Australian Government

MURRAY–DARLING BASIN AUTHORITY

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Water Audit Monitoring Report 2010–11

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

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Acknowledgments

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- SA—Department of Water, Land and Biodiversity Conservation;
- VIC—Department of Sustainability and Environment; and
- VIC—Goulburn—Murray Rural Water Corporation.

Murray–Darling Basin Authority

Postal Address: GPO Box 1801, Canberra ACT 2601

Office location: Level 4, 51 Allara Street, Canberra City, Australian Capital Territory

Tel: (02) 6279 0100, international + 61 2 6279 0100
Fax: (02) 6248 8053, international + 61 2 6248 8053

E-mail: info@mdba.gov.au
Website: http://www.mdba.gov.au

For further information contact the Murray-Darling Basin Authority office on (02) 6279 0100

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FOREWORD

March 2012

The Hon Tony Bourke, MP
Minister for Sustainability, Environment, Water, Population and Communities
Parliament House
CANBERRA ACT 2600

Dear Minister

I have pleasure in submitting to you the Water Audit Monitoring Report 2010–11.
The Council established the Cap in 1995 and set the operating framework in 1996. The Council formalised the operating rules for the Cap in the form of Schedule E (Former Schedule F) to the Murray–Darling *Basin Agreement* in 2000. The Water Audit Monitoring Report 2010–11 is the fifteenth in a series of the reports on the Cap on Diversion and has been produced as a requirement of Schedule E to the Murray–Darling *Basin Agreement*.

The Water Audit Monitoring Report 2010–11 complements the Independent Audit Group Report 2010–11. Whereas the focus of the Independent Audit Group Report is the Cap compliance and the activities related to it, this report provides a broader picture of the Cap compliance, water use, accuracy of water use figures, climatic overview for the water year, water availability through allocations, off–allocations and water trading, storages losses, and groundwater use.

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

The text in chapters 4 to 8 and data published in this report have been supplied by the States and Territory. The published data are considered to be the best available estimates for Water Diversion, Water Trade, Cap targets and other data. If better estimates become available in future, the Diversion Cap Register will be amended accordingly. The Diversion and Trade figures in this Report are considered to be the latest figures for the water year and supersede those reported in the Independent Audit Group Report 2010–11.

The Authority appreciates the co–operation received from the States and Territory Governments' Officers in compiling this Report.

Yours sincerely

Rhondda Dickson
Chief Executive

CONTENTS

Tables and Figures

Tables

Figures

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 the operation of the Cap is an open and transparent process, the Ministerial Council agreed that a Water Audit Monitoring Report should be produced and published annually. Subsequently the Cap arrangements were formalised in the form of Schedule E (Former Schedule F[1]) to the Murray–Darling *Basin Agreement* in 2000.

This report has been produced as a requirement of Schedule E to the Murray–Darling *Basin Agreement*.

The water year for the Cap accounting in the Murray–Darling Basin is July to June.

This report outlines water usage in the Basin 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 Basin state (**Section 3.4**) and reviews Cap compliance of Basin states (**Section 3.5**).

In addition to detailing water use, this report also contains information on the Basin 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 2010–11 and further actions that each State plans to undertake over the coming years (**Sections 4** to **8**).

Other information provided within this report includes water trading throughout the Basin (**Section 9**), water availability for the year (**Section 10**), environmental water (**Section 11**) a comparison of actual and natural flows at key sites within the Basin (**Section 12**), and impoundments and losses in major on–stream storages (above 10 GL capacity) (**Section 13**).

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

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

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

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

Table 1: 2010–11 Cap Compliance by State

State Territory	2010–11 Cap Compliance
New South Wales	
Intersecting Streams	A Cap is yet to be defined. The valley is unregulated. The 2010–11 diversion was estimated to be 3 GL.
Border Rivers	The New South Wales Border Rivers Cap, was approved by Murray–Darling Basin Ministerial Council in November 2011. NSW is yet to submit the Cap model for audit and approval. The 2010–11 diversion of 192 GL was less than the annual Cap target of 240 GL. The Valley has a cumulative Cap credit of 375 GL since 1997–98.
Gwydir	An IQQM Cap model approved by the Authority is available to determine the Cap compliance. The 2010–11 diversion of 271 GL was below the annual Cap target of 383 GL. The Valley has a cumulative Cap credit of 282 GL since 1997–98.
Namoi–Peel	An IQQM model approved by the Authority is available to determine Cap compliance for the Namoi–Peel valley. The 2010–11 diversion of 270 GL was below the annual Cap target of 381 GL. The Valley has a cumulative Cap credit of 251 GL since 1997–98.
Macquarie–Castlereagh–Bogan	An IQQM model audited and ready for approval is available to determine Cap compliance. The 2010–11 diversion of 183 GL was below the annual Cap target of 592 GL. The Valley has a cumulative Cap credit of 757 GL since 1997–98.
Barwon–Darling–Lower Darling	An IQQM (Interim) model for the Barwon–Darling has been submitted for audit and The Lower Darling MSM Cap model is being prepared to be resubmitted for audit. These 2 models are used to determine Cap compliance. The combined Barwon–Darling–Lower Darling valley diversion of 123 GL was below its annual Cap target of 297 GL. The valley has a cumulative Cap credit of 215 GL since 1997–98.
Lachlan	An IQQM model approved by the Authority is available to determine Cap compliance. The 2010–11 diversion of 90 GL was below the annual Cap target of 120 GL. The Lachlan valley has a cumulative Cap credit of 204 GL since 1997–98.
Murrumbidgee	An IQQM model approved by the Authority is available to determine the Cap compliance. The 2010–11 diversion of 1,461 GL for the Murrumbidgee valley was above its Cap target of 1,090 GL. The Valley has a cumulative Cap credit of 658 GL since 1997–98.
Murray	The Murray Simulation model (MSM) approved by the Authority is available to determine Cap compliance. The 2010–11 diversion of 689 GL for the Murray valley was below its annual Cap of 978 GL. The Valley has a cumulative Cap credit of 580 GL since 1997–98.
Victoria	
Goulburn–Broken– Loddon	An approved Cap model known as Goulburn Simulation model (GSM REALM) is available to determine Cap compliance. The 2010–11 diversion of 544 GL for the Goulburn–Broken–Loddon system was below its Cap target of 1265 GL. The Valley has a cumulative Cap credit of 1177 GL since 1997–98.
Campaspe	An approved Cap model, the GSM REALM, is available to determine Cap compliance. The diversion of 18 GL for the Campaspe in 2010–11 was below its Cap target of 59 GL. The Valley has a cumulative credit of 184 GL since 1997–98.
Wimmera–Mallee	A Cap Model approved by the Authority is available to determine Cap compliance. The diversion of 10 GL for the Wimmera Mallee in 2010–11 was below its Cap target of 42 GL and the valley has a cumulative Cap credit of 9 GL since 1997–98.

State Territory	2010–11 Cap Compliance
Murray–Kiewa–Ovens	The Murray Simulation model (MSM) approved by the Authority is available to determine Cap compliance. The 2010–11 diversion of 563 GL for the Murray–Kiewa–Ovens Cap valley was below its Cap target of 1211 GL and the Valley has a cumulative credit of 1737 GL since 1997–98.
South Australia	
Metro–Adelaide & Associated Country Areas	The 2010-11 diversions for the Metro Adelaide and Associated Country Areas was 56 GL. The 5 year rolling diversion upto and including 2010-11 was 555 GL. This was below the 5 year rolling Cap of 650 GL. Pending final decision, a separate 'first use licence' has been created to accommodate growth in Metro Adelaide diversions. The five–year total diversion under the 'first use licence' was zero.
Lower Murray Swamps	The 2010–11 diversion of 14 GL for the Lower Murray Swamps was below its annual Cap target of 35 GL for 2010–11. The valley has a cumulative credit of 27 GL since 1997–98.
Country Towns	The 2010–11 diversion of 34 GL for the Country Towns was below its annual Cap target of 36 GL. The Country Towns valley has a cumulative credit of 63 GL since 1997–98.
All Other Purposes	A regression model approved by the Authority is available to determine Cap compliance. The 2010–11 diversion of 257 GL for the *All Other Purposes* was below its annual Cap target of 266 GL. The Valley has a cumulative credit of 771 GL since 1997–98.
Queensland	
Condamine and Balonne	The Cap proposal for Condamine–Balonne was endorsed by the Authority in March 2011. The Cap model for this valley has been submitted for audit and approval. The 2010–11 diversion of 1064 GL was below its annual Cap target of 1728 GL. The Valley has a cumulative credit of 665 GL since 1997–98.
Border Rivers–Macintyre Brook	An IQQM model yet to be approved is available to determine the Cap compliance. The 2010–11 diversion of 421 GL was below its annual Cap target of 601 GL. The Valley has a cumulative credit of 260 GL since 1997–98.
Moonie	An IQQM model approved by the Authority is available to determine the Cap compliance. The 2010–11 diversion of 29 GL was below its annual Cap target of 77 GL. As per its Cap definition, the Valley cannot accumulate Cap credit.
Nebine	An IQQM model approved by the Authority is available to determine the Cap compliance. The 2010–11 diversion of 0.2 GL was below its annual Cap target of 3 GL. As per its Cap definition, the Valley cannot accumulate Cap credit.
Warrego	An IQQM model approved by the Authority is available to determine the Cap compliance. The 2010–11 diversion of 11 GL was below its annual Cap target of 94 GL. As per its Cap definition, the Valley cannot accumulate Cap credit.
Paroo	An IQQM model approved by the Authority is available to determine the Cap compliance. The 2010–11 diversion of 0.1 GL was equal to its annual Cap target of 0.1 GL. As per its Cap definition, the Valley cannot accumulate Cap credit.
Australian Capital Territory	The ACT long-term Cap has been agreed, But a Cap model is not yet available to determine Cap compliance. The 2010–11 diversion was 6 GL.

2. BACKGROUND

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

In June 1995, the former Commission (now Authority) completed an audit of water use in the Murray–Darling Basin *(An Audit of Water Use in the* Murray–Darling *Basin*, Murray–Darling Basin Ministerial Council, Canberra, 1995). This audit revealed that water diversions from the rivers within the Basin had increased by 8% in the previous six years and were averaging 10,800 GL/year.

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

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

The audit examined the scope for diversions to grow further under the water allocation system that existed prior to the Cap. The water allocation system evolved at a time when water managers were trying to encourage development of the water resources of the Basin. As such the system rationed water during periods of shortage but was not effective for controlling diversion during normal non–drought conditions. It was reported that, in the five years before the water audit, only 63% of the water that was permitted to be used was used. The audit found that average diversions could increase by a further 15% if all existing water entitlements were fully developed. Such an increase would reduce the security of supply to existing water users as well as exacerbating river health problems.

2.2 The Cap

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

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

- For New South Wales and Victoria the Cap is the volume of water that would have been diverted under 1993–94 levels of development plus allowances in the Border Rivers for Pindari Dam (New South Wales) and in the Goulburn–Broken–Loddon system for Lake Mokoan (Victoria);
- For South Australia, All Other Purposes diversions were capped at 440.6 GL. This represents an increase in diversions over 1993–94 levels of development but they are below allocations which were established in 1969 when a state cap was imposed; 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.[2]

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

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

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

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

Following an Intergovernmental Agreement reached in July 2009, the Murray–Darling *Basin Agreement* was amended and made part of the amended *Water Act* (Commonwealth) 2007. Schedule F was renamed as Schedule E as part of the amendments to the Murray–Darling *Basin Agreement*.

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

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

2.3 IAG Review of Cap Implementation 2010–11

As required by Schedule E, the Independent Audit Group audited the performance of each State and Territory in progressing the implementation of the Cap during 2010–11 (*Review of Cap Implementation* 2010–11, published by the Murray–Darling Basin Authority, October 2010, Canberra).

The present report represents the fifteenth in a series of annual reports and complements the report of the IAG. The data presented herein are the latest figures for the 2010–11 water year and supersede the data reported by the IAG. Most notably, the Murray–Darling Basin diversions in 2010–11 reported in this present report (**Table 2**) supersede those reported by the IAG in October 2011 (**Table 19** of that report).

2 Subsequently named as Water Resources Planning

3. THE YEAR IN REVIEW

3.1 Water Diversions

The data presented in this report has been collected by the relevant State agencies and collated by the Murray Darling Basin Authority. Accurate diversion data is difficult to obtain, as it requires the collection and collation of thousands of individual water use figures. **Table 2** presents the overall water diversion figures for the Basin in 2010–11.

The figures indicate that Basin water use in 2010–11 was 6,311 GL, representing the fifth lowest on record (27 years of record since 1983–84). Water diversions were lowest on record in South Australia, Victoria and the ACT, fifth lowest on record in New South Wales, whilst diversions were highest on record in Queensland.

Figure 1 shows the water diversions (by State) for the period 1983–84 – 2010–11 which enables a comparison of 2010–11 water diversion with that of previous years.

Figure 2 shows the same data as **Figure 1** but has the vertical axis rescaled so that the variation for States with lower overall diversions is visible.

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

Table 2: Murray–Darling Basin Diversions in 2010–11

System	Irrigation Diversion (GL)	Other Diversion[1] (GL)	Total Diversion (GL)
New South Wales[2]			
Intersecting Streams	3	0	3
Border Rivers	191	1	192
Gwydir	268	3	271
Namoi–Peel	265	5	270
Macquarie–Castlereagh–Bogan	173	10	183
Barwon–Darling	95	0	95
Lachlan	82	8	90
Murrumbidgee[4]	1,415	46	1,461
Lower Darling	27	1	28
Murray	662	27	689
Total New South Wales[3]	**3,182**	**102**	**3,283**
Victoria[2]			
Goulburn	480	33	513
Broken	4	1	6
Loddon	23	2	25
Campaspe	9	10	18
Wimmera–Mallee	0	9	10
Kiewa	1	0	1
Ovens	1	5	6
Murray	523	33	556
Total Victoria	**1,041**	**94**	**1,136**
South Australia			
Metro–Adelaide & Associated Country Areas	0	56	56
Lower Murray Swamps[5]	14	0	14
Country Towns	0	34	34
All Other Purposes	247	10	257
Total South Australia	**260**	**101**	**361**
Queensland[2]			
Condamine–Balonne	1,061	2	1,064
Border Rivers	410	1	411
Macintyre Brook	10	0	10
Moonie	29	0	29
Nebine	0	0	0
Warrego	11	0	11
Paroo	0	0	0
Total Queensland	**1,522**	**3**	**1,525**
Australian Capital Territory[6]	**0**	**6**	**6**
Total Basin	**6,005**	**306**	**6,311**

1. "Other Diversion" includes domestic & stock, town & industrial uses (Qld figures included with Irrigation Diversion).
2. New South Wales, Victoria and Queensland diversions include an estimate of unregulated stream diversions.
3. An estimate of New South Wales floodplain diversions is not available for 2010–11.
4. Lowbidgee diversions are included in the Murrumbidgee valley diversions.
5. Some water use by Lower Murray Swamp irrigators is based on an estimate of water use, while for farms that have meters the metered volume is used. The metering of diversions is currently being implemented.
6. 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 2010–11

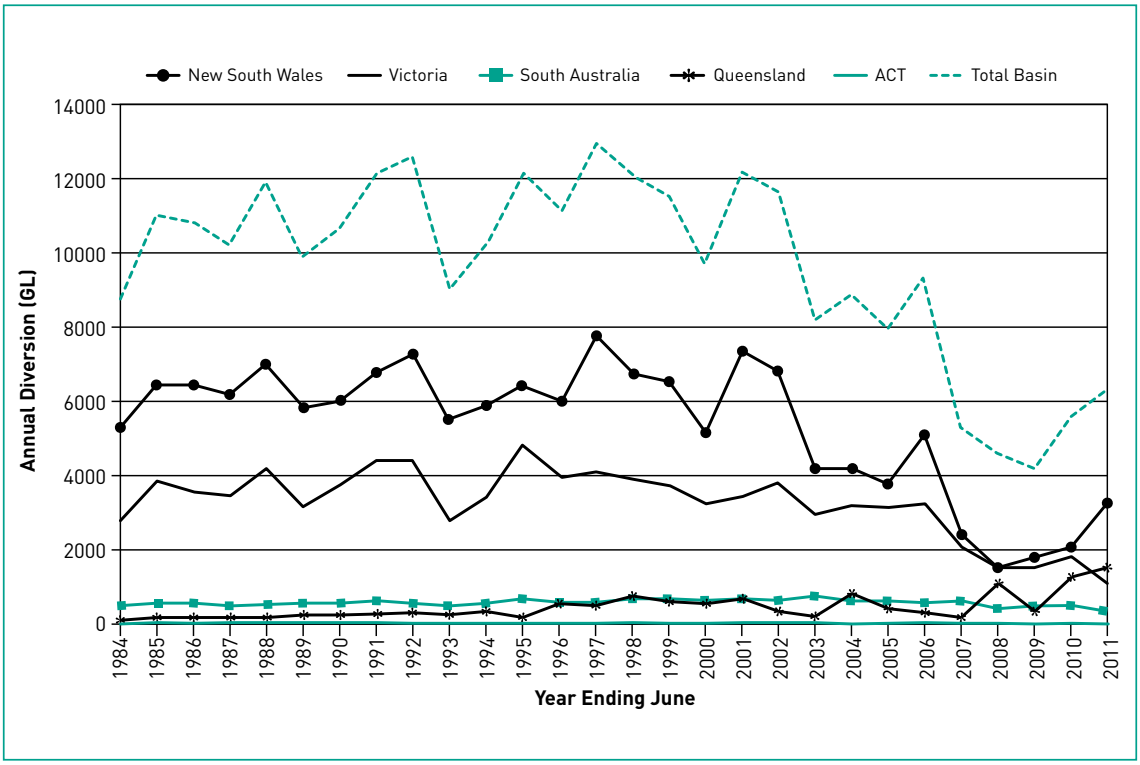
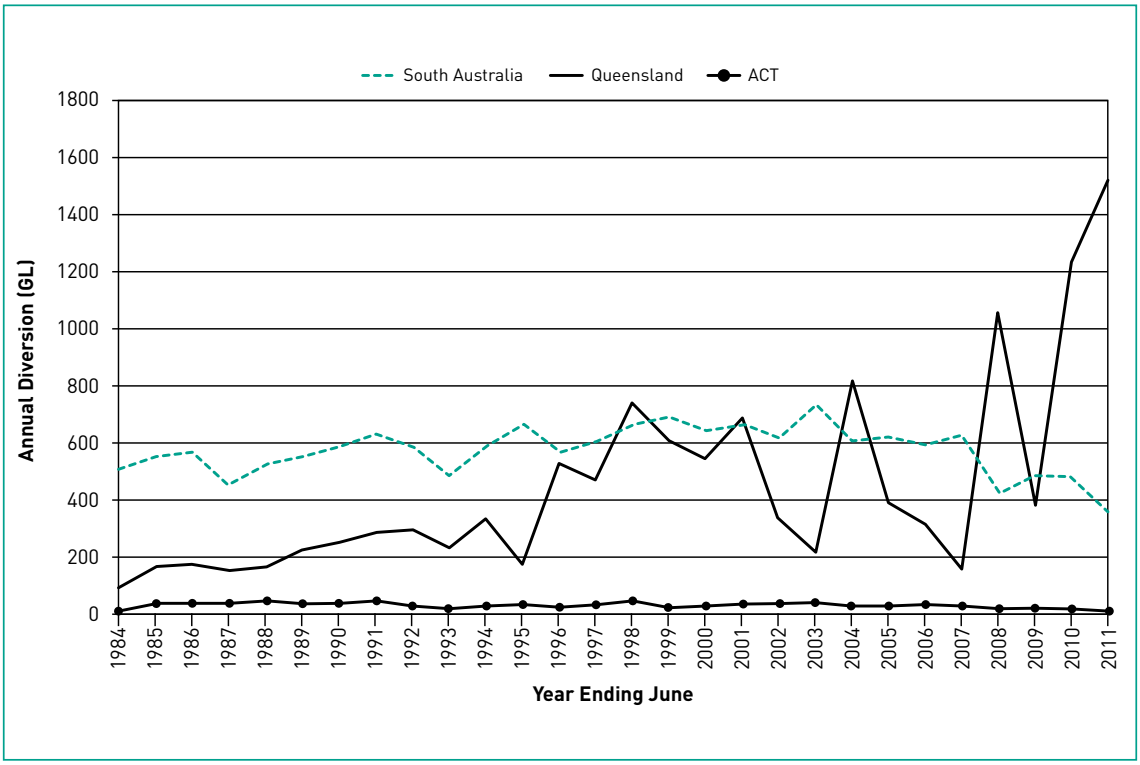


Figure 2: Murray–Darling Basin Diversions—1983–84 to 2010–11 (usage under 1600 GL/yr)



3.2 Accuracy of Measurement

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

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

Analysis of reported diversions for 2010–11 indicates that the accuracy of measurement is 14%. In comparison to 2009–10, it has gone down. This is due to relatively higher volume of diversion in valleys (e.g. Queensland Cap valleys), where the accuracy of diversion is lower.

