All Other Uses of Water from the River Murray	441	20	460	421	39	222	-88
Queensland							
Condamine/Balonne ⁵	n/a	n/a	n/a	360	n/a	n/a	n/a
Border Rivers ⁵	n/a	n/a	n/a	273	n/a	n/a	n/a
Macintyre Brook ⁵	n/a	n/a	n/a	15	n/a	n/a	n/a
Moonie ⁵	n/a	n/a	n/a	31	n/a	n/a	n/a
Warrego ⁵	n/a	n/a	n/a	9	n/a	n/a	n/a
Paroo ⁵	n/a	n/a	n/a	0	n/a	n/a	n/a
Australian Capital Territory⁵	n/a	n/a	n/a	34	n/a	n/a	n/a

- River valleys grouped thus “]” comprise designated river valleys under Schedule 1 of Schedule F and only a total diversion, Cap and difference figure is required for these designated river valleys.
- Adjustment to Cap target for trade includes exchange rate adjustments to permanent interstate trade.
- Excludes Cap Target for Pindari Dam.
- Excludes Cap Target for Lake Mokoan.
- n/a denotes Cap model is not completed or Cap target has not been able to be determined.
- The sign convention is that a negative Cap credit value denotes an exceedance of the Cap target adjusted for trade in 2000/01. A negative cumulative Cap credit value indicates an exceedance of the Cap target adjusted for trade on a cumulative basis (since 1997/98).
- Cap target exceedance trigger values are reported as negative values.
- The Cap for Country Towns is assessed on an annual basis.
- See Table 5.

Table 5. Comparison of diversions with Cap levels in 2000/01 for Metro-Adelaide & Associated Country Areas, South Australia

System	Total Diversion in 2000/01 (GL)	Total Diversion - 5 Years to 2000/01 (GL)	5 Year Cap Diversion Target (GL)	Difference between diversion and Cap (GL)
South Australia				
Metro-Adelaide & Associated Country Areas	104	541	650	109

4. Review of 2000/01 Water Use in New South Wales

4.1 Water Management Overview

The Cap is a necessary component of a suite of management initiatives that aim to preserve the sustainability of both the environment and the communities that depend upon the water within the Murray-Darling Basin. In addition to the Cap, NSW is implementing environmental flow rules and developing management plans that will produce long-term diversion levels equal to or less than Cap.

In 1997 the NSW Government set up community based River Management Committees (RMCs) charged with the task of recommending environmental flow rules for each of the major regulated systems. They were directed to advise rules which would produce a long-term average diversion that was equal to or less than Cap. The recommended rules were implemented during 1998.

With the introduction of a new Water Management Act in 2000, the NSW Government committed to the development and implementation of statutory long-term water management plans. These Water Sharing Plans (WSPs) will apply for a period of 10 years. RMCs were again directed to review the current arrangements, and recommend environmental flow and water sharing rules to the NSW Government. These rules must at least preserve the river flow benefits produced by the 1998 rules and ensure that they cannot be eroded by further growth in diversions over the life of the Plan. Each Plan will include a diversion management limit (the Plan limit) and rules for adjusting water sharing rules should diversions grow beyond the limit set in the Plan. In all major regulated rivers in the Basin these Plan limits will be below Cap. It is expected that the first round of Plans, which will cover the majority of the State's Murray-Darling water use, will be implemented during the last half of 2002.

The Plan rules will not be aimed at keeping diversions below 1993/94 levels in all years. Instead they are intended to produce

environmental benefits while also ensuring that long-term average diversions are kept below those which would result from 1993/94 development levels. Assessments of long-term diversions will be undertaken annually, and management actions will be undertaken whenever required to ensure that the Plan limit is not exceeded. The WSPs will contain provisions that prescribe specific water sharing adjustments and the process for their calculation.

Current assessments indicate that long-term average diversions in all major NSW regulated valleys are below Cap levels, with the exception of the Border Rivers where the Cap has yet to be determined, and the combined Barwon-Darling and Lower Darling valley where assessments are incomplete. Management rules to bring diversions in the Barwon-Darling River above Menindee back to Cap are currently being determined. Modelling for the Darling River below Menindee is currently being reviewed.

4.2 Water Use Overview

Favourable climatic conditions during 2000 resulted in sufficient water in all NSW regulated valleys in the Murray-Darling Basin to provide allocations of at least 100% of licensed entitlement. During the water year, climatic conditions for valleys in southern NSW were close to average, while valleys in northern NSW generally experienced wetter than average conditions.

Assessment of Cap performance for the 2000/01 water year using preliminary computer simulation models indicated that diversions for four NSW valleys were above Cap, two valleys were below Cap, and two valleys did not have Cap targets to allow assessment to be made. Under the Murray-Darling Basin *Agreement*, annual Cap performances are cumulated from the 1997/98 water year. This indicates that three NSW valleys – the Lachlan, Namoi and the combined Barwon-Darling and Lower Darling valleys, are above Cap by more than 20% of the long-term average.

NSW valleys are managed using a water year that extends from July to June, except for the Namoi, Gwydir and NSW Border Rivers, which are managed using a water year that extends from October to September. All diversions reported are in accordance with the MDBC Register of Diversion Definitions to the extent that availability of information allows.

4.3 Border Rivers

The water year in the Border Rivers runs from October to September. In the 2000/01 water year the regulated section of the NSW Border Rivers received an initial allocation of 25% of licensed entitlement, combined with 52% of licensed entitlement carried over from the 1999/00 water year. Allocations subsequently rose to 40% by December. This provided a total resource availability of 237 GL (Table 8), not including off-allocation. There was a net inter-valley transfer of allocated water of 8 GL from the NSW Border Rivers to the Queensland Border Rivers.

During 2000/01 there was a total of 115 GL of allocated water diverted, and there were seven off-allocation events during the water year between November and August, resulting in 117 GL of diversions that were not debited against allocations. This provided a total diversion from the regulated section of the Border Rivers of 232 GL (Table 2). Diversions in the unregulated sections of the catchment are not currently monitored, and an assessment has been made of these diversions. This gives a total diversion for Cap accounting purposes in 2000/01 of 248 GL (Table 2).

Cap accounting was not performed for the 2000/01 water year, as the Cap for the NSW Border Rivers is currently being determined.

4.4 Gwydir

An allocation system called Continuous Accounting (CA) is used in the regulated section of the Gwydir valley which provides licensees with an individual account which can be credited with up to 150% allocation and continuously carryover any unused allocation. At any time they may receive a new allocation increment (dependent on resource availability) up to a maximum limit of 150%. In any particular season each licensee is limited to a maximum on-allocation usage of 100% of licensed entitlement, which is 528 GL (Table 8).

In 2000/01 Gwydir Valley licensees commenced the season with an average of 104% of licensed entitlement in individual accounts, and received a further 44% of licensed entitlement as further resources became available during the water year. On-allocation diversions of 51% of licensed entitlement occurred, providing a closing average account balance across the valley of 97% of entitlement. There were five off-allocation events in the Gwydir valley during 2000/01, which resulted in 146 GL of diversions that were not debited against allocations. Diversions in the unregulated sections of the catchment are not currently monitored, and an assessment has been made of these diversions for 2000/01. This provided a total diversion of 425 GL (Table 2).

Cap accounting is performed using the Gwydir Valley IQQM. However, a Cap target from the Gwydir IQQM is not currently available due to problems with obtaining streamflow data. It is hoped to have a Cap target in the near future. Under the Murray-Darling Basin *Agreement*, annual Cap performances are cumulated from the 1997/98 water year. For the previous three water years this indicates a cumulative Cap credit of 5 GL.

4.5 Namoi/Peel

An allocation system called Continuous Accounting (CA) is used in the regulated section of the Namoi valley, which provides licensees with an individual account that can be credited with up to 150% allocation and continuously carryover any unused allocation. At any time they may receive a new allocation increment (dependent on resource availability) up to a maximum limit of 200%. In any particular season each licensee is limited to a maximum on-allocation usage of 100% of licensed entitlement, which is 265 GL. The regulated section of the Peel valley is managed using annual accounts which are forfeited at the end of each water year. The maximum allocation is 100% of licensed entitlement, which is 48 GL. This provides a combined entitlement of 313 GL (Table 8).

In 2000/01 Namoi Valley licensees commenced the season with an average of 132% of licensed entitlement in individual accounts, and received a further 104% of licensed entitlement as further resources became available during the water year. On-allocation diversions of 65% of licensed entitlement occurred, providing a closing average account balance across the valley of 171% of entitlement. The Peel received a maximum allocation of 100%, and 7 GL was diverted. There were five off-allocation events in the Namoi valley during 2000/01, which resulted in 48 GL of diversions that were not debited against allocations. Diversions in the unregulated sections of the catchment are not currently monitored, and an assessment has been made of these diversions for 2000/01. This provided a total diversion of 315 GL.

Preliminary Cap accounting is performed for the Namoi Valley IQQM. An IQQM for the Peel valley is currently being developed, and a climate-diversion relationship is currently used to assess preliminary Cap performance. The combined Cap target was 251 GL. Under the Murray-Darling Basin *Agreement*, annual Cap performances are cumulated from the 1997/98

water year. For the four year period from 1997/98 this indicates a cumulative Cap debit of 61 GL, which exceeds the trigger for special auditing of 51 GL.

4.6 Macquarie/Castlereagh/Bogan

In the 2000/01 water year the regulated section of the Macquarie valley received an initial allocation of 45% of licensed entitlement, combined with 98% of licensed entitlement carried over from the 1999/00 water year. Further inflows produced a spill of water from storage. Consequently carryover was deemed as spilled partially, and the announced allocation increased to 100% of licensed entitlement. This provided a total resource availability of 940 GL (Table 8), not including off-allocation.

During 2000/01 436 GL of allocated water was diverted. There were four off-allocation events during the water year between September and December, resulting in 28 GL of diversions that were not debited against allocations. Diversions in the unregulated sections of the catchment are not currently monitored, and an assessment has been made of these diversions for 2000/01. This provided a total diversion of 495 GL (Table 2).

Preliminary Cap accounting for the Macquarie Valley was performed using the Macquarie Valley IQQM, which indicated a Cap target of 481 GL. Under the Murray-Darling Basin *Agreement*, annual Cap performances are cumulated from the 1997/98 water year. For the four year period from 1997/98 this indicates a cumulative Cap credit of 199 GL (Table 4).

4.7 Barwon-Darling

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

Diversions from the Barwon-Darling River system in the 2000/01 water year totalled 242 GL (Table 2).

Preliminary Cap accounting for the Barwon-Darling Valley was performed using the Barwon-Darling IQQM, which indicated a Cap target of 186 GL. For assessment under the Murray-Darling Basin *Agreement*, 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 four year period from 1997/98 this indicates a cumulative Cap debit of 161 GL, which exceeds the trigger for special auditing of 35 GL.

4.8 Lachlan

In the 2000/01 water year the regulated section of the Lachlan valley received an initial allocation of 59% of licensed entitlement, combined with 41% of licensed entitlement carried over from the 1999/00 water year. Further allocation announcements saw the announced allocation increase to 84% in December. The announced allocation and carryover cannot exceed 100% in the Lachlan valley. Consequently 25% of carryover was forfeited, and the effective allocation was 100% of licensed entitlement. This provided a total resource availability of 667 GL (Table 8), not including off-allocation.

During 2000/01 384 GL of allocated water was diverted. There was only one off-allocation event during the water year, resulting in 23 GL of diversions that were not debited against allocations. Diversions in the unregulated sections of the catchment are not currently monitored, and an assessment has been made of these diversions for 2000/01. This provided a total diversion of 418 GL (Table 2).

Preliminary Cap accounting for the Lachlan Valley was performed using the Lachlan IQQM, which indicated a Cap target of 389 GL. Under the Murray-Darling Basin *Agreement*, annual Cap performances are cumulated from the 1997/98 water year. For the four year period from 1997/98 this indicates a cumulative Cap debit of 69 GL, which exceeds the trigger for special auditing of 68 GL (Table 4).