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

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

Table 3: Accuracy of Diversion Estimates in 2010–11

System	Diversion (GL)	Accuracy +/– GL	Accuracy +/– %
New South Wales			
Intersecting Streams	3	1	40%
Border Rivers	192	18	10%
Gwydir	271	29	11%
Namoi–Peel	270	53	20%
Macquarie–Castlereagh–Bogan	183	22	12%
Barwon–Darling	95	19	20%
Lachlan	90	10	11%
Murrumbidgee	1,461	118	8%
Lower Darling	28	4	13%
Murray	689	98	14%
Total New South Wales	**3,283**	**372**	**11%**
Victoria			
Goulburn	513	26	5%
Broken	6	1	10%
Loddon	25	1	5%
Campaspe	18	1	5%
Wimmera–Mallee	10	0	5%
Kiewa	1	0	11%
Ovens	6	0	4%
Murray	556	59	11%
Total Victoria	**1,136**	**89**	**8%**
South Australia			
Metro–Adelaide & Associated Country Areas	56	3	5%
Lower Murray Swamps	14	1	5%
Country Towns	34	2	5%
All Other Purposes	257	16	6%
Total South Australia	**361**	**21**	**6%**
Queensland			
Condamine–Balonne	1,064	302	28%
Border Rivers	411	97	24%
Macintyre Brook	10	1	5%
Moonie	29	12	40%
Nebine	0	0	40%
Warrego	11	4	37%
Paroo	0	0	40%
Total Queensland	**1,525**	**416**	**27%**
Australian Capital Territory	**6**	**0**	5%
Total Basin	**6,311**	**899**	**14%**

3.3 Climatic Overview 2010–11

3.3.1 Rainfall

Figure 3 shows the rainfall deciles for the period of July 2010 to June 2011 inclusive. The whole of the Basin received average or higher than average rainfall.

A continuous strip on the northern periphery of the Basin extending up to the Queensland–New South Wales border, with the exception of a small pocket surrounding the town of Condamine in Queensland, received highest on the record rainfall. Two other regions also received highest on the record rainfall. The first region was a large continuous area encompassing the towns of Menindee in New South Wales and Mildura, Bendigo and Maryborough in Victoria. The second region was three small pockets surrounding the town of Albury in New South Wales, Mt Barker in South Australia, and a small area in Danggali Conservation Park in South Australia.

Approximately three fourths of the Basin received very much above average rainfall.

With the exception of two small pockets, a large irregular shaped area encompassing the towns of Cunnamulla and St George in Queensland and Brewarrina and Narrabri in NSW received above average rainfall. Five areas on the eastern periphery of the Basin surrounding the towns of Gulgong, Cassillis, Oberon, Goulburn and Cooma in NSW and another near the mouth of the Basin also received above average rainfall.

Two small pockets surrounding the towns of Thallon and Noorama in Queensland received average rainfall.

Figure 4 shows the rainfall deciles for the period of November 2010 to April 2011 inclusive. During this period also, the whole of the Basin received average or higher than above average rainfall.

Most of the southern connected Basin experienced highest on the record rainfall. A narrow strip on the northern periphery of the north of the Basin encompassing the towns of Roma, Miles and Toowoomba in Queensland also experienced highest on the record rainfall.

One thirds of the Basin comprising the middle and northern experienced very much above average rainfall. A large continuous area extending from the north of the Basin encompassing the towns of Quilpie, Mitchell, Tara and Warwick in Queensland and most of the west and south of NSW experienced very much above average rainfall. Few small patches surrounding towns of Dubbo and Coonamble in NSW; Canberra in ACT; Omeo and Benalla in Victoria and Murray Bridge and Burra in South Australia also experienced very much above average rainfall.

A large continuous and irregular shaped area in the northern central Basin encompassing the towns of Charleville, Eula and Goondiwindi in Queensland and Tamworth, Walgett, Parkes and Oberon in NSW received above average rainfall.

Three areas in the northern part of the Basin, a continuous irregular shaped area encompassing the towns of Cunnamulla in Queensland and Narrabri in New South Wales; two small pockets surrounding the town of Bargunyah in Queensland and Coolabah in NSW received average rainfall.

3.3.2 Temperature

Figure 5 shows the temperature anomaly (the difference between the recorded temperatures and the long–term average temperatures) for the period of July 2010 to June 2011 inclusive. Lower than the average temperatures were experienced in the whole of the Basin.

A large continuous area encompassing the towns of Charleville and St George in Queensland and a small pocket surrounding the town of Wilcannia in New South Wales experienced extremely lower (between -2.0°C and -1.5°C) than average temperatures.

A significantly large continuous irregular area in the north west of the Basin in Queensland and New South Wales extending to the border of NSW–Victoria in the Basin experienced significant lower (between -1.5°C and -1.0°C) than average temperatures.

A continuous area extending from east of the Basin in Queensland and NSW to the south of the Basin covering most of Victoria and South Australia experienced mildly lower (between –1.0°C and -0.5°C) than the average temperature.

A continuous strip in the east of Basin encompassing the towns of Tamworth in NSW and Canberra in ACT experienced slightly lower (between -0.5°C and 0.0°C) than the average temperature. Two isolated pockets encompassing the towns of Horsham in Victoria and Murray Bridge in South Australia also experienced slightly lower (between -0.5°C and 0.0°C) than the average temperature.

A small area encompassing the towns of Mudgee and Bathurst in NSW experienced slightly higher (between +0.0°C and +0.5°C) than the average temperature.

Figure 6 shows the temperature anomaly for the period of December 2010 to February 2011 inclusive (the primary irrigation season). Most of the Basin experienced slightly lower (between 0°C and -1°C) than average temperature.

An irregular shaped area encompassing the town of Roma in Queensland experienced extremely lower (between -2°C and -3°C) than average temperature.

The north of the Basin in Queensland and a large pocket in the south of the Basin along the border of NSW and Victoria experienced mildly lower (between -1°C and -2°C) than average temperature. Two isolated pockets surrounding the towns of Bourke and Ivanhoe in NSW also experienced mildly lower (between -1°C and 2°C) than average temperature.

A small continuous strip in the east of the Basin encompassing the towns of Tamworth and Goulburn in NSW experienced slightly higher (between 0°C to +1°C) than average temperature. An isolated pocket near the town of Hillston in NSW also experienced slightly higher (between 0°C to +1°C) than average temperature.

The irrigation demand during the growing season was decreased due to cooler than average temperatures in the southern Basin.

Figure 3: Rainfall Deciles for the Murray–Darling Basin for the July 2010 to June 2011 Period

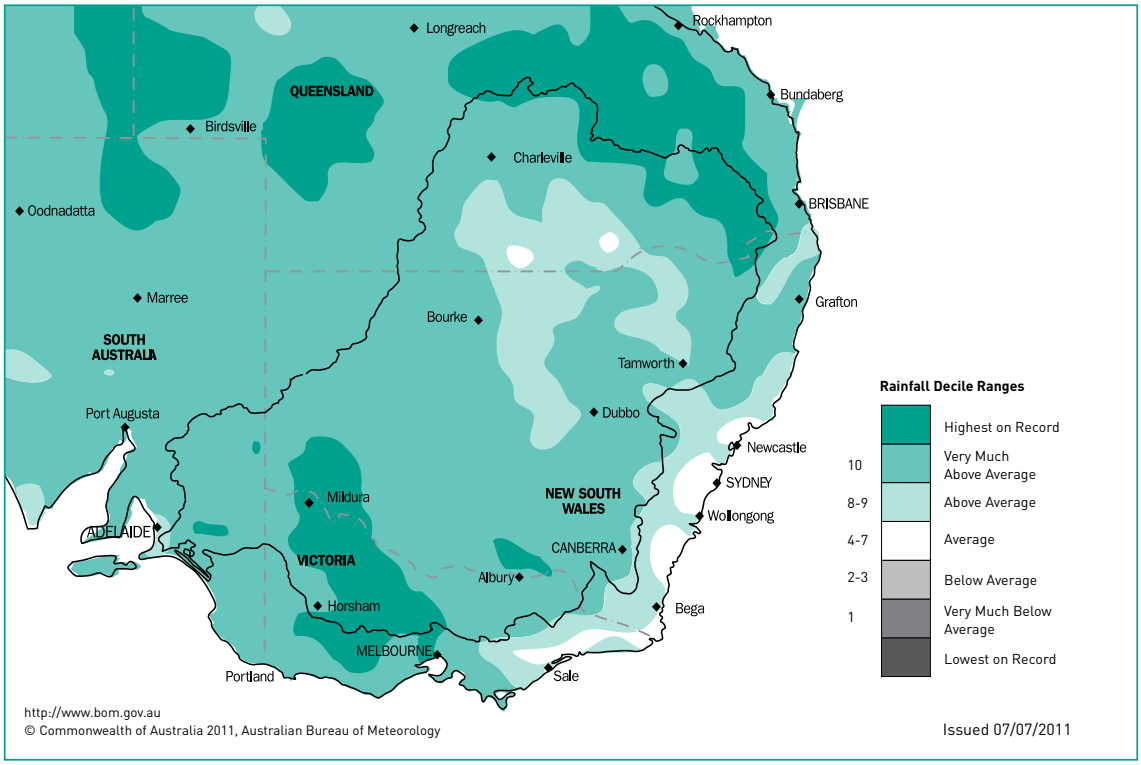


Figure 4: Rainfall Deciles for the Murray–Darling Basin for the November 2010 to April 2011 Period

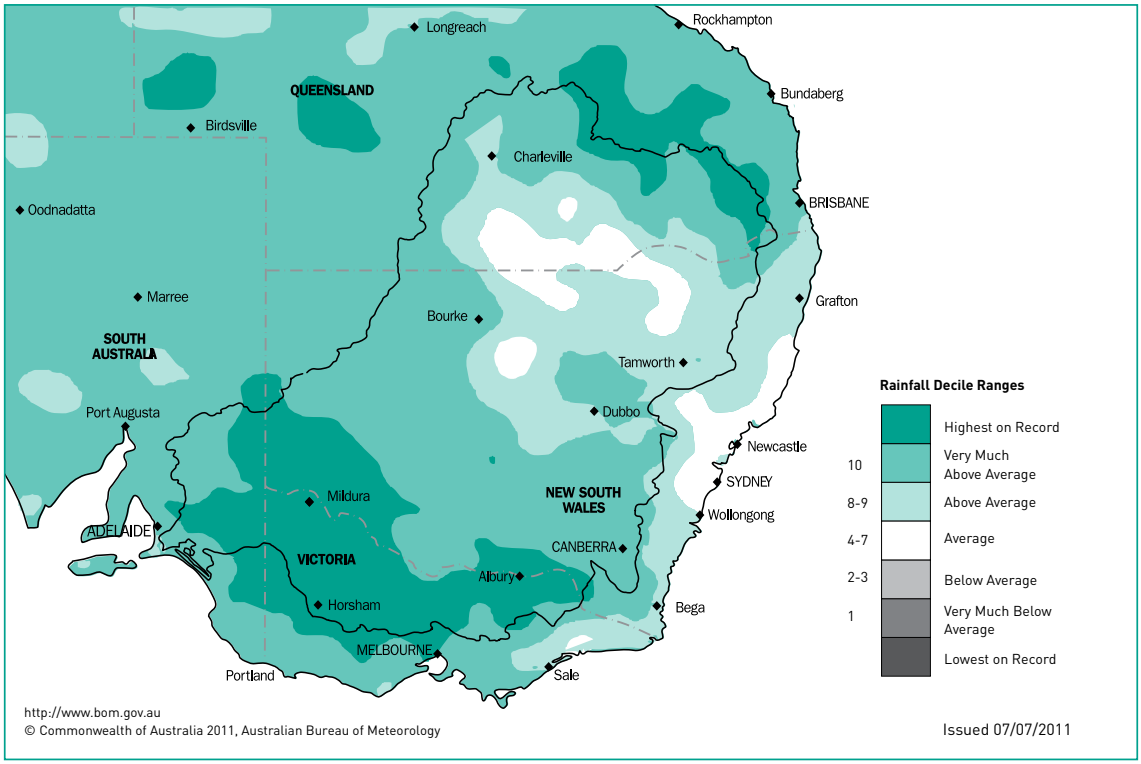


Figure 5: Temperature Anomaly for the 12 Month Period July 2010 to June 2011

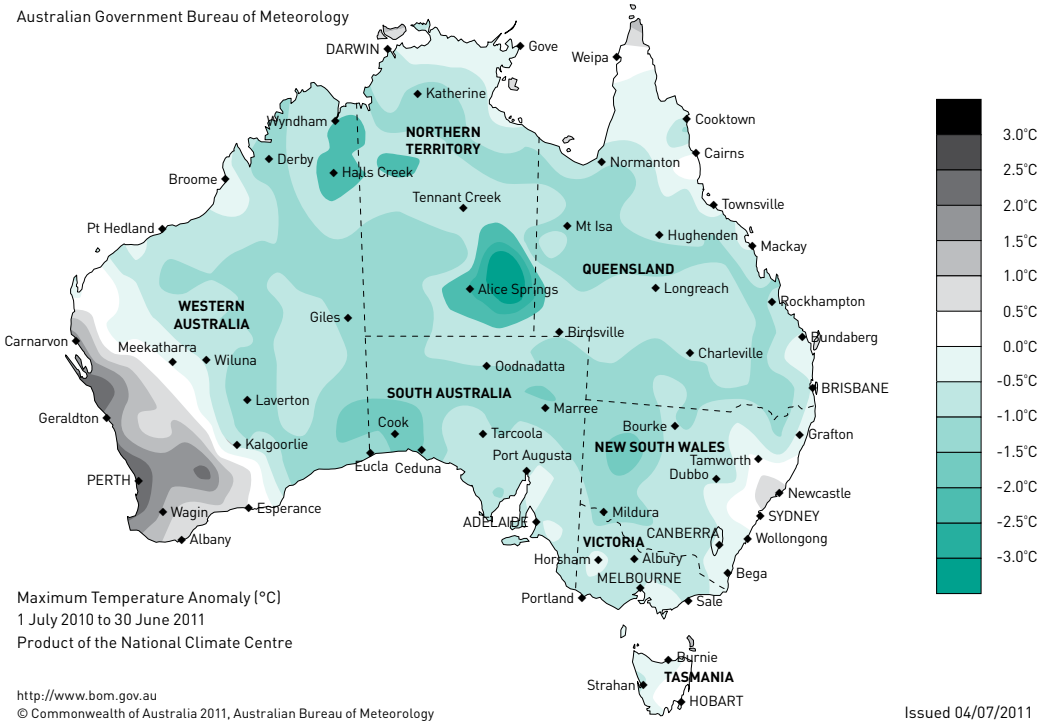
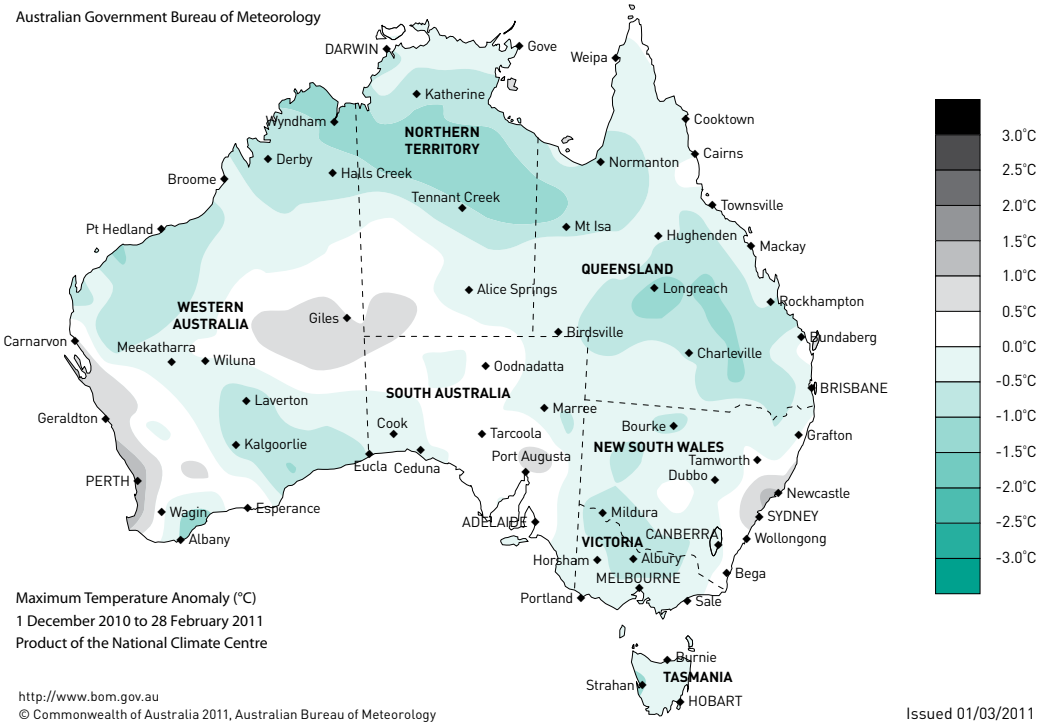


Figure 6: Temperature Anomaly for the 3 Month Period December 2010 to February 2011



3.4 Definition of Cap

The Council formalised its 1996 decision to set the Cap by adopting in 2000 a new Schedule (Schedule F) to the Murray–Darling *Basin Agreement*. Schedule F was subsequently amended in 2009. Following an Intergovernmental Agreement reached in July 2009, the Murray–Darling *Basin Agreement* was amended and made part of the amended *Water Act* (Commonwealth) 2007. Schedule F was renamed as Schedule E as part of the amendments to the Murray–Darling *Basin Agreement*.

Schedule E defines the States' long-term Cap for:

- New South Wales as 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 as 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;
  - 94.2 GL/year for the Lower Murray Swamps comprising (i) 72.0 GL/year for swamp use with unrestricted trade and (ii) 22.2 GL/year non-tradable environmental entitlement; and
  - a long-term average diversion for 'All Other Purposes' of Water from the River Murray of 449.9 GL/year.
- Queensland as the volume of water that would have been diverted under the conditions set out for each river valley in the Resource Operation Plan first adopted by the Government of Queensland in that river valley and published in the Queensland Government Gazette; and
- The Australian Capital Territory as 40 GL plus an allowance for population growth beyond 2006–07. The growth allowance is to be calculated by multiplying 0.75, the per capita consumption of 2006–07 and population growth beyond 2006–07 of the ACT and Queanbeyan. The ACT Cap was agreed by the Council in May 2009.

Queensland finalised the Resource Operations Plans for the Warrego, Paroo, Nebine, and Moonie valleys in early 2006 and submitted Cap proposals for these valleys. Council in 2007 agreed to the Caps for these valleys to apply from 2007–08. Following the completion of the Resource Operation Plan for the Border Rivers in March 2009, Queensland submitted a Cap proposal in October 2009, which was endorsed by the Authority in April 2009. On the completion of Resource Operations Plan, Queensland submitted the Cap proposal for Condamine Balonne in November 2010, which was endorsed by the Authority in March 2011. With the submission of the Cap proposal for Condamine Balonne, capping process for all Queensland Murray–Darling Basin valleys is now complete.

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

Because of these complexities, the calculation of the Cap targets is made by use of computer models with relationships for water use that include a range of climatic factors and detailed modelling of flows and storage behaviour. Auditing and approving these models is a major task. Cap models have been developed for most of Cap valleys, for which Caps have been agreed. Out of 24 Cap valleys, Caps have not been defined in 1 valley and 2 other valleys do not require a Cap model. The remaining 21 Cap valleys have 23 models as two valleys comprise 2 sub valleys and have separate Cap models. Out of 23 Cap models, 16 Cap valley models have been audited and 15 approved (1 more, Macquarie ready for approval), 4 Cap models are being audited and 3 models (NSW Border Rivers, Metro Adelaide and ACT) are yet to be submitted for audit.

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

The calculation for the Cap in South Australia is relatively straight forward; although the Cap for the fourth category of South Australian diversions described above is a long–term climate–adjusted annual average of 449.9 GL. A regression–based accredited model calculates the annual Cap target, which is then adjusted for trade. In the calculation of the Metro–Adelaide Cap, the allocation of 650 GL over 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 2010–11 are for the fifteenth water year to be covered by the Cap in the Murray–Darling Basin.

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

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

3.5 Comparison of 2010–11 Water Use with the Cap

A comparison of 2010–11 water use with the Cap for each State is as follows:

3.5.1 New South Wales

Cap compliance in 2010–11 within New South Wales varied between valleys (**Table 4**).All New South Wales valleys are in cumulative credit since 1997–98.

The Cap models for all New South Wales valleys , where Cap is defined, are available now. The Lachlan, Namoi, the NSW Murray (contained in the Murray Simulation Model (MSM) suite of Cap models), Gwydir and Murrumbidgee Cap models, after an independent audit, were approved by the Authority under Schedule E. The Macquarie Cap model after the audit has been submitted to the Authority for its approval. Lower Darling Cap model will be resubmitted for audit and expected to be accredited by the Authority during 2012. Barwon-Darling Cap model is currently being audited. The New South Wales Border Rivers Cap was approved by Murray–Darling Basin Ministerial Council in November 2011. NSW has yet to submit this Cap model for audit.

3.5.2 Victoria

The diversions in all Victorian Cap valleys were within their annual Cap target for 2010–11 (**Table 4**). All Cap valleys are in cumulative credit since 1997–98.

The Cap models for all designated Victorian valleys have been approved by the MDBA.

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

3.5.3 South Australia

South Australian diversions were within their Cap targets for *All Other Purposes of water from River Murray,* the Country Towns (**Table 4**) and the Metro–Adelaide and Associated Country Areas (**Table 5**). All Cap valleys in South Australia have substantial cumulative Cap credits.

Cap model for *All Other Purposes* has been approved by MDBA while Lower Murray Swamps and Country towns do not require a Cap Model. The Cap model for Metropolitan Adelaide and Associated Country Areas is in the advanced stages of development. This is likely to be submitted for audit by August 2012. South Australia continues to undertake improvement programs and forward–moving management initiatives for the sustainability of River Murray water resources and to ensure long–term compliance with the Cap.

3.5.4 Queensland

Diversions in the Border Rivers, Warrego, Paroo, Moonie, and Nebine valleys of Queensland were within their annual Cap targets for 2010–11 (**Table 4**). As per its Cap definition, Warrego, Paroo, Moonie, and Nebine valleys cannot accumulate Cap credit. With the finalisation of the Cap for Condamine Balonne, capping process for all Queensland Murray–Darling Basin valleys is now complete.

3.5.5 Australian Capital Territory

The Australian Capital Territory Cap has been agreed but a Cap model to determine its annual Cap target has not yet been developed. There are differences between the Authority and the ACT on the interpretation of the ACT Cap, which are being resolved. Once these differences are resolved, ACT Cap model will be finalised. Diversion in the ACT was within its long term Cap of 40 GL.

3.5.6 Basin comparison of actual diversions with the annual Cap targets

Table 4 presents a comparison of actual diversions with the annual Cap targets for New South Wales, Victoria, South Australia (except Metropolitan Adelaide & Associated Country Areas), Queensland and the Australian Capital Territory. The last column in **Table 4** is the difference between the modelled and the observed storage at the end of 2010–11.

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

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

3.6 Measurement of Land–surface (Floodplain Harvesting) Diversions

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

The Authority is committed to bringing the floodplain diversions within the Cap as per the Council's above decision. It has taken several statutory and administrative measures to this end. These measures include amendments to Schedule E (former Schedule F) and Diversion Formula Register and establishment of two investigation projects to develop a method to estimate land–surface diversions. Significant progress was made and methods and models were developed to estimate the land–surface diversions. Subsequently, the Authority completed the following two projects to improve the estimation, monitoring and reporting of Land Surface Diversions (LSD):

- Estimating Land Surface diversions by on–ground monitoring
- Estimating Land surface diversions using Remote Sensing Techniques.

The projects undertaken demonstrated that an estimation method based upon remotely sensed evapo–transpiration (ET) aided by some on–ground measurement is more practical than that based upon on-ground monitoring alone. Subject to budgetary constraints, the Authority aims to establish a pilot project in collaboration with NSW and Queensland jurisdictions, for developing and implementing a remote sensing based method for estimating land surface diversion in one catchment each in NSW and Queensland.

Table 4: Comparison of Diversions with Cap Levels in 2010–11

System	Cap Target from Cap Model (GL)	Adjustment to Cap Target for Trade[1] (GL)	Adjustment to Cap Target for Environment (GL)	Cap Target Adjusted for Trade and Environment (GL)	Total Diversion (GL)	Cap Credit[4] (GL)	Cumulative Cap Credit since 1997–98[4] (GL)	Cap Target Exceedance Trigger (20% of Long–Term Diversion Cap)[5] (GL)	Cumulative Difference (Modelled minus Observed) Storage[7] (GL)
New South Wales									
Intersecting Streams[3]	n/a	0	0	n/a	3	n/a	0	n/a	n/a
Border Rivers[3]	259	-20	0	240	192	48	375	-39	0
Gwydir	400	0	-17	383	271	111	282	-70	-104
Namoi–Peel	381	0	0	381	270	111	251	-73	-30
Macquarie–Castlereagh–Bogan	652	0	-60	592	183	409	757	-98	-250
Barwon Darling– Lower Darling	468	37	-209	297	123	173	215	-66	379
Lachlan	131	0	-12	120	90	29	204	-67	-107
Murrumbidgee	1,481	-57	-334	1,090	1,461	-372	658	-472	-246
Murray	1,386	-50	-359	978	689	289	580	-382	-91
Total New South Wales	**5,159**	**-89**	**-991**	**4,079**	**3,283**	**799**	**3,323**	**-1,267**	**-450**
Victoria									
Goulburn Broken Loddon[2]	1,427	-135	-27	1,265	544	721	1,177	-407	-68
Campaspe	59	0	0	59	18	41	184	-24	11
Wimmera–Mallee[3]	87	0	-44	42	10	33	9	-32	64
Kiewa Ovens Murray	987	325	-101	1,211	563	648	1,737	-340	-46
Total Victoria	**2,560**	**190**	**-172**	**2,578**	**1,136**	**1,443**	**3,107**	**-803**	**-38**
South Australia									
Metro–Adelaide & Associated Country Areas[6]									
Lower Murray Swamps	94	-60	0	35	14	21	27	-19	n/a
Country Towns	33	2	0	36	34	1	63	-10	n/a
All Other Purposes	404	-68	-70	266	257	9	771	-90	n/a
Total South Australia	**532**	**-125**	**-70**	**336**	**305**	**32**	**860**	**-119**	**n/a**
Queensland									
Condamine–Balonne[3]	1,728	0	0	1,728	1,064	665	665	-146	n/a
Border Rivers & Macintyre Brook[3]	587	20	-6	601	421	180	260	-50	n/a
Moonie[3]	77	0	0	77	29	48	n/a	AT	n/a
Nebine[3]	3	0	0	3	0	3	n/a	AT	n/a
Warrego[3]	94	0	0	94	11	82	n/a	AT	n/a
Paroo[3]	0	0	0	0	0	0	n/a	AT	n/a
Total Queensland	**2,489**	**20**	**-6**	**2,503**	**1,525**	**978**	**925**	**n/a**	**n/a**
Australian Capital Territory[3]	**n/a**	**n/a**	**n/a**	**n/a**	**6**	**n/a**	**141**	**n/a**	**n/a**

Note: The sign convention is that a negative Cap credit value denotes an exceedance of the Cap target adjusted for trade in 2010–11. A negative cumulative Cap credit value indicates an exceedance of the Cap target adjusted for trade on a cumulative basis (since 1997–98).

1. Adjustment to Cap target for trade includes exchange rate adjustments for permanent interstate trade and water recovered for environment.
2. Excludes Cap Target for Lake Mokoan.
3. "n/a" denotes Cap model is not completed or Cap target has not been able to be determined.
4. Cap credit is reported as positive and debit as negative
5. Cap target exceedance trigger values are reported as negative values. The 20% cumulative debit trigger for special audit does not apply to the Moonie, Nebine, Warrego and Paroo Cap valleys, where an annual trigger (AT) applies. In these valleys, whenever the annual diversions exceed the annual Cap targets by any amount, a special audit will be triggered.
6. See **Table 5.**
7. See previous page for explanation on the last column.

Table 5: Comparison of diversions with Cap levels in 2010–11 for Metro–Adelaide & Associated Country Areas, South Australia

South Australia	Total Diversion 2010–11 (GL)	Total Diversion—5 Years up to and including 2010–11 (GL)	5 Year Cap Diversion Target (GL)	Difference between Diversion and Cap (GL)
Gross Metro Adelaide and Associated Country Areas	56	555		
First Use License	0	0	0	0
Net Metro-Adelaide & Associated Country Areas against 650 GL 5-year Rolling Cap	56	555	650	95

4. REVIEW OF 2010–11 WATER USE IN NEW SOUTH WALES

4.1 Water Management Overview

At the commencement of the 2010–11 water year drought conditions were still continuing across much of NSW. Low or no allocations and low dam levels meant that on–going drought contingency measures were still in place across much of NSW. However the drought was broken in early 2010–11 with substantial and widespread rainfall across the state. The focus swiftly moved from critical water supply under drought conditions to dealing with floods, filling dams and the increasing of water allocations.

The breaking of the drought enabled almost all sharing and management rules under the suspended regulated Water Sharing Plans to recommence. These suspended plans included the NSW Murray, Lower Darling, Murrumbidgee, Lachlan and Macquarie–Cudgegong. In addition, other suspensions and restrictions were able to be lifted including suspensions on individual water accounts and restrictions on the delivery of water to some areas.

Valley Water Sharing Plans are the primary instrument for sharing and managing water resources in NSW. Each Plan includes a long–term diversion management limit (the Plan limit) and rules for adjusting water–sharing if diversions grow beyond the limit set out in the Plan. In all major regulated rivers in the NSW portion of the Basin these Plan limits are below Cap.

The Plan rules are intended to produce environmental benefits, while also ensuring that long–term average diversions do not exceed those which would result from 1993–94 development levels. Assessments of long–term diversions are undertaken annually, and management actions will be undertaken whenever required to ensure that the Plan limit is not exceeded

4.2 Water Use Overview

High rainfall resulted in major flooding in most valleys with many storages filling and spilling. This resulted in full allocations in most valleys, and large volumes of allocated water being carried over into 2011–12.

There was also a significant increase in environmental water use in 2010–11 at 601 GL which is more than five times the amount in 2009–10. Most of this environmental water use (77%) was in the Murray and Murrumbidgee Valleys.

Assessment of Cap performance for the 2010–11 water year using computer simulation models indicated that actual diversions were significantly less than the modelled Cap target for each valley. The exception is the Murrumbidgee which had a debit of 372 GL but still maintains a cumulative credit. The cumulative diversions in the Barwon–Darling component of the combined Barwon–Darling and Lower Darling valley remain over Cap, but the combined valley, as used for Cap reporting purposes, remains in credit. No Cap reporting valleys required a special audit.

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

4.3 Environmental Water Recovery

This report now includes information on water recovered for the environment from either water savings projects or the purchase of water entitlements. Over the last few years substantial volumes of water entitlements have been recovered through The Living Murray initiative, NSW's Riverbank program, projects undertaken by Water for Rivers for the Snowy River, and the Commonwealth entitlement purchase program. The entitlements reported

here are those that are formally owned by government for environmental use. There may be further entitlement purchases not reported here where contracts have been exchanged, but the process to list the changed ownership on the NSW Water Access Licence Register is not yet complete.

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

4.4 Border Rivers

A Continuous Accounting allocation system has been used in the NSW Border Rivers since 2001–02. The system provides general security licensees with an individual account, which can be credited with water up to 100% of entitlement and allows the continuous carryover of any unused water. Throughout the year and dependent on resource availability, licensees may receive an allocation increment (Available Water Determination), however the maximum that an individual general security licensee can hold in their account at any time is 100%. In any particular season, the volume of water that each licensee can use from their account is also limited to a maximum of 100%, which is equivalent to a maximum diversion of 246 GL (**Table 8**) for the valley.

NSW Border Rivers general security licensees commenced the season with an average of 11% of licensed entitlement in individual accounts, and received multiple increases to allocations throughout the year as more water became available. Total allocations for B class general security licences were around 105% however licensees were still limited to the maximum 100% use and account limits. There was a net inter–valley transfer of 23.3 GL out of the NSW Border Rivers to the Queensland Border Rivers.

Within the regulated river system a total of 164 GL was diverted during 2010–11 in the Border Rivers regulated system, including 94 GL of diversions by supplementary access licences.

Diversions in the unregulated sections of the catchment are not currently monitored in general. However, some users outside of the regulated system in the lower valley are metered. At the time of writing this information was unavailable. For the majority of unregulated users without meters, a volume of 23 GL, representing estimated average use, has been included as an estimate of unregulated diversions in 2010–11. This provided a total diversion of 192 GL from the regulated section of the NSW Border Rivers (**Table 2**).

NSW is preparing a Cap model report for submission to the MDBA for accreditation. Interim modelling results, subject to approval of the proposed Cap for the Border Rivers, indicate a long–term Cap of 195 GL and a 2010–11 Cap target of 240 GL. Modelled results also indicate a cumulative credit since 1997–98.

4.5 Gwydir

A Continuous Accounting (CA) allocation system is used for general security licences in the regulated section of the Gwydir Valley which provides licensees with an individual account that can hold up to 150% of entitlement and allows continuous carryover of any unused water. At any time they may receive a new allocation increment (dependent on resource availability) up to a maximum account limit of 150%. In any particular season, the volume of water that each licensee can use from their account is limited to a maximum of 125% of licensed entitlement with no more than 300% over any three years.

The Gwydir Valley commenced the season with an average of 2% of licensed entitlement in individual accounts, and received a further of 83% of licensed entitlement as further resources became available during the water year.

Within the regulated river system a total of 227 GL was diverted during 2010–11, including 134 GL of diversions by supplementary access licences.

Diversions in the unregulated sections of the catchment are not currently monitored in general. However, some users outside of the regulated system in the lower valley are metered. At the time of writing this information was unavailable. For the majority of unregulated users without meters, a volume of 44 GL, representing estimated average use, has been included as an estimate of unregulated diversions in 2010–11. This provided a total diversion of 271 GL for the Gwydir Valley (**Table 2**).

The Gwydir IQQM model has been accredited following independent review of the model. The Cap target is estimated for the regulated system each year using the Gwydir Valley IQQM. This target is the diversion that would have occurred during 2010–11 with management rules and irrigation development at 1993–94 levels. It is not currently possible to assess a 2010–11 Cap target for the unregulated sections of the valley, and the estimated average annual unregulated diversion is also used to represent the unregulated Cap target each year. After adjustments for Licences purchased for the environment are made, the overall Cap Target for 2010-11 was 383 GL. Under the Murray–Darling Basin agreement, annual Cap performances are cumulated from the 1997–98 water year. For the period from 1997–98 this indicates a cumulative Cap credit of 282 GL (**Table 4**).

4.6 Namoi–Peel

A Continuous Accounting (CA) allocation system is used for general security licences in the regulated section of the Lower Namoi Valley, which provides licensees with an individual account that can hold up to 200% allocation and allows continuous carryover of any unused allocation. At any time they may receive an allocation increment (dependent on resource availability) up to a maximum account limit of 200%. In any particular season, the volume of water that each licensee can use from their account is limited to a maximum of 125% of licensed entitlement with a maximum of 300% over any 3 years.

All high security licences and general security licences in the regulated section of the Peel valley are managed using annual accounts, which are forfeited at the end of each water year. The maximum allocation is 100% of licensed entitlement, which is 48 GL.

In 2010–11 Lower Namoi Valley licensees commenced with an average of 14% of licensed entitlement in individual accounts, and received allocation increases of 109% entitlement during the water year. Peel valley licensees commenced the season with zero allocation and ultimately received an allocation of 100% in early December. The Upper Namoi valley licensees commenced the season with zero allocation however carryover was available. Upper Namoi licensees received a 100% allocation before summer commenced.

Within the regulated river systems a total of 157 GL was diverted during 2010–11, with regulated river licences diverting 147 GL in the Lower Namoi Valley, 3 GL in the Upper Namoi Valley, and 7 GL in the Peel Valley. This includes supplementary access licence diversions of 87 GL in the Lower Namoi Valley during periods of high river flows.

Diversions in the unregulated sections of the catchment are not currently monitored and, a volume of 113 GL, representing estimated average use, has been included as an estimate of unregulated diversions in the Namoi and Peel Valleys. This provided a total diversion of 270 GL for the greater Namoi Valley (**Table 2**).

The Cap target is estimated for the regulated system each year using the Namoi Valley IQQM, which has been accredited for Cap purposes by the MDBA-appointed independent auditor. This target is the estimated diversion that would have occurred during 2010–11 with management rules and irrigation development at 1993–94 levels.