4.9 Murrumbidgee

In the 2000/01 water year the regulated section of the Murrumbidgee valley received an initial allocation of 51% of licensed entitlement, combined with 9% of licensed entitlement carried over from the 1999/00 water year. Further allocation announcements saw the announced allocation increase to 90% in December. This provided a total resource availability of 2719 GL (Table 8), not including off-allocation. There was a net inter-valley transfer of allocated water out of the Murrumbidgee valley to the Murray and Lower Darling system of 30 GL.

During 2000/01, 1900 GL of allocated water was diverted. There were periods of off-allocation from August to November, resulting in 218 GL of diversions that were not debited against allocations. A further 587 GL was diverted into the Lowbidgee Flood Control and Irrigation District. Diversions in the unregulated sections of the catchment are not currently monitored, and an assessment has been made of diversions for 2000/01. This provided a total diversion for the Murrumbidgee valley and the Lowbidgee district of 2711 GL (Table 2).

Preliminary Cap accounting for the Murrumbidgee valley was performed using the Murrumbidgee IQQM, which indicated a Cap target of 2658 GL. Under the Murray-Darling Basin *Agreement*, annual Cap performances are cumulated from the 1997/98 water year. For the four year period from 1997/98 this indicates a cumulative Cap credit of 44 GL (Table 4).

4.10 Lower Darling

The Lower Darling system has a small entitlement of 48 GL, which has received a full allocation every year since the volumetric allocation scheme commenced in 1981. There was a net intervalley transfer of allocated water into the Lower Darling of 20 GL from the Murrumbidgee valley and the Murray system. This combined to give a total water resource availability in the Lower Darling

of 68 GL, excluding water available in off-allocation periods.

During 2000/01 10 GL of allocated water was diverted. There were extended periods of off-allocation which resulting in 180 GL of diversions that were not debited against allocations. The Great Darling Anabranch also received 42 GL as part of its annual stock and domestic replenishment. Diversions in the unregulated sections of the catchment are not currently monitored, and an assessment has been made of diversions for 2000/01. This provided a total diversion for the Lower Darling valley of 246 GL (Table 2).

Preliminary Cap accounting for the Lower Darling valley was performed using the Murray Simulation Model, which indicated a Cap target of 171 GL. Under the Murray-Darling Basin *Agreement*, annual Cap performances are cumulated from the 1997/98 water year. For assessment under the Murray-Darling Basin *Agreement*, 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 four year period from 1997/98 this indicates a cumulative Cap debit of 155 GL, which exceeds the trigger for special auditing of 70 GL.

4.11 Murray

In the 2000/01 water year the regulated section of the Murray valley received an initial allocation of only 9% of licensed entitlement, combined with 15% of licensed entitlement carried over from the 1999/00 water year. However, a particularly wet winter and spring period saw allocation announcements increase to 95% in December. This provided a total resource availability of 2083 GL (Table 8), not including off-allocation. There was a net inter-valley transfer of allocated water out of the Murray valley to the other NSW valleys, Victoria and South Australia of 3 GL.

During 2000/01, 1755 GL of allocated water was diverted. There were periods of off-allocation from August to November, resulting in 287 GL of diversions that were not debited against allocations. Diversions in the unregulated sections of the catchment are not currently monitored, and an assessment has been made of these diversions for 2000/01. This provided a total diversion for the e Murray valley of 2048 GL (Table 2).

Preliminary Cap accounting for the Murray valley was performed using the Murray IQQM, which indicated a Cap target of 2055 GL. Under the Murray-Darling Basin *Agreement*, annual Cap performances are cumulated from the 1997/98 water year. For the four year period from 1997/98 this indicates a cumulative Cap credit of 871 GL (Table 4).

5. Review of 2000/01 Water Use in Victoria

5.1 Overview

Details of the factors influencing net water use in each of the Victorian river valleys during 2000/01 and proposed future water management activities are given below.

5.1.1 Water Use Capping Measures

Victoria has been implementing changes to water management policies under its water reform package since 1990/91. The effectiveness of the policies is continually monitored. Bulk Entitlements for the Goulburn, Murray and Campaspe river systems are now in place. Finalisation of Bulk Entitlements for the Ovens and Broken systems is anticipated during 2002/03. Development of the Bulk Entitlement for the Loddon system has recently commenced.

Annual diversions are limited by Victoria's seasonal allocation process. As occurred in 1999/00, the final allocation for supplies from the Goulburn system was limited to 100% of high security entitlement. Allocations in the Victorian Murray system reached the maximum allowable level.

5.1.2 Volumes Diverted

The volumes diverted during 2000/01 were below the Cap targets in the Goulburn/Broken/Loddon designated river valley. Diversions were slightly above the Cap target for the Murray/Kiewa/Ovens valleys and Campaspe as noted in Section 3.5, although the valleys remains within Cap. A Cap target has not been determined for the Wimmera-Mallee valley as the model is not yet calibrated.

Victorian systems diverted 3491 GL from the Murray-Darling Basin during 2000/01. The total volume authorised for use was 4748 GL, which included 872 GL of losses and approximately 4 GL net temporary trade from interstate.

The Victorian diversions equated to 73% utilisation of the total authorised volume.

5.1.3 Off-Quota

Off-quota allocations for the Goulburn River downstream of Lake Eildon, the Broken River downstream of Lake Nillahcootie, and the River Murray downstream of Hume Dam were announced on 1 September 2000. The allocations remained available from the Goulburn River until 22 September 2000, and from the Broken River until 6 October 2000. Off-quota allocations from the River Murray were removed on 10 October 2000.

5.1.4 Deliveries

• Final Deliveries & Historical Comparison

Approximately 2565 GL was delivered by Victorian systems during 2000/01. Improved resources and higher allocations in the Murray system contributed to deliveries of 1241 GL in 2000/01, compared to 1151 GL the previous year. Goulburn system deliveries were also greater than 1999/00 following the announcement of higher initial allocations.

5.1.5 Trading

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

Approximately 8.4 GL was permanently sold interstate and to other river systems by Victorian entitlement holders. South Australia purchased 3 GL of Victorian entitlement, but there was no permanent trading between Victoria and New South Wales. Further trading also occurred within systems.

Strong trading occurred on the temporary entitlement market, with 29.4 GL sold interstate and to other river systems within Victoria. Most interstate trading involved New South Wales, and resulted in a net inwards transfer of water during

2000/01. The Goulburn system received a net inwards transfer of entitlement from the other Victorian systems.

5.1.6 Environmental Flows

Releases totalling 341 GL were made from Hume Dam for watering the Barmah-Millewa forest during 2000/01. Victoria supplied 165 GL of these releases, comprising 50 GL carried over from 1999/00, 75 GL allocated in 2000/01, less 25 GL lost when Hume Dam spilled, 50 GL of high security entitlement advanced from 2000/01, and 15 GL of the northern Victorian wetlands allocation. The remaining 176 GL was provided by New South Wales.

Approximately 12 GL of northern Victorian wetlands allocation was also diverted to the northern Victorian wetlands during 2000/01.

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 48% of Water Right or Licensed Volume in August 2000. The allocation reached a maximum of 100% of Water Right or Licensed Volume in October 2000. Limited resources prevented the allocation of any Sales during 2000/01. This was the third consecutive year of record low allocations for the Goulburn system.

Lake Eildon held only 26% of capacity at the start of the Victorian irrigation season. The Goulburn system's primary storage reached 53% of capacity in December 2000, but fell to 32% by June 2001.

The volume authorised for use in the Goulburn system was 1143 GL, which comprised the seasonal allocation for irrigation, urban, industrial and stock entitlement holders (729 GL), temporary trade (9 GL), system losses (257 GL) and off-quota allocation (148 GL). The irrigation entitlements referred to the Shepparton Irrigation Area, the Central Goulburn Irrigation Area and private diverters.

Approximately 514 GL was transferred to the Murray, Campaspe, Loddon and Wimmera-Mallee systems and the Melbourne Water supply system. Diversions during 2000/01 were 1451 GL, which was below the ten year average for the Goulburn system.

Off-quota allocation was available in the Goulburn River downstream of Lake Eildon between 1 September and 22 September 2000. Gravity irrigators and private diverters used 39.3 GL in this period.

The Goulburn system is included in the Goulburn/Broken/Loddon designated river valley for the assessment of Cap compliance and diversions from this valley were below the 2000/01 Cap target.

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

5.3 Broken

Private diverters in the Broken River system received an initial allocation of 100% of Licensed Volume in August 2000. The maximum allocation of 100% Licensed Volume plus 70% Sales was granted in September 2000.

Lake Nillahcootie and Lake Mokoan held 86% and 51% of capacity respectively when the irrigation season opened in August 2000. Lake Nillahcootie spilled in late August 2000, and Lake Mokoan reached 74% of capacity during October 2000. An outbreak of blue-green algae closed Lake Mokoan in January 2001.

The 16.6 GL total diversions were equivalent to 26% of the 64.7 GL authorised volume. The system diversions were less than the ten year average.

Off-quota allocations for the Broken River downstream of Lake Nillahcootie were announced on 1 September 2000. However, no usage was recorded before the off-quota was removed on 6 October 2000.

The Broken system is included in the Goulburn/Broken/Loddon designated river valley

for the assessment of Cap compliance and diversions from this valley were below the 2000/01 Cap target.

Bulk Entitlements for the Broken system are expected to be implemented during 2002.

5.4 Loddon

Private diverters from the Loddon system were allocated 100% of Licensed Volume. Pyramid-Boort Irrigation Area customers are located in the Loddon basin, but are predominantly supplied from the Goulburn system via the Waranga Western Channel and received a 100% of Water Right allocation.

The combined resources of Cairn Curran, Tullaroop and Laanecoorie Reservoirs were at 33% of capacity for the start of the irrigation season. The storages peaked at 94% during November and fell to 51% of capacity in June 2001.

Loddon system private diverter irrigation usage, extraction for domestic and stock, commercial, industrial and urban purposes, and approximately 67 GL of supplement to the Pyramid-Boort Irrigation Area and the Wimmera-Mallee system accounted for total Loddon system diversions of 101 GL. The total diversion passed to the Pyramid-Boort Irrigation Area offtakes from the Goulburn system in 2000/01 was 320 GL.

The total authorised use in the Loddon system was 367 GL. This volume comprises entitlements for the Pyramid-Boort Irrigation Area gravity irrigators, private diverters, and urban, industrial and stock purposes. Although supplied largely from the Goulburn system, the Pyramid-Boort Irrigation Area is included among the Loddon system entitlements.

The Loddon system is included in the Goulburn/Broken/Loddon designated river valley for the assessment of Cap compliance and diversions from this valley were below the 2000/01 Cap target.

Development of Bulk Entitlements for the Loddon system commenced in December 2001.

5.5 Campaspe

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

Allocations in the Campaspe system opened at 100% of Water Right or Licensed Volume, and were increased to the maximum 220% in October 2000. Allocations for gravity irrigators in the Rochester Irrigation Area were aligned with the Goulburn system, and were 100% of Water Right.

The irrigation season began with Lake Eppalock holding 35% of capacity. The storage peaked at 97% of capacity during November 2000.

The 2000/01 Campaspe system authorised volume was 312 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 113 GL. A total volume of 31.4 GL (excluding channel outfalls) was supplied to the Waranga Western Channel via the Campaspe River pumps and diversions from Campaspe Irrigation District channels. The volume comprised 6.7 GL to cover temporary trading from the Campaspe Irrigation District, 21.7 GL of regulated supplement, and 3 GL of unregulated supplement. The Campaspe Bulk Entitlement Conversion Order authorises Goulburn-Murray Water to provide up to 24.7 GL and 4 GL of regulated and unregulated supplement annually.

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

Diversions from the Campaspe designated river valley were above Cap target in 2000/01, however cumulatively the valley is in credit.

5.6 Wimmera-Mallee

The 2000/01 season started in May 2000 with storages holding only 16% of capacity, the lowest May volume since 1968. The 2000 winter and spring again produced below average inflow to Wimmera-Mallee Water storages, with the combined inflow over the four years ending December 2000 the lowest since records began in 1903.

Storages rose to hold 19% of capacity in late November 2000, compared with 23% at the same date the previous year. The inflow for the 1997/00 period was only 303 GL, or 40% lower than the previous record low, and less than a quarter of the average inflow for a four-year period.

Restrictions were imposed on domestic and stock customers in the 2000 winter season, with these customers being able to fill only half the dams on their properties. For the second year in a row, no supply went to recreation lakes. Irrigators were limited to 30% of Water Right and no Sales allocation. The 2000/01 summer domestic and

stock run was restricted to filling one dam for 200 hectares of property, resulting in about 38% of dams being supplied. The environmental allocation was set at 25% of entitlement.

Continuing dry conditions saw the 2001 winter domestic and stock season start with customers able to only fill one-third of dams on their properties. At the end of the financial year, Wimmera Mallee Water storages held 11.6%, the lowest July volume since 1968.

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

Completion of Stages 6 of the Northern Mallee Pipeline has seen additional entitlement for environmental flows in the Wimmera and Glenelg rivers. The environment's entitlement has been increased from 24.9 GL to 30.1 GL at the end of the 2000/01 financial year.

Goulburn-Murray Water transferred 19 GL to Wimmera Mallee Water via the Waranga Western Channel after agreement to bring forward supply provisions granted by the Goulburn Bulk Entitlement order.

Development of Bulk Entitlements for the Wimmera-Mallee system commenced in 2001.

Year	1994/95	1998/99	1999/00	2000/01
Total Releases	202	182	148	
Irrigation Diversions	29	23	16	7
D&S Diversions (including urbans)	161	127	121	97
Environmental Releases	11	20	9	6
Northern Mallee Pipeline	0.5	1.5	1.5	2
Total Releases	202	182	148	112

*Note: these figures are in GL and are rounded.

5.7 Kiewa

Total diversions of 10.7 GL were 67% of the 16 GL authorised for use. Irrigation diversions in the Kiewa system were above the ten year rolling average during 2000/01.

The Kiewa system is included in the Murray/Kiewa/Ovens designated river valley for the assessment of Cap compliance. While diversions from this valley were above the 2000/01 Cap target, the valley remains within Cap and has a cumulative Cap credit.

A draft streamflow management plan for the Kiewa system has been released for public comment.

5.8 Ovens

Allocations are not announced for the Ovens River system as overall diversions are consistently less than total Licensed Volume and usage is usually satisfied by system resources. Lake William Hovell spilled in July 2000, and Lake Buffalo was filled to 87% of capacity as limited by dam safety requirements.

Total system diversions were 23 GL, which was 41% of the 56 GL authorised for use during 2000/01. A regression model is being developed to calculate Cap targets for the regulated Ovens system, but Cap targets from the model are not currently available. Ovens irrigation usage was marginally above the ten year average.

The Ovens system is included in the Murray/Kiewa/Ovens designated river valley for the assessment of Cap compliance and diversions from this valley exceeded the 2000/01 Cap target (Section 3.5). However, the valley remains within Cap and has a cumulative Cap credit.

Development of the Bulk Entitlement for the Ovens system continued during 2000/01, and is scheduled for completion in 2002.

5.9 Murray (including Mitta Mitta)

The initial allocation for Murray system gravity irrigation customers and private diverters was 100% of Water Right or Licensed Volume plus 100% Sales. As this was the maximum allocation, no changes were made during 2000/01.

Hume Dam and Dartmouth Dam held 72% and 61% of capacity respectively for the start of the Victorian irrigation season in August. Hume Dam spilled in November 2000, and Dartmouth Dam achieved a peak capacity of 80% in June 2001. Victoria maintained a significantly greater share of Murray storage resources (i.e. Dartmouth Dam, Hume Dam, Menindee Lakes and Lake Victoria) than New South Wales throughout 2000/01.

The Victorian component of the total River Murray valley authorised volume was 2663 GL. Actual usage was 1678 GL, which was above the ten year rolling average. Approximately 78 GL was diverted between 1 September 2000 and 10 October 2000 when off-quota availability was announced for the River Murray downstream of Hume Dam.

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

For the purposes of Cap compliance, the Murray system is included in the Murray/Kiewa/Ovens designated river valley. While diversions from this valley were above the 2000/01 Cap target, the valley remains within Cap and has a cumulative Cap credit.

6. Review of 2000/01 Water Use in South Australia

6.1 Overview

South Australia reports diversions under four Cap components:

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

Water diversions from the River Murray were within Cap for each of these designated Cap components in 2000/01.

Factors influencing water use in South Australia for the 2000/01 water year and an outline of future water management activities are discussed below.

6.2 Season Conditions

Weather conditions in South Australia have generally been moderate for the 2000/01 water year. Particularly, the summer period was milder than in recent previous years and rainfall was average.

The Riverland region in South Australia receives annual average rainfall of less than 300 mm and most of this usually falls in the winter months. The rain that does fall in the Riverland during the summer/growing season is not generally considered a significant factor with regard to irrigation practice as both the duration and intensity of rain during this period is too little to yield any considerable benefit. While this summer period was mild there were no significant rainfall events and evaporation remained high. These conditions coupled with some increases in developed areas resulted in a moderate jump for 2000/01 diversions compared with the previous years' figures. The Highland region, which accounts for the most significant diversions from the River Murray reflects this jump. The Highland diversions for 1999/00 were

364 GL while Highland diversions for 2000/01 were approximately 420 GL.

Generally, the 2000/01 water year has been a higher use year for South Australia. In addition to the irrigation areas the status of water supplies for Metropolitan Adelaide has also remained high. Adelaide and its surrounds are supplied with water from the Mount Lofty Ranges catchments and the River Murray. The amount of water that is diverted from the River year to year is significantly influenced by the weather conditions in the Mount Lofty Ranges. Weather conditions in the Ranges have been mild and storages were low at the beginning of the season. Inflows to storages from local catchments in the Ranges have been below average for the last few years but 2000/01 has yielded some improvement.

6.3 Metropolitan Adelaide and Associated Country Areas

The Cap for Metropolitan Adelaide is reported over a five-year rolling average period of not more than 650 GL. Usage of River Murray water for Metropolitan Adelaide remained quite high for 2000/01 at 103 GL but this is less than in recent previous years (1998/99 at 152 GL and 1999/00 at 138 GL). The total for the five years to 2000/01 was 614 GL.

6.4 Country (River) Towns

Water use for Country Towns in 2000/01 was 37.8 GL. This is 12.2 GL below the annual Cap limit of 50 GL.

The Cap for Country Towns was reviewed in October 2000 due to concerns that arose about conditions under which the Country Towns Cap was originally set. After a review by the Independent Audit Group the Country Towns Cap was confirmed as satisfactory at a limit of 50 GL per annum, fully tradeable.

6.5 Lower Murray Swamps

Improved modelling of the Lower Murray Swamps was completed in October 2000. This

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

At the meeting of the Independent Audit Group of October 2000 the IAG agreed that as a result of the improved modelling a fair and equitable Swamps Cap be finalised at a figure 103.5 GL and adjusted for trade that had already occurred.

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

Swamps use for 2000/01 was 99.6 GL.

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

Highland irrigators diverted 421.3 GL (approximately 95% of the Cap adjusted for permanent trade adjusted Cap for 2000/01). This figure has the potential to cause some concern for future Cap management unless the uptake figures for 2001/02 taper off. Historical documentation has shown that irrigation in the Highland region can vary significantly in some years, however, if the percentage of use against the Cap remains high next year the South Australian Government will consider necessary actions to maintain the integrity of Cap. Factors attributed to the uptake of water include: trade, industry movement, temperature, lack of growing season rainfall, and the activation of sleeper and/or dozer allocations.

6.7 Future Water Management Activities

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

- Development and implementation of 'Local Action Plans' and 'Land and Water Management Plans' to cover all sections of the

River Murray catchment in South Australia to ensure that improved irrigation practice and suitable farm management techniques are adopted in a coordinated manner through strong local community commitment;

- Ongoing and developing partnerships between the River Murray Catchment Water Management Board and Local Action Planning groups in implementing Local Action Plans;
- Implementation of the recently adopted Catchment Plan and Water Allocation Plans by the River Murray Catchment Water Management Board;
- Development of a new licensing system with improved audit capabilities. Stage one of this project was completed last year incorporating a user needs analysis, the development of process and data models, and the development and testing of a prototype system. Stage two, which incorporates the development of necessary aspects of the full system proposal, began earlier this year. Scheduled completion at this stage is estimated for early 2003;
- Continued rehabilitation of highland irrigation areas to reduce system losses and improve irrigation practice. Only the Loxton irrigation area remains to be rehabilitated. Scheduled completion is for December 2003;
- Installation of metering systems for swamp irrigation areas and implementation of revised water allocation and irrigation management practice; and
- Ongoing grower education programs.

7. Review of 2000/01 Water Use in Queensland

7.1 Management Overview

Details of the factors influencing water use in Queensland in 2000/01 and proposed future water management activities are given below.

- **Management Planning**

Queensland continues to develop Water Resource Plans for each of the valleys of the Queensland section of the Murray Darling Basin. The development of Water Resource Plans is a consultative process aimed at achieving a balance between consumptive use and the environment giving security of entitlement for water users whilst also providing for the health of the river system.

Following proclamation of parts of the *Water Act 2000*, in September 2000, the new Act was used to place a moratorium on new licences, or development of works, to take or interfere with water in all of the Queensland Murray Darling catchments. The moratorium will continue in place until water entitlements are firmly defined in planning processes subsequent to the Water Resource Plan. The intent of the moratorium is to hold development whilst planning directions are finalised so as not to compromise the outcomes of a Water Resource Plan.

A draft Water Resource Plan for the Condamine Balonne was released in June 2000. Extensive key stakeholder and broader community consultation followed the release with over 200 submissions being received on the plan. The Queensland Government is now considering the many complex issues raised in submissions on the plan.

In the meantime extensive auditing of water related infrastructure has been carried out during the year and this information has been used to update the model to better reflect current development in the system. A revised draft plan will be released for further consultation sometime in 2002 following further technical and scientific assessments. A key consideration in development of the plan will be determining the appropriate balance between the amount of water to be made

available for use and the water that should be retained for the riverine environment.

Water resource planning in the Border Rivers is a joint initiative with the NSW Department of Land and Water Conservation. In November 1999 the two States agreed that:

- increases in water use in the system that will cause further deterioration in the flow regime at Mungindi will not be supported
- further growth in diversions in the regulated sections of the system will not be allowed.

These decisions will form a core element of Queensland's Water Resource Plan for that part of the catchment.

The daily flow model for the catchment continues to be refined. Extensive auditing of infrastructure has been carried out in the lower parts of the Queensland side of the catchment to ensure that the level of development is correctly reflected in the model. The model was used to test a range of environmental flow scenarios and their impacts with a view to the two States developing a common set of principles and objectives for provision of environmental flows. These principles will eventually be part of the interstate agreement developed to ensure consistent elements in each State's management rules.

A draft Water Resource Plan for the Queensland part of the Border Rivers catchment is scheduled for release in 2002 for public review and submission. The Border Catchments Standing Committee and Ministerial Forum were established to guide and ratify interstate agreement on the various elements of the water resource planning process and will be convened during the submission period to provide comment on the draft plan.

The draft Water Resource Plans for the Moonie River and Warrego/Paroo/Nebine catchments were released in May and June 2000 respectively. New allocation and water access opportunities proposed in these draft plans are very limited. There are comparatively low levels of water

resource development in the catchments and the planning process is intended to control and manage water extraction to maintain a strong emphasis on providing high levels of flow to support the natural ecosystem requirements of these streams. Consequently end of valley flow performance will be maintained at relatively high levels. The current draft plans do not envisage control on overland flow and this has been identified as a potential risk to 'end of valley' flow regimes. Revised draft plans are now being prepared for these catchments based on submissions received in the consultation period and will be released for further review and submission in mid-2002.

The Water Resource Plans will set the strategic direction for allocation and management of water in the various catchments. The plans will be implemented through a Resource Operations Plan (ROP) which will provide the mechanism for conversion of existing licences to tradable entitlements and will develop operational rules to achieve the environmental and water allocation security outcomes specified in the Water Resource Plan. The Resource Operations Planning process will be initiated on release of the draft Water Resource Plans to endeavour to meet Queensland's obligations in Schedule F of the Murray-Darling Basin *Agreement*.