An IQQM for the Peel Valley regulated system has also been developed and used to assess preliminary Cap performance. The Peel Valley IQQM has also been accredited following independent review of the model. It is not currently possible to assess a 2010–11 Cap target for the unregulated sections of the valley, and the estimated average annual unregulated diversion is also used to represent the unregulated Cap target each year. The combined Cap target for 2010–11 is 381 GL. Under the Murray–Darling Basin agreement, annual Cap performances are cumulated from the 1997–98 water year. For the fourteen water years of Cap accounting since 1997–98, this indicates a cumulative Cap credit of 251 GL (**Table 4**).

4.7 Macquarie–Castlereagh–Bogan

Licensees in the regulated section of the Macquarie Valley commenced the season with an average of 5% of licensed entitlement in individual accounts, and received a further increase of 100% of entitlement through the water year. The Licensees in the regulated section of the Cudgegong Valley commenced the season with an average of 47% of licensed entitlement in individual accounts, and received further allocations totalling 100% throughout the water year. High security licences received their full allocations being 100% of their licensed entitlements.

Within the regulated river systems a total of 143 GL was diverted during 2010–11. This includes diversion by supplementary access licences of 35 GL in the Macquarie Valley.

Diversions in the unregulated sections of the catchment are not currently monitored in general. However, some users outside of the regulated system in the lower valley are metered. At the time of writing this information was unavailable although the volume is not thought to be significant. For the majority of unregulated users without meters, a volume of 35 GL, representing estimated average use, has been included as an estimate of diversions in 2010–11. This provided a total diversion of 183 GL in the Macquarie Valley (**Table 2**).

The Cap for the regulated sections of the Macquarie Valley has been audited using the Macquarie Valley IQQM that has been recommended for accreditation by the independent model auditor.

The Cap target is estimated for the regulated system each year using the Macquarie Valley IQQM. This target is the diversion that would have occurred during 2010–11 with management rules and irrigation development at 1993–94 levels. It is not currently possible to assess a 2010–11 Cap target for the unregulated sections of the valley, and the estimated average annual unregulated diversion is also used to represent the unregulated Cap target each year. After adjustments for Licences purchased for the environment are made, the overall Cap Target for 2010-11 was 592 GL. Under the Murray–Darling Basin agreement, annual Cap performances are cumulated from the 1997–98 water year. For the period since 1997–98 this indicates a cumulative Cap credit of 757 GL (**Table 4**).

4.8 Barwon–Upper Darling

Major flooding in southern Queensland combined with significant inflows from NSW tributaries have provided substantial flows for the Barwon–Darling throughout 2010–11. The total volume of extractions in the Barwon–Darling in 2010–11 was 95 GL (**Table 2**).

The Cap target is estimated each year using the Barwon–Darling Valley IQQM, which has now been presented for accreditation by the independent auditor. This target is the diversion that would have occurred during 2010–11 with management rules and irrigation development at 1993–94 levels. After adjustments for Licences purchased for the environment are made, the overall Cap Target for 2010-11 was 156 GL. Under the Murray–Darling Basin agreement, annual Cap performances are cumulated from the 1997–98 water year and since this point in time the cumulative Cap debit for the Barwon–Upper Darling is 93 GL. This exceeds the trigger for Special Auditing of 40 GL.

For Cap auditing purposes however, the Barwon–Darling and Lower Darling valleys are treated as one valley. The combined annual Cap performances totalled from the 1997–98 water year show a cumulative Cap credit of 215 GL (**Table 4**).

In recognition of a cumulative Cap debit in previous years, NSW has implemented a Cap Management Strategy to ensure Cap compliance in the Barwon–Darling sub–catchment. The restructured water entitlements and access rules have operated since 2007, and will ensure that long–term average diversions do not exceed the long–term Cap. As the Barwon–Darling is an unregulated river it is acknowledged that water availability will vary significantly between years.

The new Cap arrangements that applied from 1 July 2007 include the reduction of licensed entitlements to the volume of the (then) estimated long–term diversion Cap of 173 GL, and unlimited carryover of allocated water from one water year to the next.

NSW has also previously indicated that if the trend towards increasing Cap debits continued, it would further reduce water made available each year from 173 GL to 143 GL. As an interim measure for 2010–11, access to water in accounts that was carried over from previous water years was suspended, and water users

were limited to the 173 GL annual allocation. NSW will continue to review the Cap modelling and consider if this proposed reduction in water availability remains appropriate.

The Barwon–Darling IQQM has recently undergone a review and an upgrade to incorporate new information covering the drought–dominated years of the last decade. As a result, the modelled figures have changed and the model is now estimating that the long–term Cap is 198 GL, and the Cap debits are now significantly lower than previously reported. The interim arrangements for 2010–11 will continue for 2011–12, with the exception that the limit for extractions is increased to 198 GL for the 2011–12 water year. Because the model is yet to be accredited, it is anticipated that these interim arrangements will apply for the 2011–12 water only.

4.9 Lachlan

The Lachlan valley commenced the 2010–11 water year like numerous immediately preceding years with severely restricted allocations for even high security licences. Domestic and stock licences commenced the water year with an allocation of only 15% of entitlement. High security entitlements only received an initial allocation of 10% and local water utilities were restricted to an initial 50% allocation. General security licensees initially had zero allocations and no access to any carry over water.

Substantial inflows into Wyangla Dam and flooding from downstream tributaries during the year resulted in significant improvements to all allocations by early December. All licensees eventually received an allocation of 100% and in the case of general security licensees, their allocations reached 117%.

A total of 75 GL was diverted from the Lachlan regulated river system during the 2010–11 water year. Diversions in the unregulated sections of the catchment are not currently monitored and, a volume of 15 GL, representing estimated average use, has been included as an estimate of unregulated diversions in the Lachlan Valley. This provided a total diversion of 90 GL for the Lachlan Valley (**Table 2**).

The Cap target for the year is estimated for the regulated system each year using the Lachlan Valley IQQM, which was the first model to be accredited for Cap purposes by the independent auditor. This target is the estimated diversion that would have occurred during 2010–11 with management rules and irrigation development at 1993–94 levels. It is not currently possible to assess a 2010–11 Cap target for the unregulated sections of the valley, and the estimated average annual unregulated diversion is also used to represent the unregulated Cap target each year. After adjustments for licences purchased for the environment are made, the overall Cap target is 120 GL. Under the Murray–Darling Basin agreement, annual Cap performances are cumulated from the 1997–98 water year, and the Lachlan valley has accumulated a Cap credit of 204 GL (**Table 4**) over this period.

4.10 Murrumbidgee

The 2010–11 water year in the Murrumbidgee commenced with critically low water availability. In a similar fashion to the Lachlan, high reliability licensees received significantly reduced allocations under drought management arrangements. Domestic and stock licensees and local water utility licensees received initial allocations of 50% whilst high security licensees commenced the water year with an allocation of 20% of entitlement. Improvements in water availability early in the water year enabled these allocations to return to more normal levels before eventually reaching full allocations. Modest allocations were also then able to be made to general security users.

Whilst the general security licensees in the regulated section of the Murrumbidgee Valley commenced the season with zero allocation, they eventually received their full allocations in mid December 2010.

A total of 1036 GL was diverted from the Murrumbidgee regulated river system during 2010–11 including supplementary access licence diversions of 141 GL. For the Lowbidgee Flood Control and Irrigation District, a total of 383 GL was diverted.

Diversions in the unregulated sections of the catchment are not currently monitored and, a volume of 42 GL, representing estimated average use, has been included as an estimate of unregulated diversions in the Murrumbidgee Valley. This provided a total diversion of 1,461 GL for the Murrumbidgee Valley (**Table 2**). Net trade from the Murrumbidgee valley to other valleys in the southern Basin during 2010–11 was 49 GL.

The Cap target is estimated for the regulated system (including Lowbidgee) each year using the Murrumbidgee Valley IQQM, which has now been accredited for Cap purposes by the Authority. This target is the diversion that would have occurred during 2010–11 with management rules and irrigation development at 1993–94 levels. It is not currently possible to assess a 2010–11 Cap target for the unregulated sections of the valley, and the estimated average annual unregulated diversion is also used to represent the unregulated Cap target each year. After adjustments for inter–valley trade and licences purchased for the environment are made, the overall valley Cap target is 1,090 GL. Under the Murray–Darling Basin agreement, annual Cap performances are cumulated from the 1997–98 water year, and the Murrumbidgee Valley has accumulated a Cap credit of 658 GL (**Table 4**) over this period.

4.11 Lower Darling

All licence categories in the Lower Darling received an initial 100% allocation at the start of the 2010–11 water year. This included supplies for towns, stock and domestic users, as well as high and general security purposes. Net trade out of the Lower Darling during 2010–11 was 11 GL.

A total of 28GL was diverted from the Lower Darling regulated river system during the 2010–11 water year, with regulated river licences accounting for all of the diversions.

The Cap target is estimated for the regulated system each year using the Murray Monthly Simulation Model which is in the process of being resubmitted for accreditation. This target is the diversion that would have occurred during 2010–11 with management rules and irrigation development at 1993–94 levels. After adjustments for inter–valley trade and licences purchased for the environment are made, the preliminary Cap target is 141 GL. Under the Murray–Darling Basin agreement, annual Cap performances are cumulated from the 1997–98 water year, and the Lower Darling has accumulated a cumulative Cap credit of 306 GL over this period.

For Cap auditing purposes however, the Barwon–Darling and Lower Darling valleys are treated as one valley. The combined annual Cap performances totalled from the 1997–98 water year show a cumulative Cap credit of 215 GL.

4.12 Murray

The Murray also commenced the 2010–11 water year with severe restrictions on allocations for even high reliability licence categories. Domestic and stock licensees and local water utility licensees received initial allocations of 50% whilst high security licensees commenced the water year with a zero allocation before receiving a small allocation of 10% in late July. General security licensees also initially had a zero allocation before receiving the first allocation of 8% in September. Allocations for all licensees then increased to 100% in mid December.

A total of 661 GL was diverted in NSW from the Murray regulated river system during the 2010–11 water year including supplementary access licence diversions of 139 GL. Diversions in the unregulated sections of the catchment are not currently monitored and, a volume of 28 GL, representing estimated average use, has been included as an estimate of unregulated diversions in the NSW Murray Valley. This provided a total diversion of 689 GL for the NSW Murray Valley (**Table 2**).

The Cap target is estimated for the regulated system each year using the Murray Monthly Simulation Model that has been accredited following the independent review of the model. This target is the diversion that would have occurred during 2010–11 with management rules and irrigation development at 1993–94 levels. It is not currently possible to assess a 2010–11 Cap target for the unregulated sections of the valley, and the estimated average annual unregulated diversion is also used to represent the unregulated Cap target each year. After adjustments for inter–valley trade and licences purchased for the environment are then made, the overall valley Cap target is 978 GL. Under the Murray–Darling Basin Agreement, annual Cap performances are cumulated from the 1997–98 water year. For the fourteen water years of Cap accounting, this indicates a cumulative Cap credit of 580 GL (**Table 4**).

5. REVIEW OF 2010–11 WATER USE IN VICTORIA

5.1 Overview

Water availability in the 2010–11 irrigation season was largely driven by above average inflows to all northern Victorian storages, which resulted in significant improvements in stored resources. In 2010–11 irrigators supplied from all systems received allocation of 100% of high–reliability water shares (HRWS) for the first time since 2001–02 season. Allocations in the Campaspe, Broken and Bullarook systems also reached 100% of low–reliability water shares (LRWS).

Despite allocations reaching their highest levels in many years, allocations started at zero for the fourth consecutive year on 1 July 2010.

For the first time since 1999, irrigation areas in the Wimmera Mallee system received a 100% allocation. There was also a 100% allocation for urban, domestic and stock customers supplied from the Wimmera–Mallee pipeline.

Current carryover policy in the Murray, Goulburn and Campaspe systems allows unlimited water to be carried over. This resulted in a large volume of unused water being carried over from 2010–11 to 2011–12. Carryover has allowed irrigators to have water available to use early in a season regardless of the allocation to high–reliability water shares.

The Qualification of Rights that applied in the 2009–10 season to provide a limited supply to domestic and stock, urban and other commercial customers while allocations to high–reliability water shares are low, remained in place at the start of the 2010–11 season. Qualifications also reduce or remove the obligations to meet minimum environmental flows in some cases. Qualifications were in place for all systems except the Ovens, Kiewa and Wimmera–Mallee on 1 July 2010. The Qualifications in the Murray, Goulburn and Broken systems were revoked by the Minister for Water after available resources improved, but remained in place for the entire season in the, Campaspe and Loddon systems.

The summer of 2010–11 was the wettest season on record in Victoria, experiencing several significant rainfalls and flooding events. Flooding occurred downstream of several major storages including storages in the Goulburn, Loddon, Campaspe, Broken, Murray and Ovens systems. There were five distinct flood events occurring in September, November, December, January and February.

For all areas managed by Goulburn–Murray Water, rainfall for the year ending 30 June 2011 was overall well above average. August to March inclusive were wetter than average in nearly all areas, and well above average in the majority of areas.

The summer seasonal rainfall was considerably wetter than average across all locations with a range of 252% average at Eildon to 411% of average at Tatura. Many locations recorded their highest summer rainfall on record including: Rushworth, Boort, Cobram, Lake Eppalock, Lake Buffalo, Goulburn Weir, and Swan Hill.

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 and reviewed. Bulk Entitlements for the Goulburn, Murray, Ovens, Broken, Campaspe, Loddon and Bullarook river systems are now in place. The Wimmera–Glenelg Bulk Entitlements were revoked in October of 2010 and replaced with new Bulk Entitlement Orders and an Environmental Entitlement.

Carryover of unused allocation mainly contributes to Cap Credits in the year the water was allocated. Unused allocation carried over from 2010–11 to 2011–12 amounted to 1,390 GL in the Victorian Murray valley and 1,140 GL in the Goulburn–Broken–Loddon. In comparison, the carryover from 2009–10 into 2010–11 for the Victorian Murray and Goulburn–Broken–Loddon valley was 501.5 GL and 335 GL respectively. The main factors for

the unused allocation at the end of the 2010–11 season being higher than previous years was the high allocations and available carryover in all systems and wet seasonal conditions which resulted in very low demand as water could not be utilised by customers.

5.1.2 Volumes Diverted

The volume diverted during 2010–11 in the Murray–Kiewa–Ovens valley was 563.0 GL. In the Goulburn–Broken–Loddon designated river valley and the Campaspe river valley, diversions were 544.5 GL and 18.4 GL respectively. Wimmera–Mallee valley diversions were 9.7 GL. Victorian systems diverted 1,135.5 GL from the Murray–Darling Basin during 2010–11.

The total Cap target adjusted for trade and environmental allocations, including the Wimmera–Mallee, was 2,578.2 GL.

5.1.3 Off–Quota

Off–quota allocations have not been available in Victorian river valleys since 2003.

5.1.4 Deliveries

Final Deliveries & Historical Comparison

The total volume delivered to northern Victorian regulated systems during 2010–11 was 831.2 GL. The total Victorian usage was 27% of the total volume allocated.

Deliveries in the Murray–Kiewa–Ovens designated valley were 530.0 GL in 2010–11, compared to 772.2 GL for the previous year. Goulburn–Broken– Loddon valley deliveries were 223.5 GL in 2010–11, 273.0 GL lower than the 496.5 GL delivered in 2009–10. Deliveries in the Campaspe valley were also lower in 2010–11, with 68.4 GL compared to 106.9 GL delivered in 2009–10.

Total Wimmera–Mallee deliveries including water diverted from other valleys were 9.3 GL in 2010–11, 0.5 GL more than in 2009–10.

5.1.5 Trading

The allocation trade market in Victoria was again very active during 2010–11 with a net volume of 176.1 GL traded into Victoria.

Interstate allocation trading with New South Wales resulted in an overall net inwards transfer to Victoria of 71.1 GL during 2010–11. This volume includes net inwards allocation trade of 61.5 GL from NSW Murray and 12.2 GL from the Murrumbidgee River basin. A volume of 2.6 GL was traded into the Darling River.

Trade with South Australia was a net allocation trade of 105.0 GL from South Australia to Victoria, compared to 45.6 GL from Victoria to South Australia in the 2009–10 season.

There was 479.8 GL of allocation trade into the Kiewa–Ovens–Murray valley from other valleys and the reverse trade was 299.7 GL resulting in a net allocation trade into the Kiewa–Ovens–Murray valley of 180.0 GL.

There was a net volume of allocation trade out of the Goulburn–Broken–Loddon valley of 13.9 GL. A total of 163.2 GL was traded in while 177.1 GL was traded out. There was a net allocation trade of 21.0 GL from South Australia to the Goulburn–Broken–Loddon valley.

The net trade into the Campaspe valley was 10.0 GL, including 0.1 GL for use via the Goldfields Superpipe and 19.0 GL traded for use in the Rochester Irrigation Area. A total of 9.1 GL was traded out of the Campaspe Irrigation Area.

5.1.6 Environmental Flows

As there were long periods of unregulated flow conditions in the River Murray and allocations reached 100% early in the season, numerous sources of water were available for environmental use. Overbank flows provided by the floods that occurred in the 2010–11 season filled many of the lakes and wetlands that had received environmental water in previous years.

The total use of water for environmental allocations in 2010–11 was 196.8 GL. This volume includes water used in the Barmah–Millewa Forest from the Barmah–Millewa entitlement and in-stream use in the Wimmera– Mallee system. The total consumptive volume of water used for environmental purposes was 67.9 GL.

An additional 33.7 GL was used in the River Murray and Loddon system during periods of unregulated flows, of which 9,363 ML was delivered to sites upstream of Nyah including Richardson's Lagoon and Cullen's Lake, 13,539 ML was delivered downstream of Nyah and 10,798 ML was delivered to wetlands in the Boort district.

A total of 97.9 GL of environmental water was delivered in–stream to the Goulburn River to assist with water quality in both the Lower Goulburn River and the River Murray following the formation of 'black water' in both rivers. This water was sourced from the Goulburn Water Quality Reserve, The Living Murray, Flora and Fauna and Commonwealth entitlements. Of the 97.9 GL delivered, 85.4 GL was traded to South Australia to increase the flows over the border.

A total of 428 GL was supplied to the Barmah–Millewa Forest during 2010–11. Of this volume, 184.5 GL was contributed by Victoria, with 84.5 GL sourced from Victoria's Environmental Water Allocations to the Barmah–Millewa Forest Entitlement, and a further 100 GL supplied from Victoria's The Living Murray entitlements. A total of 30 GL from The Living Murray entitlement was consumed in the Barmah–Millewa Forest and the remaining 70 GL was traded to South Australia. Supply of this water to the Barmah–Millewa forest took place from September 2010 to February 2011 and was delivered via overbank flows downstream of Yarrawonga Weir, following natural flood events in September 2010 and January 2011. At 30 June 2011, there was 95.6 GL available in the Victorian Barmah–Millewa account.

Wetlands on the Loddon system were supplied with 11.3 GL of water. Lakes Boort, Meran, Leaghur, Yando, Little Lake Boort and Little Lake Meran all received water which was supplied from unregulated Loddon River flows. A portion of unregulated flows were diverted at Loddon Weir through the G–MW channel system and delivered to the wetlands under direction of North Central Catchment Management Authority. In addition to the unregulated flows, Little Lake Boort received 83.8 ML of donated water.

The Loddon River also received 0.4 GL of environmental water which was used to maintain increased passing flows below Loddon Weir. This water was provided from Commonwealth entitlements.