- **Water Use Efficiency (WUE)**

The Queensland Government's Rural Water Use Efficiency Initiative is a four year program with a total commitment of \$41 million to the initiative through to July 2003.

The key aims of the program are:

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

The four major elements of this initiative are:

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

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

- Sugar represented by Queensland CaneGrowers Council
- Horticulture represented by Fruit and Vegetable Growers
- Dairy Lucerne and Pasture represented by Queensland Dairyfarmers' Organisation
- Cotton and Grains represented by the Australian Cotton Cooperative Research Centre

This brings the total grants to industry since commencement of the scheme to \$7.5 million.

Under the Research and Development program a further \$1 million per year has been allocated to June 2003 to fund a range of projects that address key irrigation and water use efficiency issues relevant to the industry partners.

The Financial Incentives scheme will allocate \$12 million to June 2004 to support the implementation of 'best practice' irrigation management. This will include subsidies for equipment and system modification to improve irrigation efficiency. To date approximately \$6.1 million has been distributed to about 3500 irrigators. Irrigators have added \$15 million to this amount to effect the improvements.

The Queensland cotton industry has established three water use efficiency advisors in the

Queensland Murray-Darling Basin Catchments. The publicity and general industry awareness and consequent on ground action has increased as a result of this program. The cotton industry has set itself a target of achieving a 10% improvement in rural water use through adoption by 70% of growers of improved water management practices.

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

7.2 Stream Flow and Water Use Overview

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

Rainfall throughout the year has been generally below average in the northern and eastern parts of the Basin improving to average into the western and southern sections. Most of the major storages in the Queensland section of the Basin came into the water year at 50 to 60% of capacity following a winter with very little stream flow and significant pre watering activity in September 2000. Ring tank storages in both the Condamine Balonne and Border Rivers catchments started the season at only 20 to 30 % of capacity following the limited water harvesting opportunity in the 1999/00 water year.

This year has demonstrated the extreme variability of stream flows in the Queensland part of the Basin.

- The Border Rivers experienced major flooding in November 2000 followed by a series of smaller floods through to April 2001 with total flow passing Goondiwindi approximately 130% of the long-term annual average of 1030 GL.
- The Warrego River performed to almost double the long-term average (720 GL for the year compared with an annual average of 386 GL).

- The Condamine Balonne catchment delivered only 20% of the long-term average of 1210 GL with its Condamine sub catchment performing at only 10 % of the long-term average of 597 GL.
- The Moonie catchment performed to 50% of long-term average of 156 GL.
- The Paroo catchment delivered only 30% of long-term average of 555 GL.

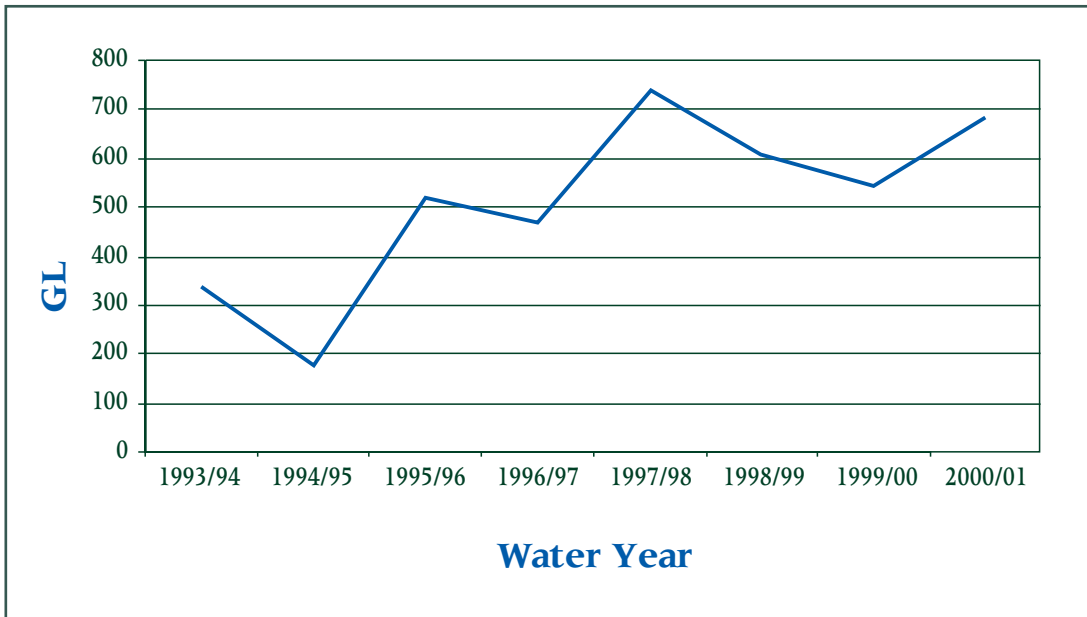
The limited flows have restricted water harvesting in the Condamine Balonne to slightly less than last year which was in itself a poor year of access opportunity. From a total Queensland section of the Basin performance perspective this has been offset by increased diversion opportunity and take up in the Border Rivers.

The diversion profile over the last 8 years is shown in Table 6 and Figure 7. Diversions associated with harvesting into storage from overland and floodplain flows are not included in these diversion figures.

Table 6. Water Diversion for last eight years in Queensland

Year	Diversion (GL)
2000/01	688
1999/00	541
1998/99	608
1997/98	741
1996/97	467
1995/96	520
1994/95	176
1993/94	338

Figure 7. Summary of Water Use in Queensland



7.3 Condamine-Balonne

- **Condamine**

Total diversion from the Condamine River upstream of Chinchilla was 110 GL. Of this approximately 60 GL was water harvesting diversion taken from a single flow event in February 2001.

Regulated diversion was 24 GL from a 26 GL entitlement between the Upper Condamine and Chinchilla Water Supply Schemes. Upper Condamine started the year with an announced allocation of 95% and Chinchilla 40%.

Announced allocations in both schemes were revised to 100 % during the water year.

Unregulated irrigation totalled 19 GL, with over 30 % of this relating to access to Toowoomba’s effluent water some of which is discharged to watercourses for downstream use by licensed irrigators. Urban, industrial and stock use totalled 7 GL.

Only 56 GL flowed past Chinchilla during the year. Average annual flow is in the order of 600 GL.

- **Balonne**

The flow situation was only marginally better at St George with a total volume of flow for the year of only 276 GL downstream of St George where average annual flow is in the order of 1200 GL.

Total diversion in the Balonne was similar to the 1999/00 water year at 251 GL. This extraction again reflects the limited water harvesting opportunity available with only one significant water harvesting event in the year. Total water harvesting extraction was 175 GL mostly taken from a flow in November 2000.

Regulated supply for the St George Water Supply Scheme was limited coming into the water year with Beardmore Dam at 35 % capacity and only 20 % announced allocation. This was revised upward to 70 % when the dam was filled in the November flow and to 100 % with further inflow in February. This is not an unusual pattern for the St George Water Supply Scheme where total nominal allocation is similar to storage capacity and the scheme reliant on annual inflows. Total regulated use for the year was 71 GL out of an 81 GL entitlement.

The balance of diversion was made up in very limited use, 1.5 GL of unregulated irrigation entitlement and 3.5 GL for urban, industrial and stock use.

7.4 Border Rivers/Macintyre Brook

The increased water harvesting opportunity available in the Border Rivers saw total diversions increase to 288 GL in the Border Rivers for the 2000/01 year.

Over 215 GL of this was taken as water harvesting diversion mostly diverted from major flows in November 2000 and March 2001.

The two major dams in the system, Glenlyon Dam near Stanthorpe and Coolmunda dam near Inglewood, started the year at around 60 % capacity. Glenlyon Dam was storing significant carryover from 1999/00 (in excess of 50 % of allocation) so announced allocation for the downstream water supply scheme (Dumaresq) was limited to 10 % for the full year. The Macintyre Brook Water Supply Scheme downstream of Coolmunda Dam started the year with an announced allocation of 65 % and this was revised to 100 % following inflows to the dam in February 2001. Regulated usage in each of the schemes continues to be above average with 59 GL being used out of a total entitlement of 101 GL. The high usage is a result of the 'use it or lose it' carryover policy in the Dumaresq scheme and continued growth in use in the Macintyre Brook scheme as farmers diversify into new crops in this area.

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

Total flow through Goondiwindi for the year was 1376 GL with a further 66 GL contributed from the Weir River system in Queensland downstream. Average annual flow past Goondiwindi is 1030 GL and from the Weir River is 157 GL.

7.5 Moonie

Diversions in the Moonie system were estimated at 31 GL for the water year, a marked increase on estimates in previous years. The increase is partly

due to a better knowledge of the infrastructure on the system allowing a more detailed estimate of use and also because of increased opportunity for water harvesting. Although the total flow through the Fenton gauge was only 76 GL, approximately half of the long-term average of 156 GL, there were two separate flows through the Summer growing season (November 2000 followed by a larger flow in February 2001) allowing irrigators to 'top up' storages depleted from peak Summer usage.

With no regulated water supply schemes in the Moonie and no sustained base flow, water harvesting diversions account for almost 100 % of diversions in the system.

7.6 Warrego/Paroo

Usage on the Warrego and Paroo Rivers was estimated at 9 GL for the year. The bulk of this usage is in the Warrego catchment with the Paroo catchment virtually undeveloped, i.e. 28 ML diversion. Irrigation diversions in the Warrego were distributed between regulated supply from the Cunnamulla Weir, 1.4 GL, and water harvesting, 7 GL, with unregulated irrigation diversion making up the balance. It was expected that the regulated supply entitlement of 2.6 GL in the Warrego might be more fully utilised this year with recent development in the area, but significant water harvesting opportunity in November/December 2000 may have offset some of the potential demand.

Over 700 GL flowed past the Cunnamulla gauging station during November and December 2000 with base flows continuing through to March 2001. Long-term flows information is not available for Cunnamulla but long-term annual average is thought to be in the 400 – 500 GL range.

The Paroo River also benefited from the November/December rainfalls but not to the same extent with only 150 GL passing Caiwarro approximately 50 km upstream of the Queensland – NSW border. A further smaller flow in June 2001 brought the total flow for the year to 173 GL. The long-term annual average is 555 GL.

8. Review of 2000/01 Water Use in the ACT

8.1 Review of Water Use in the ACT

Water use in the ACT was slightly above the climate adjusted target for 2000/01. Extractions from storages for the urban supply was close to 63GL with returns from sewage treatment plants to the river system totalling 34.2 GL resulting in net urban consumption of 28.8 GL. Non urban consumption is again estimated at 5 GL giving a total net consumption of 33.8 GL.

8.2 Progress of Water Reforms in the ACT

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

Environmental Flow Guidelines which predominantly protect low flows and the variability of remaining flows have been established and implemented. A Water Resources Management Plan has been developed and implemented. Progress to date includes the licensing of all known users and the issuing of volumetric allocations. It is expected that a small numbers of minor users, mainly urban bore owners, will continue to be discovered over the next one to two years.

The majority of rural diversions are now licensed and metered. Metering has only been in place since 1999/00 with a high percentage of rural consumers having difficulty in meeting reporting requirements in 2000/01.

8.3 Establishment of an ACT Cap

Discussions to establish an ACT Cap are continuing. A number of options have been considered with detailed discussions centred on a Cap in the 38-61 GL range and associated capacity for future trade. Resolution of interstate trading arrangements now appears to be the largest impediment to the early establishment of an ACT Cap.

9. Water Trading in the Murray-Darling Basin

9.1 History of Water Trading

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

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

Trade has an impact on the implementation of the Cap. The trade in previously unused entitlements affects the size of the allocation that can be announced by the water managers whilst

inter-valley and interstate trade affects the Cap targets for the individual river valleys. It is therefore important that data on water trading be collected and published in the Water Audit Monitoring Report.

Table 7 details the total volume of intra-valley water trades and the net inter-valley and interstate water trades that occurred during the 2000/01 water year.

The sign convention used in Table 7 is that a negative value indicates a trade out of the valley and a positive value indicates a trade into the valley. It can be seen from this that compared to the total volumes of water traded, the inter-valley trades in 2000/01 were small and the interstate trades were negligible. Permanent inter-valley trades will result in permanent changes to the valley Caps usually calculated as the volume of entitlement traded multiplied by an agreed transfer factor. Temporary trades will alter the annual Cap targets usually on a one for one basis. Trade will therefore affect the Caps for individual valleys but will not result in an increase in the overall Cap for the Basin.

Interstate water trading between New South Wales, Victoria and South Australia continued to develop in 2000/01. 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 2000/01

System	Permanent Entitlement Transfer				Temporary Entitlement Transfer				Adjustment to 2000/01 Cap Target for Temporary and unused Permanent Trade (ML)
	Total Permanent Entitlement Sold (ML)	Net Inter-valley trade Inwards excluding Interstate Trade (ML)	Net Interstate trade Inwards (ML)	Future Adjustment to Cap from this years Permanent Trade (ML)	Total Temporary Allocation Sold (ML)	Net Inter-valley trade Inwards excluding Interstate Trade (ML)	Net Interstate Inwards (ML)	Adjustment to 2000/01 Cap Target for Temporary Trade (ML)	
New South Wales									
Border Rivers	486	0	0	0	19196	0	-8474	-8474	-8474
Gwydir	198	0	0	0	21209	0	0	0	0
Namoi/Peel	1329	0	0	0	27547	0	0	0	0
Macquarie/ Castlereagh/Bogan	10583	0	0	0	42738	0	0	0	0
Barwon-Darling	0	0	0	0	0	0	0	0	0
Lower Darling	0	0	0	0	34735	21784	-1775	20009	0
Lachlan	16944	0	0	0	64410	0	0	0	0
Murrumbidgee	3558	0	0	0	212000	-29575	-602	-30177	-30177
Murray	3556	0	-176	-158	129551	7791	-4770	3021	2845
Total NSW	36654	0	-176	-158	551386	0	-15621	-15621	-35806
Victoria⁴									
Goulburn	2172	-1407	0		4485	9649	-1092		
Broken	0	0	0		0	0	0		
Loddon	4	-4	0		2369	-363	0		
Goulburn Broken Loddon	2176	-1411	0	1792	6853	9286	-1092	4328	2939
Campaspe	0	22	0	0	4189	-3866	0	0	0
Wimmera-Mallee	0	0	0	0	0	0	0	0	0
Kiewa	0	60	0		0	0	0		
Ovens	0	0	0		0	0	0		
Murray	4053	1329	-4299		11598	-5420	4984		
Kiewa Ovens Murray	4053	1389	-4299	2077	11598	-5420	4984	-436	-3346
Total Victoria	8405	0	-4299	3869	29494	0	3892	3892	-407
South Australia									
Metro-Adelaide & Associated Country Areas ⁵	0	0	0	0	0	0	0	0	0
Lower Murray Swamps	210	-210	0	-210	738	-738	0	-738	-948
Country Towns	0	0	0	0	0	0	0	0	0
All Other Uses of Water from the River Murray	42100	210	4475	4237		738	3255	3993	8678
Total South Australia	42310	0	4475	4027	738	0	3255	3255	7730
Queensland									
Condamine/Balonne	0	0	0	0	8733	0	0	0	0
Border Rivers	0	0	0	0	12345	3496	8474	11970	11970
Macintyre Brook	0	0	0	0	4159	-3496	0	-3496	-3496
Moonie	0	0	0	0	0	0	0	0	0
Warrego	0	0	0	0	0	0	0	0	0
Paroo	0	0	0	0	0	0	0	0	0
Total Queensland	0	0	0	0	25237	0	8474	8474	8474
Australian Capital Territory									
	0	0	0		0	0	0	0	0
Total Basin	87369	0	-1		606855	0	0	0	-20010

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, as per the Diversion Cap Register (Appendix A).
2. The total Cap adjustment for temporary trade is comprised of the sum of net inter-valley and interstate trade for each designated river valley, as per the Diversion Cap Register (Appendix A).
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-tradeable, unless the Ministerial Council determines otherwise.
6. Figures for NSW are approximate.

10. Water Availability for the Year 2000/01

10.1 Water Availability

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

A key step in the process to implement the Cap will be the adjustments that are made to the States’ allocation systems. In the process, it is expected that many existing water users who are disadvantaged by the implementation of the Cap will look at other systems and highlight any inconsistencies. To aid such comparisons and to make Cap implementation more transparent, the water used in each valley has been compared with the quantity of water that has been authorised for use in that valley in 2000/01 (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 Announced Overdraw

In some valleys an announcement is sometimes made during the season permitting irrigators to draw on next year’s allocation. This increases the quantity of water that can be diverted in the season but will, if not cancelled by a spill from storage, reduce the volume available for the next season. The base entitlement multiplied by the announced overdraw is reported in the third column of Table 8.

10.1.3 Allocation Transferred into Valley

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

10.1.4 Carryover and Overdraw from the Previous Year

In some valleys, irrigators have been given the right to carry over unused allocation from the previous season. This system allows individual irrigators to adjust their level of water use to change their risk profile (e.g. by use of carryover the irrigator has a greater security of supply in the following year). Ultimately such a system will allow individual irrigators to select their own security of supply and thus allows for a greater diversity of crop types. A carryover from last season, which has not been cancelled as a result of a spill from storage, will add to this season’s allocation. Table 9 shows the balance between

the carryover from last season and the overdraw utilised (as opposed to announced). The net carryover minus overdraw from 1999/00 adjusted where necessary for any cancellation is included as column 5 in Table 8.

10.1.5 Access to Off-allocation and Water Harvesting

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

Water harvesting licences have been issued in some Queensland streams. Irrigators with these licences are limited by their diversion capacity and by the flow at which they can commence to pump but not by the volume of water they can divert or by the area they can plant.

In some river valleys, a considerable percentage of the water diverted is authorised by the off-allocation or water harvesting rules. In theory it would be possible to determine the maximum volume of water that would be possible to divert each year under these rules by assuming that irrigators divert at their diversion capacity for as long as the flow conditions apply. Although, in practice this does not generally occur as diversion capacity is limited by off-stream storage development and related irrigated areas.

Queensland has adopted this method of reporting (see Table 10). In contrast, New South Wales currently report the use from off-allocation and water harvesting which underestimates the volume of water authorised for diversion (see Table 10).

10.1.6 Area Licences on Unregulated Streams

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

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

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

10.1.7 Irrigation System Losses

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

10.2 Comparison of Diversions with Water Authorised for Use

The final column in Table 10 lists the total volume of water that could be diverted in 2000/01 if all authorities to use water in 2000/01 were fully utilised (with the qualifications for off-allocation, water harvesting and area licences made in Sections 10.1.5 and 10.1.6). In Table 11 these volumes are compared with the water used in each valley and the percentage use of the water made available by the water authorities for diversion is presented.

In calculating the water used in Victorian river valleys, the volumes diverted from each stream have to be adjusted for the water diverted from other valleys (second column of Table 11). For example, in the Victorian river valleys water is physically transferred from the Goulburn Valley into the Campaspe and Loddon Valleys via the Waranga Western Channel.

It is expected that diversion as a percentage of the water authorised to be diverted will fluctuate from year to year depending upon the climatic conditions and the degree to which the diversions

are constrained by the physical resources available. Typically the utilisation of the allocations will be higher in the drier years and lower in the wetter years, especially in the south of the Basin. It is also expected that allocations would reduce and utilisation increase if the allocation system was tightened to prevent growth in diversions under the Cap. In this context, the 73% utilisation of Basin allocations in 2000/01 is higher than the average of 63% reported for the 5 years to 1993/94 in the 1995 report to the Ministerial Council "An Audit of Water Use in the Murray-Darling Basin".

Table 8. Water Allocated in 2000/01

System	Base Valley	Announced Allocation ² (GL)	Announced Overdraw ³ (GL)	Allocation Transferred into Valley ⁴ (GL)	Net	Total
	Water Entitlement ¹ (GL)				Carryover / Overdraw from 1999/00 ⁵ (GL)	Allocated Water in Valley ⁶ (GL)
New South Wales						
Border Rivers	266	108	0	-8	137	237
Gwydir	528	528	0	0	0	528
Namoi/Peel	313	313	0	0	0	313
Macquarie/Castlereagh/Bogan	675	832	0	0	108	940
Barwon-Darling ⁷	518	518	0	0	0	518
Lower Darling	48	48	0	20	0	68
Lachlan	667	570	0	0	97	667
Murrumbidgee	2773	2566	0	-30	183	2719
Murray	2180	2083	0	3	292	2378
Total NSW	7968	7566	0	-16	817	8367
Victoria						
Goulburn	729	729	0	9	0	738
Broken	39	57	0	0	0	57
Loddon	283	283	0	0	0	283
Campaspe	279	279	0	-4	0	275
Wimmera-Mallee	100	81	0	0	0	81
Kiewa	16	16	0	0	0	16
Ovens	56	56	0	0	0	56
Murray	1190	2008	0	0	0	2008
Total Victoria	2693	3511	0	4	0	3514
South Australia						
Metro-Adelaide & Associated Country Areas ⁸	130	213	0	0	0	213
Lower Murray Swamps	100	100	0	-1	0	99
Country Towns	50	50	0	0	0	50
All Other Uses of Water from the River Murray	515	515	0	4	0	518
Total South Australia	794	877	0	3	0	880
Queensland						
Condamine/Balonne	127	127	0	0	19	146
Border Rivers	87	12	0	12	39	64
Macintyre Brook	19	19	0	-3	0	15
Moonie	0	0	0	0	0	0
Warrego	3	3	0	0	0	3
Paroo	0	0	0	0	0	0
Total Queensland	236	161	0	8	58	228
Aust. Capital Territory¹⁰	34	34	0	0	0	34
Total Basin	11725	12148	0	0	875	13023

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. Base entitlement multiplied by the announced percentage overdraw.
4. Net temporary inter-valley entitlement transfer from Table 7.
5. Net Carryover less Overdraw from Previous Year (see Table 9).
6. Allocated water = announced allocation + announced overdraw + inter-valley trade + net carryover from last season (in NSW the addition of high security entitlements are also included).
7. The entitlement of 518 GL is upper bound use. Water is allocated in the Barwon-Darling system on an event basis.
8. Indicative average annual allocation from 5-year rolling total of 650 GL.
9. Volume that could be diverted before the 5-year Cap would be exceeded in 2000/01.
10. There is no formal entitlement in ACT to date. Net diversion shown.

Table 9. Carryovers and Overdraws for 2000/01

System	Overdraw	Carryover	Overdraw	Carryover	Net		Carryover to 2000/01 (GL)
	from 1999/00 (GL)	from 1999/00 (GL)	Cancelled in 2000/01 (GL)	Cancelled in 2000/01 ¹ (GL)	Carryover from 1999/00 ² (GL)	Overdraw from 2000/01 (GL)	
New South Wales							
Border Rivers	0	137	0	0	137	0	111
Gwydir	0	0	0	0	0	0	0
Namoi/Peel	0	0	0	0	0	0	0
Macquarie/Castlereagh/Bogan	0	601	0	493	108	0	345
Barwon-Darling	0	0	0	0	0	0	0
Lower Darling	0	0	0	0	0	0	62
Lachlan	0	246	0	149	97	0	214
Murrumbidgee	0	183	0	0	183	0	338
Murray	0	292	0	0	292	0	0
Total NSW	0	1458	0	642	817	0	1069
Victoria							
Goulburn	0	0	0	0	0	0	0
Broken	0	0	0	0	0	0	0
Loddon	0	0	0	0	0	0	0
Campaspe	0	0	0	0	0	0	0
Wimmera-Mallee	0	0	0	0	0	0	0
Kiewa	0	0	0	0	0	0	0
Ovens	0	0	0	0	0	0	0
Murray	0	0	0	0	0	0	0
Total Victoria	0	0	0	0	0	0	0
South Australia							
Metro-Adelaide & Associated Country Areas	0	0	0	0	0	0	0
Lower Murray Swamps	0	0	0	0	0	0	0
Country Towns	0	0	0	0	0	0	0
All Other Uses of Water from the River Murray	0	0	0	0	0	0	0
Total South Australia	0	0	0	0	0	0	0
Queensland							
Condamine/Balonne	0	19	0	0	19	0	2
Border Rivers	0	52	0	13	39	0	7
Macintyre Brook	0	0	0	0	0	0	0
Moonie	0	0	0	0	0	0	0
Warrego	0	0	0	0	0	0	0
Paroo					0		
Total Queensland	0	71	0	13	58	0	9
Aust. Capital Territory	0	0	0	0	0	0	0
Total Basin	0	1530	0	655	875	0	1079

1. Under certain conditions (such as storage spills), carryovers and overdraws from the previous season can be cancelled.