Water from Commonwealth entitlements was used to maintain increased passing flows in the Campaspe River as per environmental flow recommendations during June 2011, with a total of 2.1 GL used.

The Goulburn wetlands being Reedy Swamp, Black Swamp and Doctors Swamp, were not supplied with environmental water during 2010–11.

In addition to the volumes supplied to forests and wetlands, 7.8 GL from the Goulburn Water Quality Reserve was used to improve the health of Broken Creek via diversions at Goulburn Weir to the Murray system via Rice's Weir on Broken Creek.

5.2 Goulburn

Gravity irrigation customers and private diverters in the Goulburn System of the Goulburn–Broken–Loddon designated river valley were given an initial allocation of 0% of high–reliability water shares in July 2010. The allocation reached a maximum of 100% of high–reliability water shares on 15 November 2011. There has been no allocation of low–reliability water shares since 1997–98.

Lake Eildon was 27.5% full at the start of July 2010 and reached 87.5% of capacity on 30 June 2011. Lake Eildon has not filled to capacity since 1996.

Waranga Basin filled from catchment inflows during August for the first time since 2005. By the end of season, Waranga Basin was drawn down to 80.0% capacity. Pumping at the Major and Minor outlets at Waranga Basin were not needed to increase water availability to customers as the allocation exceeded 37% without pumping.

The total volume allocated for use in the Goulburn valley was 792 GL. Usage in the Goulburn valley was 167.7 GL, or 21% utilisation of the total allocated volume.

Approximately 154.8 GL was transferred to the Murray, Campaspe and Loddon systems. The total diversion during 2010–11 to the Goulburn valley was 513.5 GL. A total of 11.3 GL was transferred from north to south of the Great Dividing Range to Melbourne Water from the Silver and Wallaby creeks which are tributaries of the Goulburn River. An additional 7.5 GL was transferred to Melbourne Water from the Goulburn River via the Sugarloaf pipeline.

The Goulburn–Broken–Loddon valley is within Cap and maintains a cumulative Cap credit of 1,177.0 GL.

5.3 Broken

For the fourth year in a row private diverters in the Broken River system received an initial zero allocation at the start of July 2010. Allocations improved rapidly to reach 100% of high–reliability water shares in early September. An allocation of 100% of low–reliability water shares was announced in mid November.

Lake Nillahcootie rose from a low of 28.7% full at the start of July 2010 and filled to 100% of capacity in late August. Due to sustained inflows and wet conditions, the storage remained close to full throughout the year as there was no need to release additional water to meet downstream requirements.

The Broken usage equated to 1.6 GL, or 6.8% utilisation of the total allocated volume. The Broken system is included in the Goulburn–Broken–Loddon designated river valley, which is within Cap and has a cumulative Cap credit.

5.4 Loddon

On 16 August 2010 an allocation of 26% of high–reliability water shares was announced for the Loddon System (excluding Bullarook Creek). The allocation reached 100% of high–reliability water shares & 0% low–reliability water shares on 15 November 2010. Allocations to customers in the Bullarook system received an allocation of 100% high–reliability water shares and 100% low–reliability water shares.

Cairn Curran and Tullaroop reservoirs reached 100% capacity in early November and early September respectively. This is the first time since 2000 that Cairn Curran reservoir filled the first time since 1996 that Tullaroop reservoir filled. At the 30 June 2011, Cairn Curran was at 95.9% of capacity and Tullaroop reservoir was at 89.4% of capacity.

Laanecoorie reservoir rose from 21.1% in early July 2010 and for the first time in seven years exceeded capacity in mid August 2010. On 30 June 2011 Laanecoorie was at 76.8% of capacity.

Newlyn reservoir reached a capacity of over 100% by mid August 2010 and remained at capacity for the rest of the year.

Diversions from the Loddon River and tributaries for private irrigation use, domestic and stock, commercial, industrial and urban purposes remained low, amounting to only 3.4 GL.

Due to the higher allocations and water availability on the Loddon system, some of the supply to the Boort region of the Pyramid–Boort Irrigation Area was able to be met from the Loddon storages for the first time in nine years. A total of 44.2 GL was delivered in Pyramid–Boort in 2010–11.

The Loddon valley is included in the Goulburn–Broken–Loddon designated river valley for the assessment of Cap compliance which is within Cap and has a cumulative Cap credit. Loddon valley usage was 54.2 GL, or 21.7% of the allocated volume.

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 to irrigators in the Rochester Irrigation Area are the same as those in the Goulburn system.

Allocations in the Campaspe system opened at 0% of high–reliability water shares but increased to 100% of high–reliability water shares by 15 September for the first time since 2003–04. Allocations to low–reliability water shares also reached 100% in November.

Lake Eppalock was at only 8.8% capacity on 1 July 2010 and by late November the storage filled for the first time since 1996. As at 30 June 2010, Lake Eppalock was still at 96.7% capacity.

As all Coliban storages filled early in the 2010–2011 season the Goldfields Superpipe was not needed to transfer any water from the Goulburn system to Sandhurst reservoir at Bendigo or to the White Swan Reservoir at Ballarat. An amount of 0.1 GL was transferred from the Goulburn system to Lake Eppalock of which all was attributed to Coliban Water.

No water was pumped from Lake Eppalock to Bendigo by Coliban Water in the 2010–11 season.

The 2010–11 Campaspe valley allocation volume was 281.0 GL of which 24% was utilised.

There was no water harvested from the Campaspe River to the Waranga Western

Channel via the Campaspe Irrigation District channels or the Campaspe Pumps although there was water available.

Woodend was supplied with 53 ML from the Campaspe system.

Diversions from the Campaspe designated river valley were 41.0 GL less than the Cap target in 2010–11. The Campaspe valley has a cumulative Cap credit of 184.4 GL.

5.6 Wimmera–Mallee

Like much of Victoria, the Wimmera–Mallee system water resource management activities were dominated by floods.

Inflows for the year were 389.6 GL compared to 93.6 GL in 2009–10. This resulted in the total volume held in store increasing from 36.2 GL in July 2010 to 322.6 GL by June 2011. This is the most water held in the system since 1998. The large inflows received also saw a number of reservoirs spill, including Moora Moora, Lonsdale and Wartook.

Completion of the Wimmera Mallee Pipeline Project in May 2010 means 2010–11 is the first full year the Wimmera Mallee Pipeline has been operated within a reporting period. The Wimmera–Glenelg Bulk Entitlements were revoked in October of 2010 and replaced with new Bulk Entitlement Orders and an Environmental Entitlement. The new volume of entitlement held in the Wimmera–Glenelg system is 125 GL. This reduction in total entitlement of about 50 GL reflects the water savings made from the latter stages of the Wimmera Mallee Pipeline Project.

Opening allocations were 118.3 GL (determined in November 2010) with the final allocation for the 2010–11 water year being 125.5 GL. A reserve volume of 95 GL was also created during this period.

A 100% allocation was made available for irrigation for the first time since 1999. Both Coliban and Wannon water authorities had a 100% allocation.

For the year ending June 2011, diversions from water sourced within the Wimmera–Mallee valley totaled 9.7 GL.

5.7 Kiewa

Total Kiewa usage was 0.5 GL or 43.2% of the urban entitlement volume. A further 0.7 GL was used in the unregulated system. The Kiewa system is included in the Murray–Kiewa–Ovens designated river valley for the assessment of Cap compliance which is within Cap and has a cumulative Cap credit.

5.8 Ovens

Lake Buffalo was operated below full supply for most of the 2010–11 season due to flood conditions. Inflows were more than required to sustain downstream flow requirements. The storage did not fill during the year and was drawn down to 46.1% of capacity at the end of June. Lake William Hovell was full throughout the 2010–11 season. As both storages were effectively spilling all season, customers had access to spill-reliability water shares.

Total Ovens valley usage was 5.5 GL or 14.6% of the allocated volume. A further 0.4 GL was used in the unregulated system. The Ovens valley is included in the Murray–Kiewa–Ovens designated river valley for the assessment of Cap compliance which is within Cap and has a cumulative Cap credit.

5.9 Murray (including Mitta Mitta)

There was zero allocation at the start of July 2010 for Murray system gravity irrigation customers and Mitta private diverters. An allocation of 2% of high–reliability water shares was announced on 2 August 2010, which was subsequently increased in steps to a final allocation of 100% on 15 October 2010.

At 1 July 2010, Lake Dartmouth was 33.3% of capacity and steadily increased throughout the year. By late June 2011 the storage had nearly doubled capacity and was at 64.5%.

In the 2010–11 season Lake Hume filled in mid November 2010 after starting the season on 1 July 2010 at 27.3% of capacity. At 30 June 2011 the storage had been drawn down to 93.4% of capacity.

The Menindee Lakes remained in MDBA control for the entire 2010–11 season.

The total diversion, excluding all environmental diversions, was 556.0 GL for the Victorian component of the River Murray valley. This diversion included 2.7 GL for the Northern Mallee pipeline. The allocated volume was 1,675 GL, of which 524.0 GL or 31% was used.

For the purposes of Cap compliance, the Murray valley is included in the Murray–Kiewa–Ovens designated river valley. Diversions from this valley were 648.1 GL below the 2010–11 Cap target and the accumulated Cap credit for the Murray–Kiewa–Ovens designated river valley is 1,737.2 GL.

6. REVIEW OF 2010–11 WATER USE IN SOUTH AUSTRALIA

6.1 Overview

At the commencement of the 2010-11 water year, South Australia was experiencing the fifth consecutive year with access to less that its Entitlement Flow of 1850GL due to the prolonged period of low flows.

The volume of water available to South Australia at the start of 2010-11 was 1384GL, which included 696GL for dilution and losses, 201GL for critical human water needs, a small opening allocation of 21 percent and provision of 100 percent of carryover for water access entitlement holders.

As the year progressed, conditions changed across the Southern Murray-Darling Basin due to a number of heavy rainfall events. As a consequence, the Basin experienced widespread flooding, filling and spilling of storages followed by an extended period of unregulated flows into the River Murray and Darling River systems.

The significant improvement of inflows into the Murray-Darling Basin resulted in South Australia receiving its full Entitlement Flow of 1850GL for 2010-11.

This allowed South Australian water access entitlement holders, in aggregate, to receive a 100 percent water allocation, consisting of 422GL (or 67 percent) as a general allocation plus 228GL for those users that carried over unused allocations from 2009-10, bringing the volume of water allocated to the 650GL cap under the Water Allocation Plan for the River Murray Prescribed Watercourse.

In addition to managing the dynamic and unplanned seasonal conditions, South Australia is addressing the ability to store and deliver water additional to the annual 1850GL Entitlement Flow through South Australia's Storage Right under the impending Schedule G of the Murray-Darling Basin Agreement. It is anticipated that the Murray-Darling Basin Ministerial Council will approve the new Storage Right arrangement early in 2011-12. The Storage Right will provide South Australia with formal recognition of carryover and the implementation arrangements associated with storing water for this purpose and in the management of critical human water needs.

6.2 Impact of recovery from drought conditions

The seasonal outlook changed dramatically by late spring and summer 2010 in response to several heavy rainfall events that generated a number of inflow events. These inflow events resulted in over 15000 GL flowing across the border and flows peaking at 94 GL/day by mid February 2011. Being the highest annual flow across the border since 1975-76 benefited severely drought affected floodplains and improved water quality in the Lower Lakes. It also triggered the removal of a number of temporary structures that were put in place to manage water levels during the drought to prevent acidification.

Prior to the high inflow events, the River channel, floodplain and Lower Lakes suffered from the lack of high flow and in particular overbank flow, that commences at about 40 GL/day. The last time flow was more than 40 GL/day was in December 2000. The high flow provided significant benefits for the riparian, wetland and floodplain vegetation, in particular river red gum communities, which were suffering from impacts of salt and lack of inundation. This high flow event also allowed large-scale recruitment of a number of wetland or floodplain species that will require future watering for survival and further recruitment.

Large areas of the floodplain received water and all locks and weirs were inundated by the high flow. The River Murray downstream of Lock 11 was free flowing for the entire length of the system and a large volume of water was discharged from the Lower Lakes into the Coorong.

6.3 River Murray Water Management

An opening water allocation of 21 percent, together with 228GL for private carryover, was announced on 1 July 2010 for River Murray water access entitlement holders. South Australia's volume of water from the shared resources continued to improve, allowing the allocation to be increased on 1 October 2010 to 67 percent (or 422GL) of entitlement. Together with carryover this was the maximum allocation allowable for 2010-11 under the cap of 650GL included in the Water Allocation Plan for the River Murray Prescribed Watercourse.

Until South Australia's Storage Right (Schedule G) comes into effect, carryover forms part of the general consumptive pool. Once endorsed, Schedule G will allow water to be available in addition to any announced allocations and will be in addition to South Australia's 1850 GL Entitlement Flow.

This Storage Right will provide an opportunity for most South Australian water access entitlement holders to participate in a proposed Private Carryover Scheme. The policy and implementation arrangements will be developed in consultation with water users in 2011-12 and is planned to be operational from the 2012-13 water year. The scheme will contain a number of conditions whereby South Australia is limited with regard to when it can defer and store water. Conditions will include a restriction on water being deferred or stored during a period of unregulated flow and that South Australia's water will spill first from a storage if there is a pre-release or spill from where water is stored.

South Australia's Storage Right will also be the mechanism for the long term management of South Australia's River Murray water for critical human water needs.

While South Australia may have the ability to store water for private carryover and for managing critical human water needs, an assessment of resource conditions (including the outlook for water availability), water quality and risk of spill will be considered prior to water being deferred. The Department for Water will administer the process for deferring and storing water through a 12 month rolling Deferred Water Storage and Delivery Plan. This will require approval from the Murray–Darling Basin Authority before any changes are implemented.

6.4 River Murray Water Use

Total diversions from the River Murray in 2010-11 were 362 GL, representing the lowest diversions since the introduction of the Cap under the Murray-Darling Basin Agreement and are reflective of the seasonal conditions. The diversions comprised:

- 56.4 GL for Metropolitan Adelaide and Associated Country Areas;
- 34.1 GL for Country Towns;
- 13.6 GL for the Lower Murray Swamps (including ELMA, which is restricted by the same percentage as irrigation allocations);
- 244.2GL for metered consumption; and
- 13.7 GL for non-metered consumption.

The metered consumption (principally irrigation) was extremely low as a result of the above average rainfall conditions (due to La Niña weather patterns) experienced during the main growing season (spring to summer) along the length of the River Murray. A total of 460mm was recorded at the Berri Post Office and isolated falls of 150mm-200mm were recorded at some locations.

The Langhorne Creek Irrigation Area also received localised widespread flooding from heavy rainfall generated over the eastern Mount Lofty Ranges allowing the Angas and Bremer Rivers to flow out onto the floodplain and into some vineyards. This process is a naturally occurring event and is important for reducing soil salinity and to recharge groundwater systems.

6.5 Metropolitan Adelaide and Associated Country Areas

The Metropolitan Adelaide Water Supply System uses two major water resources: natural catchment inflows into the Mount Lofty Ranges storages and the River Murray.

Water from the Mount Lofty Ranges storages is used as the primary water source because of the significant costs of treating and pumping water from the River Murray. The high flows in the River Murray and resulting blackwater event that was generated upstream, significantly increased treatment costs for urban and country areas water supply.

The Mount Lofty Ranges storage level is the major factor influencing the amount of water to be pumped from the River Murray. Natural inflows to the Mount Lofty Ranges storages were approximately 88 GL. Metropolitan Adelaide and Associated Country Areas also received above average rainfall during spring and summer and experienced below average temperatures. This resulted in a low volume of water use. Diversions from the River Murray for Metropolitan Adelaide and Associated Country Areas were 56.4 GL, being the lowest volume since the Cap was introduced. This allowed the Minister for Water and the River Murray to relax water restrictions imposed during the drought. Permanent water conservation measures remained in place.

The five-year rolling diversion for the Metropolitan Adelaide was 555.3 GL, which is 94.7 GL less than the 650 GL five year rolling Cap. The 2006-07 diversion of 203.1 GL was unusually high due to the additional 60 GL pumped during that year for use in 2007-08.

6.6 Country Towns

Country Towns used 34.1 GL, which was also the lowest diversion since the Cap was introduced. Diversions against this licence do not vary significantly between years as there are no other local water supplies available eg reservoirs.

6.7 Lower Murray Swamps

The Lower Murray Reclaimed Irrigation Areas (LMRIA), located between Mannum and Wellington, were formerly wetlands connected to the River Murray. The Cap on these areas was agreed in 2001 by Ministerial Council. This Cap was based on recognised best irrigation practice applied to approximately 5000 hectares of former wetlands and an additional 780 hectares of the adjoining highland.

Water allocations within the LMRIA have been treated in the same manner as all other irrigation licences (67 percent plus carryover). Diversions were only 13.6 GL, which included a small volume of non-metered use. This was the third lowest diversion since the Cap was introduced. Water access was not an issue during 2010-11 due to water levels being restored to the normal annual operating range of 0.5m AHD to 0.85m AHD.

6.8 All Other Purposes of water from the River Murray

Annual diversions under the All Other Purposes component of the Cap were 257.9 GL, including non-metered water use of 13.7 GL. These diversions were the lowest since the Cap was implemented and lower than the annual diversions between 2006 and 2010, when allocations were restricted due to low water availability. Above average rainfall during peak crop-growing times was a factor contributing to reduced diversions. In addition, there was a significant volume of water traded out of South Australia due to the State not being able to carryover water in 2011–12.

The All Other Purposes Cap includes stock, domestic, environmental, industrial and recreation entitlements. Annual water restrictions apply to all components of the Cap with the exception of industrial, stock and domestic (which equates to approximately 20 GL). A model for All Other Purposes Cap has been developed, and is used to enable a comparison of annual diversions against the annual climate adjusted Cap target. The Cap model for the All Other Purposes is a regression model in which the historical monthly demands are adjusted (de-trended) to reflect the 1993-94 level of development. An annual Cap target is then derived through regression of the de-trended data with rainfall and temperature data from Berri and Loxton and scaled up to 449.9 to account for the transfer of 9.3 GL from the Lower Murray Swamps Cap.

Table 6.1: Metropolitan Adelaide Cap Assessment

	2006–07	2007–08	2008–09	2009–10	2010–11	Total
Rolling Diversion Against 650 GL Cap	203.1	89.4	149.5	56.9	56.4	**555.3**
Five Year Cap						**650.0**
Amount Below Limit						**94.7**

The climate adjusted Annual Cap Target for 2010-11 from the All Other Purposes Cap model was 404.1 GL, including 9.3 GL transferred from the Lower Murray Swamps. Further adjustments to the Annual Cap Target occurred due to:

- excluding net transfers of environmental water into South Australia from trade adjustments in accordance with Schedule E – Cap on Diversions;
- determining the effective volume of South Australian entitlement recovered for environmental purposes. Although 111.5 GL in total was recovered for TLM and CEWH by 30 June, only 86.7 GL of this resulted in water being allocated to the environment in 2010-11;
- multiplying the effective entitlement by the appropriate Cap factor of 0.9 to determine the long term Cap equivalent volume of 78 GL;
- scaling this volume down by the ratio of the modelled 2010-11 Cap target to the 449.9 GL long term Cap; and
- the final adjustment was = -78x404.1/449.9 = -70.1 GL.

6.9 Water Trade

Significant trading of temporary water allocations into South Australia occurred during 2010-11. A total of 404.2 GL was traded into South Australia. This included water for general allocations and substantial volumes for the environment (from Multi-Site Environmental Watering Trials and other releases and spills from storages).