2. Net carryover is defined as: [(carryover less cancelled carryover) - (overdraw less cancelled overdraw)].

Table 10. Water Authorised for Use in 2000/01

System	Total Allocated Water in Valley¹ (GL)	Access to Off-Allocation, Water- harvesting² (GL)	Unregulated Stream Use not in Allocation³ (GL)	System Losses not in Allocation⁴ (GL)	Authorised Use in Valley⁵ (GL)
New South Wales					
Border Rivers	237	117	16	0	369
Gwydir	528	146	11	0	685
Namoi/Peel	313	50	42	0	405
Macquarie/Castlereagh/Bogan	940	28	31	0	999
Barwon-Darling	518	0	0	0	518
Lower Darling	68	180	50	0	298
Lachlan	667	22	11.0	0	700
Murrumbidgee	2719	760	6.0	0	3485
Murray	2378	287	6	0	2671
Total NSW	8367	1589	173	0	10129
Victoria					
Goulburn	738	148	0	257	1143
Broken	57	8	0	0	65
Loddon	283	0	0	84	367
Campaspe	275	0	0	36	312
Wimmera-Mallee	81	0	0	46	127
Kiewa	16	0	0	0	16
Ovens	56	0	0	0	56
Murray	2008	206	0	449	2663
Total Victoria	3514	361	0	872	4748
South Australia					
Metro-Adelaide & Associated Country Areas ⁶	213	0	0	0	213
Lower Murray Swamps	99	0	0	0	99
Country Towns	50	0	0	0	50
All Other Uses of Water from the River Murray ⁷	518	0	0	0	518
Total South Australia	880	0	0	0	880
Queensland					
Condamine/Balonne ⁸	146	235	20	10	411
Border Rivers ⁸	64	215	10	0	289
Macintyre Brook	15	0	1	0	16
Moonie	0	30	0	0	31
Warrego	3	7	1	0	10
Paroo	0	0	0	0	0
Total Queensland	228	488	31	10	756
Aust. Capital Territory	34	0	0	0	34
Total Basin	13023	2438	204	881	16547

1. Allocated water from Table 8 (Figures for NSW are approximate).
2. The volume of off-allocation water used and water harvested has been reported for NSW and Victoria. The volume of water made available for Queensland has been included.
3. Unregulated stream entitlement in Victoria is included in the base entitlement.
4. 'System Losses not in Allocation' are losses in those irrigation systems where the entitlement is defined at the farm gate and losses in the distribution system are not covered by an entitlement.
5. Water is allocated in the Barwon-Darling system on an event basis.
6. The water allocated for Metro-Adelaide & Associated Country Areas in 2000/01 is based upon the usage in the previous four years against the five-year rolling total of 650 GL.
7. Water authorised for use is not equal to the Cap component for 'All Other Uses of Water from the River Murray', as this is defined as 90% of the total licensed allocations.
8. Authorised diversions allowed to operate above account flow thresholds without restriction of storages.

Table 11. Use of Valley Allocations in 2000/01

System	Diversion from valley (GL)	Diverted from other valleys (GL)	Total use in valley (GL)	Authorised use in valley (GL)	Use as a percentage of authorised valley use (%)
New South Wales					
Border Rivers ¹	248	0	248	369	67%
Gwydir	425	0	425	685	62%
Namoi/Peel	315	0	315	405	78%
Macquarie/Castlereagh/Bogan	495	0	495	999	50%
Barwon-Darling ¹	242	0	242	518	47%
Lower Darling ¹	246	0	246	298	83%
Lachlan	418	0	418	700	60%
Murrumbidgee	2711	0	2711	3485	78%
Murray	2048	0	2048	2671	77%
Total NSW	7148	0	7148	10129	71%
Victoria					
Goulburn	1451	-514	937	1143	82%
Broken	17	0	17	65	26%
Loddon	101	241	343	367	93%
Campaspe	113	206	318	312	102%
Wimmera-Mallee	98	19	117	127	92%
Kiewa	11	0	11	16	67%
Ovens	23	0	23	56	41%
Murray	1678	37	1715	2663	64%
Total Victoria	3491	-11	3480	4748	73%
South Australia					
Metro-Adelaide & Associated					
Country Areas ²	104	0	104	213	49%
Lower Murray Swamps	100	0	100	99	101%
Country Towns	38	0	38	50	76%
All Other Uses of Water from the River Murray ³	421	0	421	518	81%
Total South Australia	662	0	662	880	75%
Queensland					
Condamine/Balonne	360	0	360	411	88%
Border Rivers	273	0	273	289	95%
Macintyre Brook	15	0	15	16	94%
Moonie	31	0	31	31	100%
Warrego	9	0	9	10	88%
Paroo	0	0	0	0	100%
Total Queensland	688	0	688	756	91%
Aust. Capital Territory	34	0	34	34	100%
Total Basin	12023	-11	12013	16547	73%

1. The authorised use in valley does not satisfactorily describe the volume of water that could be utilised for water harvesting, off-allocation and area licences on unregulated streams.
2. The volume authorised for use for Metro-Adelaide & Associated Country Areas for 2000/01 is the amount that could be used before the 5-year Cap of 650 GL would be exceeded.
3. Water authorised for use is not equal to the Cap component, as this is defined as 90% of the total licensed allocations.
4. Figure of authorised use in NSW are approximate.

11. Comparison of Actual Flows with Natural Flows

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

The natural flows are estimated from computer modelling studies. Many of the river models are incomplete or not yet modified to allow these numbers to be readily calculated for 2000/01. Table 12 presents the 2000/01 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.

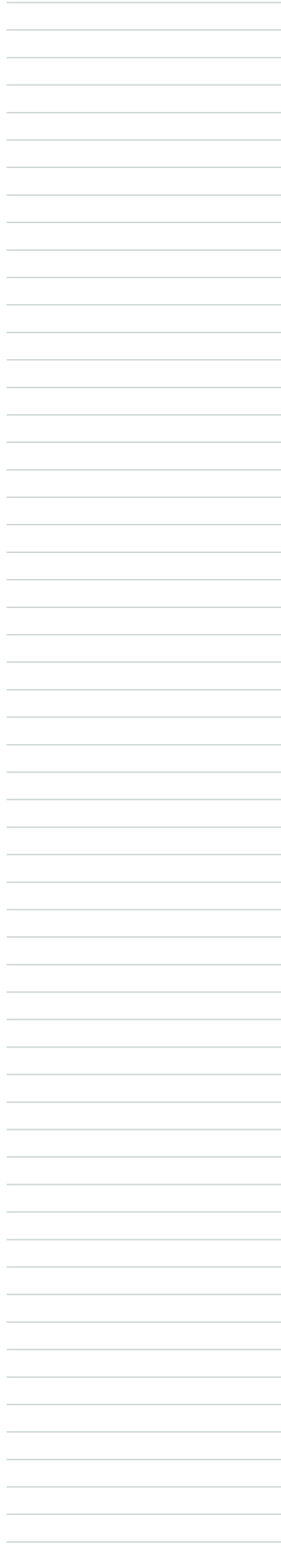
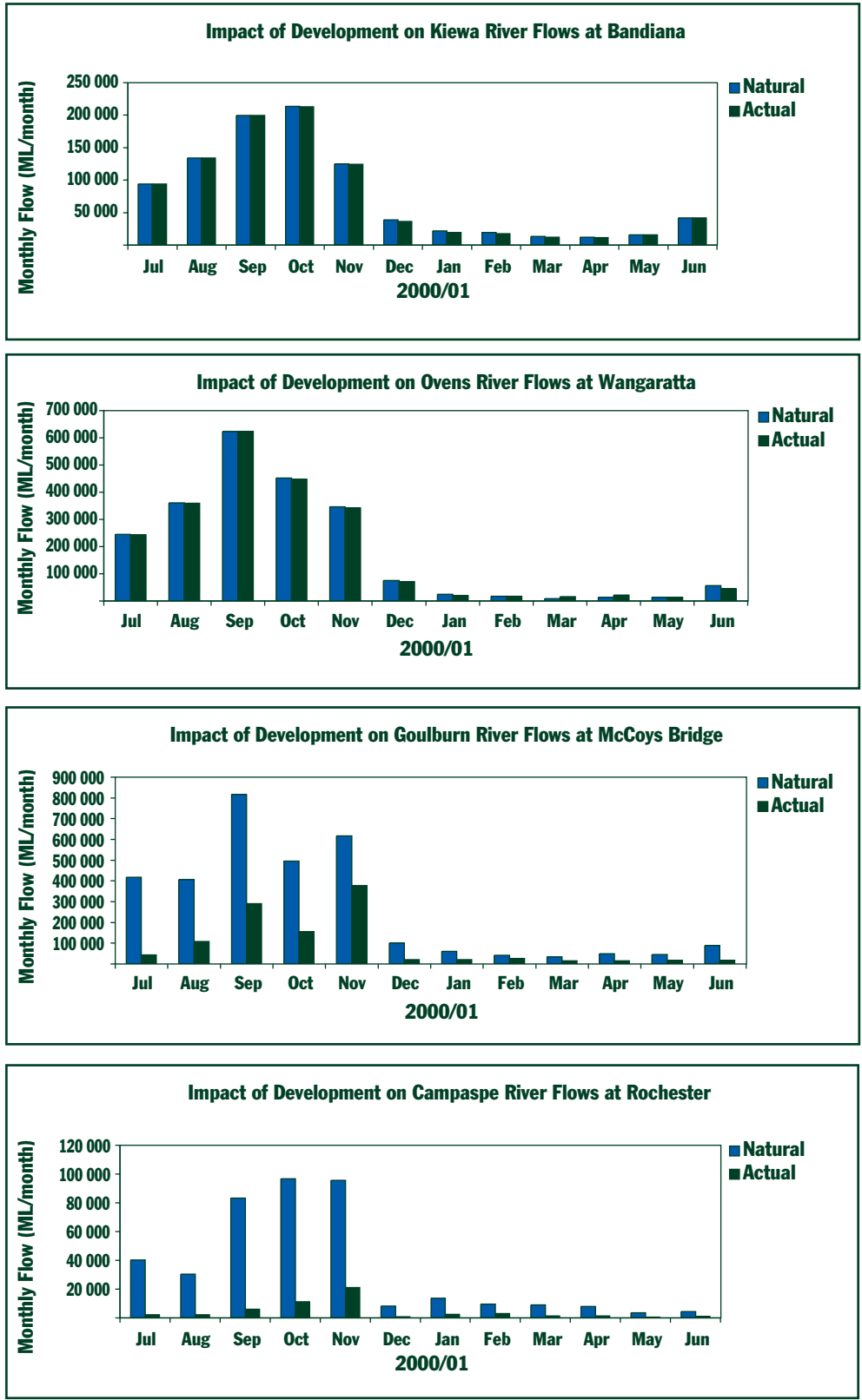


Table 12. Comparison of 2000/01 Actual and Natural Annual Flows for Key Sites within the Murray-Darling Basin

System	Actual Flow (GL)	Natural Flow (GL)	Actual/Natural (%)
Inter-Basin Transfers			
Snowy Mountain Scheme to Murrumbidgee River	961	n/a	n/a
Snowy Mountain Scheme to Murray River	538	n/a	n/a
Glenelg River Catchment to Wimmera-Mallee	n/a	n/a	n/a
Wannon River Catchment to Wimmera-Mallee	n/a	n/a	n/a
New South Wales Tributaries²			
Barwon River at Mungindi + Boomi River	490	n/a	n/a
Inflows to Gwydir Wetland	79	n/a	n/a
Gwydir System Outflows to Barwon River	353	n/a	n/a
Namoi System Outflows to Barwon River	1176	n/a	n/a
Inflows to Macquarie Marshes	887	n/a	n/a
Macquarie/Castlereagh/Bogan Outflows	619	n/a	n/a
Darling River Inflows to Menindee Lakes	2447	n/a	n/a
Lachlan River at Corrong	165	n/a	n/a
Lachlan River at Booligal	242	n/a	n/a
Murrumbidgee River at Balranald	1467	n/a	n/a
Lower Darling River at Burtundy	1691	n/a	n/a
Victorian Tributaries			
Kiewa River at Bandiana	919	930	99%
Ovens River at Wangaratta	2218	2236	99%
Goulburn River at McCoys Bridge	1109	3171	35%
Campaspe River at Rochester	53	403	13%
Loddon River at Appin South	21	208	10%
Wimmera River at Horsham	3	18	15%
Queensland Tributaries			
Condamine/Balonne/Culgoa Flows at NSW Border	91	n/a	n/a
Macintyre River at Goondiwindi	1376	n/a	n/a
Moonie River at Fenton	76	n/a	n/a
Warrego River at Cunnamulla	720	n/a	n/a
Paroo River at Caiwarro	173	n/a	n/a
River Murray			
Albury (Doctors Point)	5931	n/a	n/a
Downstream of Yarrawonga Weir	6234	n/a	n/a
Euston	5610	n/a	n/a
South Australian Border	6540	n/a	n/a
Barrages	4972	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 2000/01 Actual and Natural (Modelled) Flows in Victoria



12. Impoundments and Losses in Major On-Stream Storages

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

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

The impoundments and losses in major on-stream storages (above 10 GL capacity) within the Basin are reported in Table 13. The volumes reported indicate that the total volume in storage in the Basin in 2000/01 has increased from 14122 GL to 15475 GL (61% full). Total evaporative losses for major storages within the Basin were calculated by the respective States and are reported at 1385 GL, representing 6% of total storage capacity and 12% of total diversion from the Basin. The total reduction in flow of 2738 GL due to impoundment and evaporative losses was 23% of total basin diversion.

Table 13. Impoundments and Losses in Major On-Stream Storages (greater than 10 GL capacity) in 2000/01

	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	1999	1971	1975	99%	4	609	613
<i>Murray</i>	Dartmouth Reservoir	1979	3906	2190	3138	80%	947	-4	943
	Hume Reservoir	1936-61	3038	1289	1254	41%	-35	58	23
	Lake Victoria	1928	680	500	360	53%	-140	120	-20
Total Murray-Darling Basin Commission			9623	5950	6727	70%	777	783	1560
Snowy Mountains Scheme in Murray-Darling Basin									
<i>Murrumbidgee River Valley</i>	Jounama Pondage	1968	44	37	24	55%	-13	0	-13
	Talbingo Reservoir	1971	921	910	917	99%	7	4	11
	Tantangara Reservoir	1960	254	28	20	8%	-9	0	-9
	Tumut Pondage	1958	53	31	35	66%	4	0	4
<i>Murray River Valley</i>	Geehi Reservoir	1966	21	17	14	65%	-3	0	-3
	Tooma Reservoir	1961	28	4	3	12%	0	0	0
	Khancoban Pondage	1965	22	10	9	44%	0	0	0
Total Snowy Mountains Scheme			1342	1036	1021	76%	-15	4	-10
Borders Rivers Commission									
<i>Border Rivers</i>	Glenlyon Dam	1976	254	149	136	54%	-13	12	-1
Total Border Rivers Commission			254	149	136	54%	-13	12	-1
New South Wales									
<i>Border Rivers</i>	Pindari Reservoir	1962-96	312	255	289	93%	34	10	44
<i>Gwydir</i>	Copeton Reservoir	1976	1364	873	835	61%	-38	60	22
<i>Namoi/Peel</i>	Chaffey Reservoir	1979	62	60	62	100%	2	6	8
	Keepit Reservoir	1960	423	221	281	66%	59	36	96
	Split Rock Reservoir	1987	397	355	390	98%	35	23	58
<i>Macquarie/Castlereagh/Bogan</i>	Burrendong Reservoir	1967	1678	1206	1016	61%	-191	61	-129
	Windamere Reservoir	1984	368	266	332	90%	66	16	82
<i>Lachlan</i>	Carcoar Reservoir	1970	36	36	31	87%	-4	4	-1
	Lake Brewster	1952	153	91	27	17%	-64	87	22
	Lake Cargelligo	1902	36	36	35	97%	-1	21	20
<i>Murrumbidgee</i>	Wyangala Reservoir	1936-71	1220	1093	929	76%	-164	50	-113
	Blowering Reservoir	1968	1631	679	860	53%	181	21	202
	Burrinjuck Dam	1907-56	1028	397	412	40%	15	20	35
	Tombullen Off-River Storage	1980	11	n/a	n/a	n/a	n/a	n/a	n/a
	Hay Weir	1981	14	n/a	n/a	n/a	n/a	n/a	n/a
Total NSW			8733	5568	5499	63%	-69	415	346
Victoria									
<i>Goulburn/Broken/Loddon</i>	Eildon Reservoir	1956	3390	612	1082	32%	470	2	471
	Lake Mokoan	1971	365	151	203	55%	52	34	86
	Lake Nillahcootie	1967	40	20	20	51%	0	-1	0
	Cairn Curran Reservoir	1956	148	36	75	51%	39	8	46
	Tullaroop Reservoir	1959	74	19	41	55%	22	3	25
<i>Campaspe</i>	Lake Eppalock	1964	312	81	199	64%	117	15	132
	Lauriston Reservoir	1941	20	16	19	93%	3	0	3
	Malmsbury Reservoir	1870	18	12	12	64%	0	0	0
<i>Wimmera-Mallee</i>	Upper Coliban Reservoir	1903	37	8	22	58%	14	1	15
	Lake Bellfield	1966	79	25	22	28%	-3	2	0
	Lake Fyans	1916	21	8	7	31%	-2	6	4
	Lake Lonsdale	1903	66	0	0	0%	0	5	5
	Lake Taylor	1923	36	12	19	52%	7	3	10

Table 13 continued

	Major On-Stream Storage	Completion Date	Storage Capacity (GL)	Volume of Storage at Beginning of Water Year (GL)	Volume of Storage at End of Water Year (GL)	Percentage of Storage Full at End of Year (%)	Increase in Volume of Storage (GL)	Evaporation Losses (GL)	Net Reduction in Flow due to Storage (GL)
<i>Murray/Kiewa/Ovens</i>	Pine Lake	1928	64	9	2	3%	-7	4	-3
	Tooloondo Reservoir	1953	107	37	14	13%	-23	9	-14
	Wartook Reservoir	1887	29	5	11	38%	6	6	13
	Rocky Valley Reservoir	1959	28	5	23	80%	18	0	18
	Lake Buffalo	1965	24	15	14	59%	-1	-1	-2
	Lake William Hovell	1973	14	14	9	64%	-5	-1	-6
Total Victoria			4871	1085	1791	37%	706	96	802
Queensland									
<i>Condamine/Balonne</i>	Beardmore Dam	1972	82	27	36	44%	9	35	44
	Chinchilla Weir	1974	10	5	4	44%	-1	3	3
	Cooby Dam	1942	21	17	15	73%	-1	3	2
	Jack Taylor Weir	1953-59	10	6	9	84%	3	3	6
	Leslie Dam	1985	106	54	30	28%	-24	9	-15
<i>Macintyre Brook</i>	Coolmunda Dam	1968	75	41	31	41%	-10	16	6
Total Queensland			304	150	125	41%	-24	70	46
Australian Capital Territory									
<i>Murrumbidgee</i>	Bendora Reservoir	1961	11	8	8	77%	0	0	0
	Corin Reservoir	1968	76	52	45	60%	-7	0	-7
	Googong Reservoir	1979	125	124	121	98%	-2	4	2
Total ACT			211	184	175	83%	-9	5	-4
Total Basin			25338	14122	15475	61%	1353	1385	2738

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

13. Groundwater Use in the Basin

Context

Based on the findings from the Review of the Operation of Cap the Council, in August 2000, agreed to the following the 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 running 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 the *Recommendation 20*.

Groundwater Data for 2000/01

The GTRG supplied the estimated data for sustainable yield (SY) allocation and usage of groundwater in 2000/01 for each Groundwater

Management Unit (GMU) in the Basin. The data for NSW 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 2786 GL. Out of this 3014 GL was already allocated in 2000/01, which constituted 108% of SY. The total usage of groundwater in the Basin was 1240 GL, which was of 41% of allocation and 45% of SY. The groundwater usage was 10% of surface water diversion in the Basin. This reinforces the fact that groundwater is an important resource in which there is a considerable scope for future development within the current allocation. A recent report by Sinclair Knight Merz (SKM) has estimated that there is strong linkage between groundwater use and surface water flows with an average reduction in surface water flow of 600 ML for every 1000 ML of groundwater use. This highlights the importance of management of groundwater to the Cap on diversions.

Table 14 . Basin-wide groundwater data for 2000/01 aligned along the designated Cap valleys

Designated River Valley System	Estimated Sustainable Yield (GL/yr)	2000/01 Allocation (GL)	2000/01 Use (GL)	Surface Water Use (GL) ¹
New South Wales				
Border Rivers	16	18	15	248
Moonie	38	48	48	
Gwydir	71	176	82	425
Namoi/Peel	219	503	279	315
Macquarie/Castlereagh/Bogan	143	279	81	495
Barwon-Darling	5	9	9	242
Lower Darling	n/a	n/a	n/a	246
Lachlan	377	529	127	418
Murrumbidgee	298	390	202	2711
Murray	158	351	56	2048
Total NSW	1324	2302	900	7148
Victoria				
Goulburn/Broken/Loddon	447	264	110	1569
Campaspe	83	71	25	113
Wimmera-Mallee	331	57	26	98
Kiewa/Ovens/Murray	378	99	37	1712
Total Victoria	1239	491	198	3491
South Australia				
Metro-Adelaide & Associated Country Areas	n/a	n/a	n/a	104
Lower Murray Swamps	n/a	n/a	n/a	100
Country Towns	n/a	n/a	n/a	38
All Other Uses of Water from the River Murray	n/a	n/a	n/a	421
Total South Australia	58	61	25	662
Queensland				
Condamine/Balonne	133	137	105	360
Border Rivers	19	20	9	273
Macintyre Brook	n/a	1	1	15
Moonie	1	0	0	31
Warrego	5	2	1	9
Paroo	n/a	0	0	0
Total Queensland	158	159	116	688
Australian Capital Territory	7	1	1	34
Total Basin	2786	3014	1240	12023

1. Refer Table 2.

14. Conclusion

The information and data contained within this report provides a comprehensive review of consumptive water use and management for the 2000/01 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 2000/01 was 12023 GL and Groundwater use was 1240 GL.

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

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

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

The accuracy of diversion measurements remained static at $\pm 7\%$ in the 2000/01 water year in comparison to previous years.

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

Interstate water trading between New South Wales, Victoria and South Australia continued to develop in 2000/01.

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 2000/01 increased from 14122 GL to 15475 GL (61% full). Total evaporative losses for major storages within the Basin was 1385 GL, representing 6% of total storage capacity and 12% of total Basin diversion.

The Cap was exceeded in NSW Namoi, Lachlan, Barwon-Darling/Lower Darling. However there was large basin-wide Cap credit.

The estimated sustainable yield of aquifers in GMU in 2000/01 was 2786 GL. The allocation of groundwater in the basin was 3014 GL and usage was 1240 GL.

Environmental releases of 341 GL were diverted to the Barmah-Millewa Forest in 2000/01.