The environmental trades do not constitute a transfer of the Cap and therefore they have been excluded from the diversion calculations under the All Other Purposes Cap. **Table 6.2** below identifies the temporary water trades, including the water source, for the 2010-11 water year.

In addition to temporary trades, permanent interstate trades prior to 2007 and inter-valley trades with South Australia resulted in the exchange of Cap shown in **Table 6.3.**

Table 6.3: Exchange of Cap resulting from permanent entitlement trade

	(GL)
Lower Murray Swamps	-47.2
All Other Purposes	79.6
Total to SA	**32.4**

Table 6.2: River Murray Interstate Temporary Water Trade 2010–11

	Temporary Trade (GL)	Environmental Trade (GL)	Non–Environmental Trade (GL)
Interstate Trade			
From SA to Victoria	-318.0	-96.8	-221.2
From SA to New South Wales	-16.8	-3.2	-13.6
Total out of SA	**-334.8**	**-100.0**	**-234.8**
Into SA from Victoria	213.1	198.5	14.6
Into SA from New South Wales	191.1	128.3	62.8
Total into SA	404.2	326.8	77.4
Net Trade into SA	69.4	226.8	-157.4

6.10 Environmental Watering

During 2010-11 a large volume of environmental water was delivered, in addition to unregulated flow. Environmental water bids, trades, delivery, accounting and monitoring were undertaken in partnership with a range of organisations and community groups. South Australia received a total of 306.410 GL of environmental water for wetlands, floodplains and the Lower Lakes, Coorong and Murray Mouth. This included water from the following sources:

- Murray-Darling Basin Authority, TLM— 157.347 GL;
- Commonwealth Environmental Water Holder (CEWH) - 139.528 GL;
- Private donations - 0.100 GL; and
- Return flows from Victorian environmental watering actions—8.873 GL.

In addition, a total of 0.563GL was delivered as part of the 2010–11 multi-site environmental watering trial.

South Australia also provided 92 GL of water saved under the River Murray Drought Water Allocation Framework for Lakes Alexandrina and Albert. A summary of environmental water delivered is provided in **Table 6.4.**

Table 6.4: Summary of Environmental Water Delivered in 2010–11

Site	Volume GL	Source
Lower Lakes, Coorong, Murray Mouth	92	Drought Allocation Framework
	139.4	CEWH
	8.9	Victorian return flows
	157.2	TLM
Monoman Creek Depression, Chowilla Floodplain	0.057	TLM
Monoman Depression, Chowilla Floodplain	0.045	TLM
Punkah Creek Floodrunner, Chowilla Floodplain	0.034	TLM
Inner Mundic Floodrunner, Pike Floodplain	0.008	Private Donation
Mundic Billabong, Pike Floodplain	0.092	Private Donation
Carpark Lagoons, Katarapko Floodplain	0.154	CEWH
Coombool Swamp, Chowilla Floodplain	0.506	CEWH carryover from 2009–10
Kulkurna wetland, NSW	56.85	CEWH carryover from 2009–10

7. REVIEW OF 2010–11 WATER USE IN QUEENSLAND

7.1 Water Planning and Management Overview

Queensland has water resource plans (WRPs) in place in all its Murray–Darling Basin catchments. WRPs provide a framework with a strong legislative basis that limits diversions from watercourses, lakes, springs and overland flows, provides for water trading and requires monitoring and reporting of the achievement of plan outcomes. The focus of these plans has been initially on surface water but will extend in the future to consider and incorporate groundwater in priority areas as additional information and improved methods to address groundwater sustainability become available.

Resource operations plans (ROPs) implement the provisions of WRPs and have been in place for the Moonie, Warrego, Paroo, and Nebine catchments since January 2006, and the Queensland Border Rivers catchment since March 2008. The Condamine and Balonne Resource Operations Plan was finalised for the upper and middle parts of the plan area, excluding the Gowrie–Oakey Creek sub–catchment, on 12 December 2008. The plan was amended on 26 March 2010 to include the Lower Balonne area. Arrangements for the Gowrie–Oakey Creek sub-catchment have been excluded due to complexities associated with the re–use of water released from Toowoomba's waste water treatment plant. It will be included in the ROP through a later amendment.

ROPs largely manage the take of water from watercourses in the Queensland Murray–Darling Basin through limits stated on entitlements and water sharing rules. The take of overland flow water is managed through regulation of works under the Sustainable Planning Act 2009 and limits on entitlements.

7.1.1 Moonie, Warrego, and Paroo Rivers and Nebine Creek

This is the fifth year in which Cap arrangements have been in place for the Moonie, Warrego, Paroo, and Nebine catchments.

Diversions reached 38 per cent of the Cap target for the Moonie catchment, 12 per cent for the Warrego, 68 per cent for the Paroo and 5 per cent for the Nebine catchment for the 2010–11 water year.

7.1.2 Border Rivers

A Cap proposal for the Queensland Border Rivers was noted by the Murray–Darling Basin Authority (Chief Executive acting as the Authority) on 26 March 2009 and further noted by the Murray–Darling Basin Ministerial Council at Meeting 1 on 29 May 2009. The Cap model has been submitted to the MDBA for review by an independent auditor and accreditation.

Diversions reached 70 per cent of the Cap target for the Border Rivers catchment for the 2010–11 water year.

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

7.1.3 Condamine and Balonne

A Cap proposal for the Condamine and Balonne was submitted to the MDBA in October 2010 and noted by the MDBA on 30 March 2011. The Condamine and Balonne model has been finalised and was submitted for accreditation in May 2011.

Diversions reached 62 per cent of the Cap target for the Condamine and Balonne catchment for the 2010–11 water year.

7.1.4 Metering

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

Queensland has commenced metering projects in the Moonie, Warrego, Paroo and Nebine resource operation plan areas. While the majority of works in the Moonie, Warrego and Nebine catchments are equipped with water meters, metering the larger works was deferred until National Standards had been finalised. DERM intended to complete metering of these works in 2010. However, meter installation was delayed due to flooding and infrastructure damage in 2010, and the intent now is to complete these in September–October 2011. Meters will be installed in accordance with manufacturer's specifications if pattern approvals are not available. Water diverted in the Paroo catchment is metered.

Metering of unsupplemented water allocations in the Border Rivers catchment is complete; however, take under water licences (mostly area–based licences in the Granite Belt) is primarily unmetered. Area–based licences are scheduled for metering in 2012.

About 50 per cent by volume of waterharvesting diversion in the Condamine catchment area is metered. Surface water take from downstream of Cecil Plains to Beardmore Dam is intended to be metered by July 2012. Surface water take under water allocations in the Lower Balonne is metered to varying standards. A project is underway to bring all meters in line with the National Standard by July 2012. The project includes measurement of water taken under the authority of overland flow licences in the Lower Balonne.

7.1.5 Water Use Efficiency (WUE)

The fourth stage of the Rural Water Use Efficiency Initiative (RWUEI) began in July 2009, with $4.5 million available from the Queensland Government over four years.

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

The initiative invests in an Industry Development Officer employed by Irrigation Australia Limited to improve the standards of service delivery by irrigation consultants, contractors, suppliers and installers in Queensland.

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

7.2 Stream Flow and Water Use Overview

El Niño conditions in the Pacific through the 2009–10 water year underwent a rapid transition to La Niña in autumn 2010. By the start of the 2010–11 water year in July, La Niña conditions were well established. The 2010 La Niña was exceptionally strong, as measured by the Southern Oscillation Index, with rainfall generally well above average from August 2010 to January 2011 across the Queensland section of the MDB. Persistent heavy rainfall on wet catchments culminated in extensive and severe flooding across the Queensland section of the Murray Darling Basin in December and January. Flooding continued to a lesser extent and degree through into May.

The main flows occurred in December 2010 and January 2011 following the particularly heavy rain in these months. Record flood levels occurred at a number of locations in the Queensland section of Murray Darling Basin (QMDB) in 2010–11. In some cases these flood peaks broke records which had only just been set during the February–March 2010 event.

The main events were as follows:

- A significant rain and storm band late in July 2010 produced flooding that persisted into August in the lower Macintyre and Paroo rivers.
- In the second week of September 2010, heavy rainfall in the upper reaches of the Warrego catchment produced minor to moderate flooding of the Warrego River. Heavy rainfall in the Border Rivers catchment caused flooding in the lower Macintyre River at Goondiwindi, followed by minor to moderate flooding in the lower Weir River as a result of the breakout of floodwaters from the Macintyre River. Goondiwindi recorded its highest ever September rainfall.
- Continued rainfall through October produced a major flood peak at Goondiwindi, the seventh peak above minor flood level since August 2010. Minor to moderate flooding was also recorded in the Condamine and Weir rivers and the Paroo, Moonie and Warrego river catchments.
- Minor to moderate flooding in the Warrego River and tributaries and minor flooding in the Paroo River persisted through November.
- Queensland experienced yet another month of widespread rainfall in December, following the wettest spring on record. A weak category one tropical cyclone, Tasha, crossed the coast south of Cairns early on Christmas morning and continuing active monsoonal activity led to a wet Christmas period, culminating in some of the most widespread and significant flooding in Queensland's history. By the end of December, flood warnings had been issued for the Condamine, Balonne, Moonie, Paroo and Warrego rivers.
- In January 2011, rainfall ranged from average or below average in the south to very much above average in the east and west of the QMDB. Heavy rain on saturated catchments produced significant runoff and resulted in almost every river east of the Warrego reaching major flood level at some time between 23 December 2010 and 7 January 2011.
- Although rain eased in February, further moderate to heavy rainfall in the first week of March resulted in widespread moderate to major flooding that extended east into the Warrego River catchment. Moderate to major flooding affected the Condamine River in mid–March, with floodwaters impacting the Lower Balonne by the end of March.
- Rainfall was generally average or below average across the QMDB catchments for the remainder of the water year.
- Notable flood peaks included:
  - Condamine River—record flows in the middle reaches of the Condamine River, with flows at Chinchilla Weir peaking at 389 GL/day, 1.4 metres higher than the previous record set in 1988. The total volume of flow passing for the December–January event was 4,177 GL.
  - Maranoa River—passing flow at Cashmere was 300 GL higher than the 2009–10 flow, which was reported as causing the highest flooding in 20 years.
  - Balonne River—the flow passing St George of 8,535 GL was more than six times the average flow, but still did not reach the maximum flow recorded in 1955–56.
  - Border Rivers—the record flow of 3,005 GL at Goondiwindi was 400 GL higher than the previous record set in 1983–84.

Rain eased in April, although flooding continued in the Balonne River system until late in the month.

The continuous flows in most of Queensland's streams through the 2010–11 water year has provided exceptional waterharvesting opportunities, particularly in the Balonne and Border rivers, with total stream diversions in the QMDB estimated at 872 GL. Of this, 60 per cent was taken from the Lower Balonne and 27 per cent from the Border Rivers catchment. The record flooding in January 2011 also provided extensive overland flow opportunity with an estimated total of 653 GL taken during floodplain harvesting in the year. Irrigators with overland flow water access were able to partially substitute take of overland flow for stream flow diversion.

Table 7.1 summarises the diversions from the QMDB catchments and the annual flow volumes for 2010–11 as measured at key sites. Flows were well above the long term average, except in the Paroo and Nebine rivers. The high stream flow and widespread flooding has resulted in the second highest stream diversion figures and the highest overall level of diversions (stream flow plus floodplain harvesting) since recording began in 1993.

Diversion across all catchments is estimated to be 872 GL, made up of a combination of supplemented diversion (take from regulated flow associated with public storages under the authority of a water allocation) and unsupplemented diversion (take primarily from waterharvesting practices).

Overland flow, in the form of floodplain diversion, has been assessed from regional appraisal in the key areas where waterharvesting and floodplain diversion operate together. It has been estimated that a further 653 GL of floodplain diversion has occurred. Upland flow capture and on–farm rainfall runoff are not included in the overland flow diversion figures.

Therefore, total diversions across all QMDB catchments from streams and overland flow (floodplain diversion) for 2010–11 are estimated to be 1,525 GL.

Table 6 shows stream diversion levels for the total QMDB catchments over the past 18 years. The 872 GL diverted in 2010–11 had an associated cross border flow of 9,367 GL (**Table 7.2**). In comparison, in 2007–08, when Queensland's highest watercourse diversions of 876 GL were reported, 3,271 GL flowed into NSW.

Table 7.2: Cross border flows

Valley	Flow (GL)
Paroo	489
Warrego	1,301
Nebine	8
Condamine and Balonne	5,631
Moonie	543
Border Rivers	1,395
Total	**9,367**

Table 7.1: Summary for Queensland catchments 2010–11

Catchment	Flow 2010–11 (GL)	Mean annual flow (GL)	Stream diversion 2010–11 (GL)	Floodplain harvesting 2010–11 (GL)
Condamine and Balonne				
Condamine (Chinchilla)	4,722	588	57	201
Condamine–Balonne (Weribone)	8,163	1,238	16	n/a
Maranoa (Cashmere)	886	144	<1	n/a
Lower Balonne (St George)	8,535	1,246	527	263
Border Rivers				
Granite Belt (Farnbro)	431	81	3	22
Macintyre–Barwon (Goondiwindi)	3,005	791	200	140
Weir (Talwood)	485	147	30	25
Moonie (Fenton)	543	158	27	2
Nebine (Roseleigh)	8	Only gauged since 2007	<1	<1
Warrego (Cunnamulla)	1,301	517	11	n/a
Paroo (Caiwarro)	489	551	<1	n/a
		TOTAL	**872**	**653**

Public storages are comparatively small in number and storage volume across the QMDB. Around one third of these storages are used solely for urban supplies, with the other storages supplying multiple needs.

There were significant inflows into public storages in the QMDB during the 2010–11 water year. All storages benefited from the high level of rainfall and resultant stream flows, with the majority of storages finishing the year at close to 100 per cent capacity.

7.3 Warrego

Monthly rainfalls from July through to March were generally above average. The highest rainfall was recorded in November with a quarter of the annual rainfall falling in this month. Total rainfall for the 2010–11 year recorded at Cunnamulla was 500 mm compared to an average annual rainfall of 377 mm.

Stream flow for the Warrego River at Cunnamulla for the 2010–11 water year was 1,301 GL, well above the average annual flow of 517 GL and the fourth highest flow on record. A total of 618 GL, nearly half of the 2010–11 annual flow, passed the gauging station in December.

The normal summer flow pattern in the Warrego River continued, with the main flows occurring in December and January, and additional smaller flows in October 2010 and March 2011.

Supplemented water diversion in this catchment is limited to the Cunnamulla Weir Water Supply Scheme. The scheme is based on conserving and supplying water allocations from a 4.7 GL weir on the Warrego River at Cunnamulla.

The announced allocation for the 2010–11 water year from the Cunnamulla Weir Water Supply Scheme was 100 per cent. Supplemented water diversion was less than 1 GL from an available entitlement of 2.6 GL.

The take of unsupplemented water within this catchment must be in accordance with stated flow conditions at a specified reference point. Diversion of unsupplemented water for the 2010–11 water year was 10.6 GL.

There were eight announced periods to take unsupplemented water in the Upper Warrego Water Management Area and six periods of announced flow in the Lower Warrego Water Management Area for 2010–11. The first events commenced in September 2010 and the last ended in April 2011.

While the majority of works are equipped with water meters, metering the larger works was deferred until National Standards had been finalised. DERM intended to complete metering on these works in 2010. However, meter installation was delayed due to flooding and infrastructure damage in 2010 and the intent now is to complete these in September–October 2011. Meters will be installed in accordance with manufacturer's specifications if pattern approvals are not available.

The Commonwealth Environmental Water Holder holds two unsupplemented entitlements in the Warrego catchment. A total of 16 GL (total volumetric limit associated with entitlements) of Commonwealth–held in–stream (non–regulated) environmental water was retained within the Warrego catchment as environmental flow during the 2010–11 water year. The following water contributed to the enhancement of environmental assets in the Warrego:

- In the Upper Warrego, Commonwealth–held in–stream environmental water complemented natural flow events that occurred between September and April.
- In the Lower Warrego, Commonwealth–held in–stream environmental water contributed to the first post–winter flow in the system, which is known to be a critical spawning cue for native fish.
- During March to April 2011, Commonwealth–held in–stream environmental water also contributed to an overbank flow that charged the nationally significant Warrego River distributary system and Yantabulla Swamp.

Held environmental water is not included in the cap target.

Annual diversion of 11 GL was 12 per cent of the cap target of 94 GL. Water entitlement holders did not fully avail themselves of access opportunities provided during the year for a number of reasons, including that property infrastructure and entitlements were not fully developed.

7.4 Paroo

Rainfall recorded for 2010–11 at Hungerford in the southern part of the Paroo catchment was 673 mm. This was more than double the long–term average of 297 mm and well over the 2009–10 total of 463 mm. Rainfall was heavily influenced by the La Niña conditions prevailing in the first half of the water year. The peak monthly rainfall received was in February, with 142 mm falling compared to the long term average for February of 36 mm.

The volume of flow passing the Caiwarro gauging station, which is located on the Paroo River upstream of the Queensland–New South Wales border, was recorded as 489 GL for the 2010–11 water year. This is below the average annual flow at Caiwarro of 551 GL (1968 to 2011) and significantly less than the 2,040 GL recorded in the 2009–10 water year. As in the Warrego catchment, nearly half the annual flow (227 GL) passed the gauging station in December.

There are no supplemented water allocations and only two unsupplemented water allocations in the Paroo catchment. Diversion for irrigation was 0.01 GL. An additional 0.04 GL was taken for urban purposes. Overland take from floodplain flows for the catchment is estimated at 0.01 GL.

Water diverted in the Paroo catchment is metered.

The annual diversion of 0.06 GL was 68 per cent of the 2010–11 cap target of 0.08 GL.

7.5 Nebine

Rainfall was above average in the Nebine catchment with 483 mm recorded in the south of the catchment at Mulga Downs for the 2010–11 water year, against an average of 401 mm. Rainfall was well above average in the first half of the water year but below average from January to June 2011.

The mean annual flow from the Nebine catchment (including the Noorama and Widgeegoara creeks) is estimated at 33 GL/year. Flows either terminate on floodplains or discharge into the Culgoa River in New South Wales.

The new gauging station installed at Roseleigh Crossing (on Nebine Creek) now has four full years of recording. This gauging station is 10.5 km upstream of the Queensland–New South Wales border. A number of small flow events were recorded at the Roseleigh Crossing station and Wallam Creek at Cardiff (upstream of Bollon).

Flows in Wallam Creek at Cardiff and Nebine Creek at Roseleigh for 2010–11 totalled around 2 GL and 8 GL respectively, considerably less than the 2009–10 water year's flows of 314 GL and 110 GL.

There are no supplemented water allocations and only four unsupplemented water allocations in the Nebine catchment. Diversion of unsupplemented water was 0.1 GL. An additional 0.1 GL of overland flow were diverted in the catchment.

While some works are equipped with water meters, completion of meter installation has been delayed due to flooding and infrastructure damage in 2010, and the intent now is to complete installation in September–October 2011. Meters will be installed in accordance with manufacturer's specifications if pattern approvals are not available. Water use assessments are currently completed for each of these works.

The Commonwealth Environmental Water Holder holds one unsupplemented entitlement in the Nebine catchment. The flow levels needed to trigger access under Commonwealth water allocations were not met and therefore no Commonwealth–held environmental water was made available in the system in the 2010–11 water year. Held environmental water is not included in the cap target.