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>ACTEW</i>	Australian Capital Territory Electricity and Water.
<i>announced allocation</i>	The percentage of water entitlement declared available for diversion from a regulated stream in a season.
<i>annual allocation</i>	The annual volume of water available for diversion from a regulated stream by an entitlement holder.
<i>authorised use</i>	Total of the water allocated in the valley plus off-allocation and water harvesting use plus unregulated stream use not in allocation and system losses not in allocation.
<i>Border rivers</i>	The rivers and tributaries forming, or intersecting the border between NSW and Queensland.
<i>bulk entitlement</i>	A perpetual entitlement to water granted to water authorities by the Crown of Victoria under the Water Act 1989.
<i>carryover</i>	An unused entitlement from one season that can be used in the next year.
<i>channel capacity</i>	The maximum rate at which water can be delivered through a river reach or an artificial channel.
<i>COAG</i>	Council of Australian Governments.
<i>diversion</i>	The movement of water from a river system by means of pumping or gravity channels.
<i>diversion licence</i>	Specified licences issued for a specified annual volume and diversion rate.
<i>DLWC</i>	The Department of Land and Water Conservation (of NSW).
<i>DNRM</i>	The Department of Natural Resources and Mines (of Queensland).
<i>DNRE</i>	The Department of Natural Resources and Environment (of Victoria).
<i>dozer allocation</i>	An allocation that is not fully utilised.
<i>DWR</i>	The Department for Water Resources (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.
<i>GL</i>	Gigalitre: one thousand million or 10 ⁹ litres.
<i>G-MW</i>	Goulburn-Murray Water (of Victoria).

<i>gravity districts</i>	Districts which use gravity to divert the flow of water from the river.
<i>high security entitlement</i>	An entitlement which does not vary from year to year and is expected to be available in all but the worst droughts.
IAG	Independent Audit Group.
LV	Licensed Volume.
<i>impoundment</i>	The storage of water diverted from a water course.
<i>irrigation</i>	Supplying land or crops with water by means of streams, channels or pipes.
MDBC	Murray-Darling Basin Commission.
MDBMC	Murray-Darling Basin Ministerial Council.
<i>megalitre (ML)</i>	One million litres. One megalitre is approximately the volume of an Olympic swimming pool.
<i>Ministerial Council, the</i>	Murray-Darling Basin Ministerial Council.
ML	Megalitre: one million litres. One megalitre is approximately the volume of an Olympic swimming pool.
<i>Murray-Darling Basin Agreement</i>	The <i>Agreement</i> between the Governments of the four Basin States and the Commonwealth. The current <i>Agreement</i> is the 1992 <i>Agreement</i> .
<i>off-allocation</i>	When unregulated tributary inflows or spills are sufficient to supply irrigation needs and downstream obligations.
<i>on-farm storage</i>	Privately owned storages used to harvest surplus flows or to store unused allocations for use in the following season.
<i>overdraw</i>	Water diverted in one season against a prospective allocation in the subsequent year.
<i>overland flow</i>	Water that runs off the land following rainfall, before it enters a watercourse, and floodwater that erupts from a watercourse or lake onto a floodplain.
<i>permanent transfer</i>	The transfer of water entitlements on a permanent basis. The right to permanent transfers allows irrigators to make long-term adjustments to their enterprise and enables new operators to enter the industry.
<i>private diverters</i>	Licensed to operate privately owned pumps or diversion channels; includes river pumps and diverters as well as town water supplies.
<i>property right</i>	In this context, the right to ownership of allocated volumes of water.
RAMSAR wetland	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.
RIT	Renmark Irrigation Trust.
<i>sales water</i>	In Victoria, water that may be purchased by an irrigator in addition to the basic water right. Access to sales water is announced each season as a percentage of water right depending on the available resource.
<i>salinity</i>	The concentration of dissolved salts in groundwater or river water usually expressed in EC units.
<i>sleeper allocation</i>	An allocation that does not have a history of water usage.
<i>temporary transfer</i>	Water entitlements transferred on an annual basis.
<i>unregulated streams</i>	Streams that are not controlled or regulated by releases from major storages.
<i>utilisation</i>	The amount of water available for diversion that is actually diverted.
<i>water entitlement</i>	The legal right of a user to access a specified amount of water in a given period.
<i>water harvesting</i>	The diversion of water from an unregulated stream in Queensland in which the access to water is defined only by a diversion rate and a starting flow in the stream.
WRP	Water Resources Planning. It is a process currently under way in Queensland to enable the acceptable level of allocatable water to be determined for a river system. This methodology will determine what part of the flow regime should be preserved for environmental flows, and what part can be made available for consumptive use.
WMRWG	Water Market Reform Working Group.
WR	Water Right.
WUE	Water Use Efficiency.

Appendix A: Annual Cap Adjustments for Trade (ML)

System	1997/98	1998/99	1999/00	2000/01
New South Wales				
Intersecting Streams	0	0	0	0
Border Rivers	0	-1593	-3505	-8474
Gwydir	0	0	0	0
Namoi/Peel	0	0	0	0
Macquarie/Castlereagh/Bogan	0	0	0	0
Barwon-Darling/Lower Darling	5393	12534	8986	20009
Lachlan	0	0	0	0
Murrumbidgee	-30660	-37982	-113650	-30177
Murray	27423	6675	104535	-2662
Total NSW	2156	-20366	-3634	-21304
Victoria				
Goulburn/Broken/Loddon Cap valley	-2957	3456	-6531	-2101
Campaspe	0	0	0	0
Wimmera-Mallee	0	0	0	0
Murray/Kiewa/Ovens Cap valley	17572	11736	-572	-303
Total Victoria	14615	15192	-7103	-2404
South Australia				
Metro-Adelaide & Associated Country Areas	0	0	0	0
Lower Murray Swamps	-2596	-3136	-4213	-4577
Country Towns	0	0	0	0
All Other Uses of Water from the River Murray	-14175	6717	11436	19802
Total South Australia	-16771	3581	7223	15225
Queensland				
Condamine/Balonne	0	0	0	0
Border Rivers	0	1593	3505	8474
Macintyre Brook	0	0	0	0
Moonie	0	0	0	0
Warrego	0	0	0	0
Paroo	0	0	0	0
Total Queensland	0	1593	3505	8474
Australian Capital Territory				
	0	0	0	0
Total Basin	0	0	-9	-9

Appendix B: Trade Adjusted Annual Cap Targets (GL)

System	1997/98	1998/99	1999/00	2000/01
New South Wales				
Intersecting Streams	n/a	n/a	n/a	n/a
Border Rivers	168	179	146	n/a
Gwydir	525	333	428	n/a
Namoi/Peel	285	277	284	251
Macquarie/Castlereagh/Bogan	418	544	439	512
Barwon-Darling/Lower Darling	302	357	266	357
Lachlan	420	311	239	389
Murrumbidgee	2484	2494	1980	2658
Murray	2057	1903	1954	2058
Total NSW	6660	6398	5736	6225
Victoria				
Goulburn/Broken/Loddon Cap valley	1949	1655	1637	1631
Campaspe	132	81	75	109
Wimmera-Mallee	n/a	n/a	n/a	n/a
Murray/Kiewa/Ovens Cap valley	1867	1783	1590	1646
Total Victoria	3948	3519	3302	3386
South Australia				
Metro-Adelaide & Associated Country Areas ¹	n/a	n/a	n/a	n/a
Lower Murray Swamps	101	100	99	99
Country Towns	50	50	50	50
All Other Uses of Water from the River Murray	426	447	452	460
Total South Australia²	577	598	601	609
Queensland				
Condamine/Balonne	n/a	n/a	n/a	n/a
Border Rivers	n/a	n/a	n/a	n/a
Macintyre Brook	n/a	n/a	n/a	n/a
Moonie	n/a	n/a	n/a	n/a
Warrego	n/a	n/a	n/a	n/a
Paroo	n/a	n/a	n/a	n/a
Total Queensland	0	0	0	0
Australian Capital Territory	n/a	n/a	n/a	n/a
Total Basin	11185	10515	9640	10220

1. See Table 5.

2. Excludes Metro-Adelaide.

Appendix C: Annual Diversions (GL)

System	1997/98	1998/99	1999/00	2000/01
New South Wales				
Intersecting Streams	n/a	n/a	n/a	n/a
Border Rivers	204	182	198	248
Gwydir	532	306	444	425
Namoi/Peel	265	281	297	315
Macquarie/Castlereagh/Bogan	435	367	417	495
Barwon-Darling/Lower Darling	251	438	260	488
Lachlan	425	289	296	418
Murrumbidgee	2555	2469	1838	2711
Murray	1863	1978	1212	2048
Total NSW	6530	6310	4962	7148
Victoria				
Goulburn/Broken/Loddon Cap valley	1909	1699	1553	1569
Campaspe	96	76	73	113
Wimmera-Mallee	184	153	116	98
Murray/Kiewa/Ovens Cap valley	1743	1804	1555	1712
Total Victoria	3932	3731	3299	3491
South Australia				
Metro-Adelaide & Associated Country Areas	153	153	139	104
Lower Murray Swamps	101	100	99	99
Country Towns	35	36	37	38
All Other Uses of Water from the River Murray	375	400	368	421
Total South Australia	664	690	642	662
Queensland				
Condamine/Balonne	545	467	366	360
Border Rivers	177	116	151	273
Macintyre Brook	9	7	11	15
Moonie	8	8	8	31
Warrego	2	10	3	9
Paroo	0	0	0	0
Total Queensland	741	609	541	688
Australian Capital Territory	44	23	27	34
Total Basin	11911	11362	9471	12023

Appendix D: Cumulative Cap Credits (GL)

System	Long-Term Cap	Scheduled F Trigger	1997/98	1998/99	1999/00	2000/01
New South Wales						
Intersecting Streams	n/a	n/a	n/a	n/a	n/a	n/a
Border Rivers	204	-41	-36	-39	-90	n/a
Gwydir	345	-69	-7	20	4	n/a
Namoi/Peel	284	-57	20	16	3	-61
Macquarie/Castlereagh/Bogan	474	-95	-17	160	182	199
Barwon-Darling/Lower Darling	296	-59	51	-30	-24	-155
Lachlan	350	-70	-5	17	-40	-69
Murrumbidgee	2289	-458	-71	-46	97	44
Murray	1877	-375	194	120	861	871
Total NSW	6000	-1200	130	218	992	829
Victoria						
Goulburn/Broken/Loddon Cap valley	2084	-417	40	-3	80	142
Campaspe	122	-24	36	41	43	39
Wimmera-Mallee	162	-32	n/a	n/a	n/a	n/a
Murray/Kiewa/Ovens Cap valley	1656	-331	124	103	138	72
Total Victoria	4024	-805	200	141	261	253
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	15	28	42	54
All Other Uses of Water from the River Murray	441	-88	52	99	183	222
Total South Australia	n/a	n/a	66	127	225	276
Queensland						
Condamine/Balonne	n/a	n/a	n/a	n/a	n/a	n/a
Border Rivers	n/a	n/a	n/a	n/a	n/a	n/a
Macintyre Brook	n/a	n/a	n/a	n/a	n/a	n/a
Moonie	n/a	n/a	n/a	n/a	n/a	n/a
Warrego	n/a	n/a	n/a	n/a	n/a	n/a
Paroo	n/a	n/a	n/a	n/a	n/a	n/a
Total Queensland	n/a	n/a	n/a	n/a	n/a	n/a
Australian Capital Territory	n/a	n/a	n/a	n/a	n/a	n/a
Total Basin	n/a	n/a	397	487	1478	1359

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

Appendix E: Cap Register for Metropolitan Adelaide

Designated River Valley	1998/99		1999/00		2000/01	
	5 Year Cap Target (GL)	Diversions - 5 Years to 1998/99 (GL)	5 Year Cap Target (GL)	Diversions - 5 Years to 1999/00 (GL)	5 Year Cap Target (GL)	Diversions - 5 Years to 2000/01 (GL)
South Australia Metro-Adelaide & Associated Country Areas ¹	650	566	650	576	650	541

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

Appendix F: 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 2000/01 is shown in the following table.

State	Opening Balance (GL)	New Allocation this year ¹ (GL)	Account Spills ² (GL)	Usage of Allocation this year (GL)	Closing Balance ³ (GL)	Additional Release this year ⁴ (GL)	Total Release this year (GL)
NSW	100	50	0	150	0	26	176
Victoria	50	75	25	150	-50	15	165
TOTAL	150	125	25	300	-50	41	341

1. Comprises 50 GL high security plus 25 GL low security when Victorian irrigation allocations reaching 100% Water Right plus 30% Sales.
2. All but 100 GL for each State is spilled from the B-M account when Hume spills.
3. Each State is permitted to overdraw their B-M account by 50 GL subject to "sufficient water" being in storage.
4. From NSW Murray Environmental Allocation and Victorian Murray Wetlands Environmental Allocation.