Annual diversion of 0.2 GL (including overland flow take) was 5 per cent of the cap target of 3 GL.

7.6 Moonie

Rainfall was above average in the first half of the 2010–11 water year and below average in the second half. Rainfall at Nindigully, located on the Moonie River in the south west of the catchment, was 568 mm for the year, compared to the average of 504 mm. The peak monthly total of 90 mm was recorded in November.

Stream flow for the Moonie River at Fenton, the most downstream gauge in Queensland, was 543 GL in 2010–11. This was more than three times the recorded annual average at this site of 158 GL.

There were a number of flows from October 2010 through to April 2011, with the main flow of 351 GL occurring in January. Record flooding at this time provided opportunity for floodplain harvesting.

No supplemented water supply exists in this catchment. The majority of the 33 water allocations in the catchment have flow conditions that relate to the take from watercourses (i.e. water harvesting).

Diversion for 2010–11 has been estimated at 27 GL, with take primarily occurring in December 2010 and January 2011.

While the majority of works are equipped with water meters, metering the larger works was deferred until National Standards had been finalised. DERM intended to complete metering on these works in 2010. However, meter installation was delayed due to flooding and infrastructure damage in 2010, and the intent now is to complete installation in September–October 2011. Meters will be installed in accordance with manufacturer's specifications if pattern approvals are not available.

Overland flow harvesting from floodplain flows in the catchment is estimated at 2 GL based on a broad assessment of infrastructure development and opportunity.

The Commonwealth Environmental Water Holder holds one unsupplemented entitlement in the Moonie catchment. A total of 1.4 GL of Commonwealth–held environmental water remained in–stream in the Moonie catchment. Whilst this is a small volume compared to other river inflows it complemented floodplain flows of the lower Moonie River. This provided benefits to vegetation, water birds, native fish, and carbon and nutrient exchange. Held environmental water is not included in the cap target.

The 2010–11 annual diversion for the Moonie catchment was 29 GL (including the floodplain component of overland flow), 38 per cent of the cap target of 77 GL.

7.7 Queensland Border Rivers

Rainfall was above average across the Border Rivers catchment for the year. The upper catchment around Stanthorpe recorded 1,183 mm of rainfall compared to an average of 757 mm, with a total of 400 mm falling in December and January. The lower catchment around Goondiwindi recorded 818 mm of rainfall for the year compared to an average of 600 mm, with 139 mm falling in September—the highest September rainfall on record for this location.

Flows in the Border Rivers during the 2010–11 water year were well above average, with record flows in a number of locations. The main flows were recorded in January.

The flow passing Farnbro on the Dumaresq River during the 2010–11 water year was 431 GL, the highest on record and more than five times the average annual flow at Farnbro of 81 GL. A total of 203 GL passed the gauging station in January.

A total of 458 GL passed the Booba Sands gauging station on the Macintyre Brook during the water year compared to an average annual flow of 108 GL. Nearly half of the annual flow (220 GL) passed the gauging station in January.

Flows in the Macintyre River at Goondiwindi for the 2010–11 water year were 3,005 GL, the highest on record and nearly 400 GL higher than the previous record set in 1983–84. The passing flow was again highest in January at 1,029 GL.

The flow passing Talwood on the Weir River was 485 GL during the water year compared to an average annual flow of 147 GL. In January, the flow passing Talwood totalled 234 GL.

There are two major water supply storages in the Queensland part of the Border Rivers catchment. At 1 July 2010, GLenlyon Dam, the major storage for the Borders Rivers Water Supply Scheme, was at 22 per cent of capacity with 11 GL available for general use from the Queensland share of the storage. The storage finished the year at 99 per cent of capacity with around 70 GL available for general use from the Queensland share.

Coolmunda Dam on Macintyre Brook is the major storage for the Macintyre Brook Water Supply Scheme. This scheme now operates

on continuous accounting. Coolmunda Dam started the year at 13 per cent of capacity (9 GL) and filled in September 2010. The dam finished the year at 87 per cent of capacity.

In the 12 months to 30 June 2011, 31 GL of supplemented water was diverted within the Border Rivers Water Supply Scheme. This included supplemented take from releases from GLenlyon Dam and run of the river flows. The take of water transferred from NSW (23 GL net) is also included in the total. A total of 10 GL of supplemented water was diverted in the Macintyre Brook Water Supply Scheme.

From early August, flows triggered water harvesting access under the water sharing rules on the Border Rivers, with 160 GL diverted over multiple events. Water harvesting thresholds were also triggered in the Weir River, with 30 GL diverted in this catchment. A further 2.6 GL were diverted for direct irrigation purposes or stored for later use in the Granite Belt.

An additional 0.8 GL were taken for urban use, taking the total unsupplemented diversions in the Border Rivers to 193 GL for 2010–11.

The majority of diversion in this catchment is metered. Essentially all take under water allocations is metered and take under water licences (mostly area–based licences in the Granite Belt) is primarily unmetered. Area–based licences are scheduled for metering in 2012.

An estimated 187 GL of overland flow water were taken through floodplain harvesting in the Border Rivers and Weir River catchments, bringing total diversions in the Border Rivers catchment to 421 GL, 70 per cent of the cap target of 601 GL.

During the 2010–11 water year, the Commonwealth Environmental Water Holder held one unsupplemented entitlement and 17 supplemented entitlements in the Border Rivers catchment. In accordance with the access conditions on their water allocations, the Commonwealth was entitled to take 3,000 ML of unsupplemented water in the Border Rivers catchment. This water remained in–stream contributing to flows in the Border Rivers and further downstream.

There were 5.6 GL of supplemented water available under Commonwealth entitlements in the Border Rivers Water Supply Scheme. This water was not ordered but, under continuous accounting rules, remains available for use in future years when it can provide a greater environmental benefit. This held environmental water has been excluded from the cap target.

7.8 Condamine–Balonne

7.8.1 Condamine

Rainfall was generally above average across the Condamine area. Annual rainfall across the area was around 1,100 mm against an average of 670 mm. The main falls were in December, January and March.

The main flow events in December 2010 and January 2011, as well as a number of smaller flow events, passed along the entire Condamine system. Annual flows recorded at Cecil Plains Weir, Chinchilla and Cotswold were the highest on record, while the flow at Warwick was the second highest on record.

A total of 470 GL passed Warwick, in the upper reaches of the system, while 2,064 GL passed Cecil Plains Weir, 4,722 GL passed Chinchilla and 6,408 GL passed Cotswold at the end of the Condamine system in 2010–11.

The major storage for the Upper Condamine Water Supply Scheme is Leslie Dam which commenced the year at 9 per cent capacity. Inflows to the dam began in August, with the dam level steadily increasing until, on 5 January 2011, the water level rose to spill–over point for the first time in over 20 years, and water was released from the dam. Dam levels have remained high, with the dam finishing the year at 99 per cent capacity. Announced allocations in the Upper Condamine Water Supply Scheme are based on storage in Leslie Dam. An announced allocation of 100 percent was made for medium priority water allocations in November 2010.

The Chinchilla Weir, on the mid Condamine River, started the year at 78 per cent capacity and filled in September. The weir has remained at 100 per cent capacity since. Announced allocations for the Chinchilla Weir Water Supply Scheme were 100 per cent.

A total of 12 GL of supplemented water was diverted in the Condamine catchment in 2010–11, with 11.5 GL diverted in the Upper Condamine scheme and less than 1 GL at Chinchilla. The volume diverted in the Upper Condamine was from run of the river flows, which are made available for diversion subject to minimum flow conditions.

There were twelve waterharvesting events announced between August 2010 and June 2011 in the Upper Condamine Water Management Area, with July 2010 the only month of the water year in which no waterharvesting access was announced. Eight events were announced for the Condamine River North Branch with 3,450 ML of water extracted. In comparison, two events were announced in the 2009–10 water year with 3,390 ML extracted.

The volume of unsupplemented water taken in the Condamine catchment over 2010–11 is estimated at 58 GL with the majority of take (45 GL) occurring upstream of Chinchilla Weir. About 17 GL of unsupplemented water were diverted for direct irrigation with 9.5 GL taken from flows supplemented by treated effluent discharged from Toowoomba into the Gowrie–Oakey Creek system. An additional 1.9 GL were taken for urban use.

About 50 per cent by volume of waterharvesting diversion in the Condamine catchment area is metered. Surface water take from downstream of Cecil Plains to Beardmore Dam is intended to be metered by July 2012.

An estimated additional 201 GL of overland flow water were taken through harvesting of water on the Upper Condamine Floodplain, bringing the total take in the Condamine catchment to 273 GL.

7.8.2 Balonne and Maranoa

Rainfall in the Balonne and Maranoa was above average for the 2010–11 water year with 644 mm falling at St George (on the Balonne River) compared to an average of 518 mm. At Mitchell (on the Maranoa River) 932 mm was recorded compared to an average of 567 mm. The December rainfall in Mitchell was the highest on record for that month and 60 mm greater than the previous December record.

The heavy rainfalls in the Condamine and Balonne catchment recorded in December 2010 and January 2011 resulted in record flows in the Balonne (comprising flow through from the Condamine plus tributary inflow). The passing flow at Weribone (on the Balonne River) was 8,163 GL, compared to an average annual flow of 1,238 GL, while the flow passing St George was 8,535 GL compared to an average flow of 1,246 GL. The main flows occurred in January with 5,287 GL passing Weribone in the month and 5,953 GL passing St George.

The main flows in the Maranoa River were recorded in December, with 524 GL out of the annual total of 886 GL passing in that month. Annual flow was well over the long term average of 144 GL.

Beardmore Dam started the year at 85 per cent capacity. The first inflow into Beardmore Dam commenced in mid–September and filled the dam. Inflows continued through the year, with the dam remaining at 100 percent capacity.

Inflows up to 730 ML a day may be passed downstream for environmental, stock and domestic purposes, or are sometimes held in storage for later release to maximise the benefit to downstream water users. From mid–September all inflows up to 730 ML–day were passed downstream for environmental, stock and domestic purposes.

A total of 57 GL (including 0.02 GL from the Maranoa Water Supply Scheme) was diverted from the water supply schemes.

High flows in the Balonne River between mid–September and May resulted in the triggering of take under flow condition–based water allocations. Total estimated take in the Lower Balonne was 470 GL, taken over seven announced periods. Flooding in the Lower Balonne between September and April allowed an additional take of 263 GL in floodplain harvesting.

An additional 0.02 GL of water were taken in the Maranoa catchment.

Surface water take under water allocations in the Lower Balonne is metered to varying standards. A project is underway to bring all meters in line with the National Standard by July 2012. The project includes measurement of water taken under the authority of overland flow licences in the Lower Balonne.

The 2010–11 annual diversion for the Condamine and Balonne catchment was 1,064 GL (including the floodplain component of overland flow), 62 per cent of the cap target of 1,728 GL.

Table 6: Water Diversions in Queensland since 1993–94

Year	Diversion (GL)
2010–11	1525
2009–10	1232
2008–09	383
2007–08	1054
2006–07	160
2005–06	316*
2004–05	392*
2003–04	815*
2002–03	214*
2001–02	341*
2000–01	688*
1999–00	541*
1998–99	609*
1997–98	741*
1996–97	467*
1995–96	520*
1994–95	176*
1993–94	338*

Notes: Water year reported prior to 2006 was 1 October to 30 September. Water year reported post 2008 is 1 July to 30 June.
* Diversions do not include take of overland flow water

8. REVIEW OF 2010–11 WATER USE IN ACT

8.1 Review of Water Use in the ACT

The ACT experienced significantly higher rainfall during 2010–11 especially in the spring and early summer of 2010–11 than the previous eight years and in turn there were considerably higher stream inflows. Urban water restrictions were in place up to 1 November 2010. Since then permanent water conservations have been applied. In general water storages supplying the Canberra and Queanbeyan urban water supply were above 50%. The storage levels were at 60% (123.9 GL) at the start of the year and 97% (201.3 GL) by the end of the year.

Inflows improved during the last quarter of the year (since the start of the next water year there has been marked increase in rainfall and inflows).

ACTEW modelling analysis reveals that 20.5 GL was the total saving for 2010–11. This was based on demand management measures and the prevailing weather conditions at that time. It was apparent that it was the result of the lag effect of being on water restrictions for so long and the occurrence of then wet conditions during 2010–11.

Extractions from storages for the urban supply were 40.9 GL, with returns from sewage treatment plants at 35.1 GL resulting in net urban consumption of 6.4 GL. Metered non urban consumption was 0.5 GL, giving a total net consumption of 6.9 GL.

Consumption was significantly lower than would have been expected for the climatic conditions due to the occurrence of a very good rainfall for the year and the continuation of demand management programs and adoption of water conservation measures.

There was no increase in the demand for water in the ACT for industrial use and therefore no need to acquire additional water for the ACT.

8.2 Progress of Water Reforms in the ACT

The ACT is currently reviewing its water resources strategy, Think water, act water and will develop a revised strategy.

ACTEW is also undertaking an expansion of its storage and supply infrastructure through the construction of an expanded Cotter Dam and a pump and pipeline system from the Murrumbidgee River to Googong Dam.

9. WATER TRADING IN THE MURRAY–DARLING BASIN

9.1 History of Water Trading

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

Initially water trading was confined to trades within irrigation systems. However, over time, changes have been made to the trading rules, which have permitted inter–valley and more recently interstate trade to take place. In recent years, Australian Governments have been working together to reduce the differences in water entitlements, in preparation for the introduction of increased interstate water trading. These changes are part of the water market–reform package, which was endorsed by the COAG in 1994 and subsequently in 2004 as the *National Water Initiative*.

Trade has an impact on the implementation of the Cap. The trade in previously unused entitlements affects the size of the allocation that can be announced by the water managers, 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 2010–11 water year.

The sign convention used in **Table 7** is that a negative value indicates a trade out of the valley and a positive value indicates a trade into the valley. Permanent trade now occurs as tagged trade, where the entitlement remains with the originating (selling) valley, but the water use takes place in the destination valley. The cap target in the originating valley is reduced and that in the destination valley is increased by the volume of water used in the destination valley. Temporary trades will alter the annual Cap targets, usually on a one–for–one basis. Trade will therefore affect the Caps for individual valleys but will not result in an increase in the overall Cap for the Basin.

Interstate water trading between New South Wales, Victoria and South Australia continued to develop in 2010–11. However, resource constraints in the New South Wales and Victorian sections of the Murray Valley restricted the supply of available water for trade.

Table 7: Net Water Entitlement Transfers (excluding environmental transfers) in 2010–11

System	Trade Data not affecting Cap		Trade Data affecting Cap			
	Total Intra-valley Entitlement (Permanent) Sold[1] (GL)	Total Allocation (Temporary) Sold[2] (GL)	Net Tagged trade Inwards[3] (GL)	Net Temporary Trade Inwards[3] (GL)	Adjustment to this Year's Cap for Previous Permanent Trade (GL)	Total Trade Adjustment to this Year's Cap Target (GL)
New South Wales						
Border Rivers	0	48	4	-23	0	-20
Gwydir	1	60	0	0	0	0
Namoi–Peel	3	8	0	0	0	0
Macquarie–Castlereagh–Bogan	48	107	0	0	0	0
Barwon–Darling	0	0	0	0	0	0
Lower Darling	1	98	0	37	0	37
Lachlan	2	68	0	0	0	0
Murrumbidgee	95	577	0	-57	0	-57
Murray	43	497	0	-47	-2	-50
Total New South Wales	**193**	**1,462**	**4**	**-91**	**-2**	**-89**
Victoria[4]						
Goulburn	81	286	-15	17	0	-
Broken	1	0	0	0	0	-
Loddon	26	44	-5	-17	0	-
Total Goulburn–Broken–Loddon[7]	**108**	**329**	**-21**	**-1**	**-109**	**-135**
Campaspe[6]	37	31	-5	0	0	0
Wimmera–Mallee	2	0	0	0	0	0
Kiewa	0	0	0	0	0	-
Ovens	1	0	0	0	0	-
Murray	185	451	25	225	0	-
Total Kiewa–Ovens–Murray	**186**	**451**	**25**	**225**	**74**	**325**
Total Victoria	**333**	**812**	**0**	**225**	**-35**	**190**
South Australia						
Metro–Adelaide & Associated Country Areas[5]	0	0	0	0	0	0
Lower Murray Swamps	0	0	0	-12	-47	-60
Country Towns	0	0	0	2	0	2
All Other Purposes	0	0	0	-147	80	-68
Total South Australia	**0**	**0**	**0**	**-157**	**32**	**-125**
Queensland						
Condamine–Balonne	12	3	0	0	0	0
Border Rivers	16	35	-4	23	0	23
Macintyre Brook	0	5	0	0	0	0
Moonie	2	0	0	0	0	0
Nebine	0	0	0	0	0	0
Warrego	1	0	0	0	0	0
Paroo	0	0	0	0	0	0
Total Queensland	**31**	**42**	**-4**	**23**	**0**	**23**
Australian Capital Territory	0	0	0	0	0	0
Total Basin	**557**	**2,316**	**0**	**0**	**-5**	**-1**

1. The total Cap adjustment for permanent trade (including exchange rate adjustments to permanent interstate trade) is comprised of the sum of net inter–valley and net interstate trade for each designated river valley.
2. The total Cap adjustment for temporary trade is comprised of the sum of net inter–valley and interstate temporary trade and unused component of permanent trade this year for each designated river valley.
3. The sign convention used is that a negative value indicates a trade out of the valley and a positive value indicates a trade into the valley.
4. Temporary entitlement transfers in Victoria, includes temporary trade in both water right and sales entitlement.
5. The Metro–Adelaide & Associated Country Areas Cap component is non–tradable, unless the Ministerial Council determines otherwise.
6. Adjustment for Campaspe equals water transferred via Goldfields Superpipe. All other trades are effected by changing the Rochester pumped diversions
7. Goulburn–Broken–Loddon Cap adjustment reduces by the total water transferred via the Goldfields Superpipe.
8. n/a—data not available

10. WATER AVAILABILITY FOR THE YEAR 2010–11

10.1 Water Availability

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

A key step in the process to implement the Cap is adjusting the States' allocation systems. To make Cap implementation more transparent, the water used in each valley has been compared with the quantity of water that has been allocated for use in that valley in 2010–11 (see **Table 11**).

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

10.1.1 Volumetric Allocations

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

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

10.1.2 Continuous Accounting

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

10.1.3 Allocation Transferred into Valley

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

10.1.4 Carryover from the Previous Year

Carryover is available in a number of valleys in New South Wales, Victoria and South Australia. This enables unused allocation in one season to be carried over to the next, up to specified limits. Carryover differs from continuous accounting in that accounts are kept on an annual basis rather than a continuous one. In some valleys, carryover is

cancelled as allocations approach 100% or if a storage spills and carryover can also be reduced to allow for increased evaporations. **Table 9** shows the carryover added to the valley allocation. The net carryover from the previous season is included as column 3 in **Table 8**.

10.2 Allocated Water

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

10.3 Access to Water Not in the Allocation System

10.3.1 Supplementary Access (Off-allocation) and Water–harvesting

Water is made available to irrigators in some regulated streams during periods when storages are spilling or there are unregulated flows by declarations of off-allocation periods. Water diverted in these periods does not count against an irrigator's allocation for the rest of the season. Historically there were no controls over the size of these diversions other than the duration of the event and the licensed pump capacity. However, in recent years, quotas have been established in some systems and annual limits have been imposed. Access to off–allocation has been discontinued in South Australia. In New South Wales, the off–allocation has been redesignated as supplementary access and requires separate licence

Water harvesting licences were issued in most Queensland streams, but the majority have now been converted into tradable water allocations. These water allocations are limited by diversion capacity, the passing stream-flow at which water allocation holder can commence to pump and volumetric limits. The total volume of surface water able to be taken in a Queensland Murray Darling Basin catchment is also limited under the catchment's water resource plan.

10.3.2 Area Licences on Unregulated Streams

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

10.3.3 Irrigation System Losses

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

10.4 Comparison of Use of Allocated Water with the Allocated Volume

The final column in **Table 10** lists the total use of allocated water. This is worked out by subtracting from the total diversions, the sum of supplementary access–water harvesting (third column), unregulated stream use (fourth column) and diversions not in the allocation (fifth column). In calculating the water used in Victorian river valleys, the volumes diverted from each stream have to be adjusted for the water diverted from other valleys (second column of **Table 10**). For example, in Victoria, water is physically transferred from the Goulburn Valley into the Campaspe and Loddon Valleys via the Waranga Western Channel.

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

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

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

The 2010–11 utilisation of 30% is lowest since Cap accounting started in 1997–98. This appears quite reasonable given wet conditions during 2010–11.

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

Figure 7: Utilisation of allocated water as percentage of the allocated volume since 1997–98

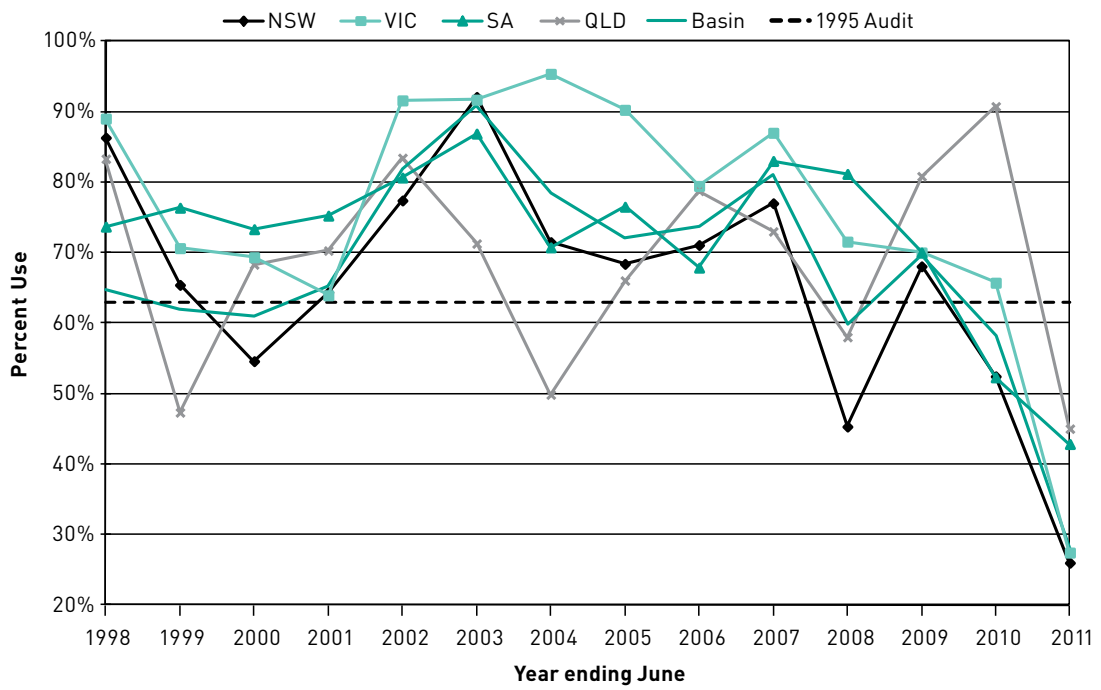


Table 8: Water Allocated in 2010–11

System	Base Valley Water Entitlements (GL)	Announced Allocation (GL) [2]	Net Carryover Overdraw from Previous Year (GL) [5]	Water Available under continuous accounting (GL) [3]	Allocation Transferred into Valley (GL) [4]	Net water allocated to Environmental Entitlements (GL)	Total Allocated Water in Valley (GL) [6]
New South Wales							
Intersecting Streams	24	0	0	0	0	0	0
Border Rivers[3]	413	279	28	307	-20	0	246
Gwydir[3]	754	444	11	455	0	-88	366
Namoi–Peel[3]	551	336	38	374	0	-7	312
Macquarie–Castlereagh–Bogan	791	672	20	-	0	-105	447
Barwon–Darling	195	0	0	-	0	0	0
Lower Darling	366	95	13	-	37	0	144
Lachlan	720	788	32	-	0	-143	429
Murrumbidgee	2,935	2,213	512	-	-57	-344	2,324
Murray	2,550	1,693	560	-	-47	-107	2,100
Total New South Wales	**9,301**	**6,518**	**1,214**	**1,136**	**-87**	**-794**	**6,368**
Victoria							
Goulburn	939	640	275	-	1	-124	792
Broken	34	20	4	-	0	0	24
Loddon	357	220	56	-	-22	-3	251
Campaspe	375	236	54	-	-5	-5	281
Wimmera–Mallee	82	82	0	-	0	-42	40
Kiewa	20	1	0	-	0	0	1
Ovens	63	38	0	-	0	0	38
Murray	1,543	1,224	502	-	251	-302	1,675
Total Victoria	**3,411**	**2,461**	**890**	**0**	**225**	**-474**	**3,102**
South Australia							
Metro–Adelaide & Associated Country Areas[3]	150	150	175	0	0	n/a	325
Lower Murray Swamps	47	32	15	0	-12	n/a	34
Country Towns[3]	50	33	0	0	2	n/a	36
All Other Purposes	596	404	192	0	-147	n/a	449
Total South Australia	**843**	**619**	**382**	**0**	**-157**	**n/a**	**843**
Queensland						n/a	
Condamine–Balonne	121	115	14	0	0	n/a	129
Border Rivers	78	76	0	0	20	n/a	96
Macintyre Brook	19	19	0	0	0	n/a	19
Moonie	0	0	0	0	0	n/a	0
Nebine	0	0	0	0	0	n/a	0
Warrego	3	3	0	0	0	n/a	3
Paroo	0	0	0	0	0	n/a	0
Total Queensland	**220**	**212**	**14**	**0**	**20**	**n/a**	**246**
Australian Capital Territory[8]	0	**0**	**0**	**0**	**0**	n/a	0
Total Basin	**13,776**	**9,810**	**2,501**	**1,136**	**0**	**-1,268**	**10,559**

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.
3. In continuous accounting, individual accounts can accumulate up to a specified percentage of entitlements but use can be limited to a specified percentage of entitlements during a season.
4. Net temporary inter-valley entitlement transfer from **Table 7.**
5. Net Carryover from Previous Year (see **Table 9**).
6. Allocated water = announced allocation or permitted use under continuous accounting + inter-valley trade + net carryover from last season (in NSW the addition of high security entitlements are also included).
7. The gazetted allocation for Metro Adelaide & Associated Country areas and Country Towns.
8. There is no formal entitlement in ACT to date.

Table 9: Carryovers for 2010–11

System	Carryover from 2009–10 (GL)	Less Carryover Cancelled in 2010–11 (GL)	Less Overdraw used in 2009–10 (GL)	Plus Overdraw cancelled in 2010–11 (GL)	Plus Overdraw from 2011–12 (GL)	Net Carryover for 2010–11 (GL)
New South Wales						
Intersecting streams	0	0	0	0	0	0
Border Rivers	28	0	0	0	0	28
Gwydir	11	0	0	0	0	11
Namoi–Peel	38	0	0	0	0	38
Macquarie–Castlereagh–Bogan	41	21	0	0	0	20
Barwon–Darling	0	0	0	0	0	0
Lachlan	33	1	0	0	0	32
Murrumbidgee	521	10	0	0	0	512
Lower Darling	13	0	0	0	0	13
Murray	564	4	0	0	0	560
Total New South Wales	**1,250**	**36**	**0**	**0**	**0**	**1,214**
Victoria						
Goulburn	275	0	0	0	0	275
Broken	4	0	0	0	0	4
Loddon	56	0	0	0	0	56
Campaspe	54	0	0	0	0	54
Wimmera–Mallee	0	0	0	0	0	0
Kiewa	0	0	0	0	0	0
Ovens	0	0	0	0	0	0
Murray	502	0	0	0	0	502
Total Victoria	**890**	**0**	**0**	**0**	**0**	**890**
South Australia						
Metro–Adelaide & Associated Country Areas	175	0	0	0	0	175
Lower Murray Swamps	15	0	0	0	0	15
Country Towns	0	0	0	0	0	0
All Other Purposes	192	0	0	0	0	192
Total South Australia	**382**	**0**	**0**	**0**	**0**	**382**
Queensland						
Condamine–Balonne	14	0	0	0	0	14
Border Rivers	0	0	0	0	0	0
Macintyre Brook	0	0	0	0	0	0
Moonie	0	0	0	0	0	0
Nebine	0	0	0	0	0	0
Warrego	0	0	0	0	0	0
Paroo	0	0	0	0	0	0
Total Queensland	**14**	**0**	**0**	**0**	**0**	**14**
Australian Capital Territory	**0**	**0**	**0**	**0**	**0**	**0**
Total Basin	**2,537**	**36**	**0**	**0**	**0**	**2,501**

1. Under certain conditions (such as storage spills), carryovers from the previous season can be cancelled.
2. Net carryover is defined as: carryover less cancelled carryover less overdraws used during last year plus overdraw permitted this year.

Table 10: Use of Allocated Water (excluding environmental water) in 2010–11

System	Diversion from Valley (GL)	Diverted from other Valleys (GL)	Less Supplementary Access, Water–Harvesting Use and Land Surface Diversions (GL)	Less Unregulated Stream Use (GL)	Less Diversions not in Allocation (GL)	Use of Allocated Water in Valley (GL)
New South Wales						
Intersecting Streams	3	0	0	3	0	0
Border Rivers	192	0	94	28	0	70
Gwydir	271	0	134	44	0	93
Namoi–Peel	270	0	87	113	0	70
Macquarie–Castlereagh–Bogan	183	0	35	40	0	108
Barwon–Darling	95	0	0	95	0	0
Lower Darling	28	0	0	0	0	28
Lachlan	90	0	0	15	0	74
Murrumbidgee	1,461	0	524	42	0	895
Murray	689	0	139	28	0	523
Total New South Wales	**3,283**	**0**	**1,013**	**409**	**0**	**1,861**
Victoria						
Goulburn	513	-155	0	3	188	168
Broken	6	0	0	0	4	2
Loddon	25	53	0	1	24	54
Campaspe	18	68	0	0	18	68
Wimmera–Mallee	10	0	0	0	0	9
Kiewa	1	0	0	1	0	0
Ovens	6	0	0	0	0	6
Murray	556	15	0	2	45	524
Total Victoria	**1,136**	**-19**	**0**	**8**	**278**	**831**
South Australia						
Metro–Adelaide & Associated Country Areas	56	0	0	0	0	56
Lower Murray Swamps	14	0	0	0	0	14
Country Towns	34	0	0	0	0	34
All Other Purposes	257	0	0	0	0	257
Total South Australia	**361**	**0**	**0**	**0**	**0**	**361**
Queensland						
Condamine–Balonne	1,064	0	975	7	12	69
Border Rivers	411	0	371	0	9	31
Macintyre Brook	10	0	0	0	0	10
Moonie	29	0	29	0	0	0
Nebine	0	0	0	0	0	0
Warrego	11	0	11	0	0	1
Paroo	0	0	0	0	0	0
Total Queensland	**1,525**	**0**	**1,386**	**7**	**22**	**111**
Australian Capital Territory	6	0	0	0	0	n/a
Total Basin	6,311	-19	2,399	423	299	3,164

1. 'Diversion Losses not in Allocation' are losses in those irrigation systems where the entitlement is defined at the farm gate and losses in the distribution system are not covered by an entitlement.

Table 11: Use of Valley Allocations (excluding environmental allocations) in 2010–11

System	Total Allocated water in Valley (GL) [3]	Use of Allocated water in Valley (GL)	Use as a % of Authorised Valley use (GL)
New South Wales			
Intersecting Streams[1]	0	0	n/a
Border Rivers[1]	246	70	28%
Gwydir[1]	366	93	25%
Namoi–Peel[1]	312	70	22%
Macquarie–Castlereagh–Bogan	447	108	24%
Barwon–Darling[1]	0	0	na
Lower Darling[1]	144	28	20%
Lachlan	429	74	17%
Murrumbidgee	2,324	895	39%
Murray	2,100	523	25%
Total New South Wales	**6,368**	**1,861**	**29%**
Victoria			
Goulburn	792	168	21%
Broken	24	2	7%
Loddon	251	54	22%
Campaspe	281	68	24%
Wimmera–Mallee	40	9	23%
Kiewa	1	0	43%
Ovens	38	6	15%
Murray	1,675	524	31%
Total Victoria	**3,102**	**831**	**27%**
South Australia			
Metro–Adelaide & Associated Country Areas[1,2]	325	56	17%
Lower Murray Swamps	34	14	40%
Country Towns	36	34	96%
All Other Purposes	449	257	57%
Total South Australia	**843**	**361**	**43%**
Queensland			
Condamine–Balonne[1]	129	69	54%
Border Rivers [1]	96	31	32%
Macintyre Brook[1]	19	10	54%
Moonie[1]	0	0	n/a
Nebine	0	0	n/a
Warrego[1]	3	1	33%
Paroo[1]	0	0	n/a
Total Queensland	**246**	**111**	**45%**
Australian Capital Territory	**0**	n/a	**n/a**
Total Basin	**10,559**	**3,164**	**30%**

1. The use of water not covered by allocations (e.g. water harvesting, off–allocations– supplementary water, unregulated stream licenses) constitutes a large percentage of the use in these valleys.
2. The volume authorised for use for Metro–Adelaide & Associated Country Areas for 2010–11 is the amount that could be used before the 5–year Cap of 650 GL would be exceeded.
3. Allocated water from **Table 8**

11. ENVIRONMENTAL WATER AND CAP ADJUSTMENTS

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

Environmental water that is recovered through savings or other mechanisms for the Snowy and River Murray System, in some cases, require adjustment to the Cap in valleys where this water is recovered or used. Different States treat environmental allocations and environmental uses differently. This affects the timing and manner of Cap adjustment. Ministerial Council Meeting 45—23 May 2009 adopted a protocol for adjusting Caps for environmental entitlements and uses. The Protocol provides for different methods for adjusting the Cap. However, a State must seek approval of the Murray–Darling Basin Authority of its proposed method of adjusting the Cap for environmental water. The Protocol requires the Authority to receive data from the States on environmental entitlements created, allocations for environment use, trade in environmental entitlements and allocations, and Cap adjustments for environmental use to be reported and report the information in the Water Audit Monitoring Report. The collated data received from the States related to these matters given in **Table 12—Table 15.** Total water available from entitlements for environmental use was 1,846 GL, total use of this water was 1,119 GL, and total net consumptive environmental use was 79 GL. The Cap adjustment for environmental use was 1,238 GL.

Table 12: Environmental Water Entitlements in 2010–11

System	Total Environmental Entitlements			Entitlements created from Savings made outside the Cap		
	High Reliability Entitlement (GL)	Low Reliability Entitlement (GL)	Environmental Supplementary Access Entitlement (GL)	High Reliability Entitlements (GL)	Low Reliability Entitlements (GL)	Environmental Supplementary Access Entitlements (GL)
New South Wales						
Intersecting Streams	0	0	0	0	0	0
Border Rivers	0	0	0	0	0	0
Gwydir	0	107	20	0	0	0
Namoi–Peel	0	6	0	0	0	0
Macquarie–Castlereagh–Bogan	0	120	3	0	0	0
Barwon–Darling	0	0	22	0	0	0
Lachlan	2	120	0	0	12	0
Murrumbidgee *	60	268	27	35	0	0
Lower Darling	1	48	250	0	0	0
Murray *	38	187	113	4	0	13
Total New South Wales	**100**	**856**	**435**	**38**	**12**	**13**
Victoria						
Goulburn	94	167	0	0	0	0
Broken	0	0	0	0	0	0
Loddon	3	3	0	0	0	0
Campaspe	5	5	0	0	0	0
Wimmera–Mallee	42	0	0	0	0	0
Kiewa	0	0	0	0	0	0
Ovens	0	0	0	0	0	0
Murray *	158	136	34	0	0	34
Total Victoria	**302**	**312**	**34**	**0**	**0**	**34**
South Australia						
Metro–Adelaide & Associated Country Areas	0	0	0	0	0	0
Lower Murray Swamps	0	0	0	0	0	0
Country Towns	0	0	0	0	0	0
All Other Purposes	112	0	0	0	0	0
Total South Australia	**112**	**0**	**0**	**0**	**0**	**0**
Queensland						
Condamine–Balonne	0	0	0	0	0	0
Border Rivers	0	9	1	0	0	0
Macintyre Brook	0	0	0	0	0	0
Moonie	0	0	1	0	0	0
Nebine	0	0	1	0	0	0
Warrego	0	0	8	0	0	0
Paroo	0	0	0	0	0	0
Total Queensland	**0**	**9**	**11**	**0**	**0**	**0**
Australian Capital Territory	**n/a**	**n/a**	**n/a**	**n/a**	**n/a**	**n/a**
Total Basin	**515**	**1,177**	**480**	**38**	**12**	**47**

Table 13: Environmental Water Allocations in 2010–11

System	Environmental Allocation (GL)	Net Availability of Carry-over (GL)	Environmental Allocation borrowed by Non environmental Users (GL)	Use of Environmental Supplementary Access Entitlements (GL)	Net Trade in from Non-Environmental Allocations (GL)	Net transfer in from Environmental Allocations in other valleys (GL)	Water from Entitlements available for Environmental Use (GL)	Water made available to Environment as the result of Savings Outside Cap (GL)
New South Wales								
Intersecting Streams	0	0	0	0	0	0	0	0
Border Rivers	0	0	0	0	0	0	0	0
Gwydir	88	1	0	3	–1	0	91	0
Namoi–Peel	7	0	0	0	0	0	7	0
Macquarie–Castlereagh–Bogan	105	0	0	3	0	0	109	0
Barwon–Darling	0	0	0	8	0	0	8	0
Lachlan	142	1	0	0	0	0	143	14
Murrumbidgee	232	34	0	26	70	8	370	35
Lower Darling	48	0	0	153	0	–48	153	0
Murray	149	68	0	33	27	–138	140	4
Total New South Wales	**771**	**104**	**0**	**226**	**97**	**–178**	**1,020**	**52**
Victoria								
Goulburn	112	28	0	0	0	–16	124	0
Broken	0	0	0	0	0	0	0	0
Loddon	3	0	0	0	0	–1	3	0
Campaspe	6	0	0	0	0	–1	5	0
Wimmera–Mallee	42	0	0	0	0	0	42	0
Kiewa	0	0	0	0	0	0	0	0
Ovens	0	0	0	0	0	0	0	0
Murray	181	152	0	23	0	–31	325	34
Total Victoria	**343**	**180**	**0**	**23**	**0**	**–49**	**497**	**34**
South Australia								
Metro–Adelaide & Associated Country Areas	0	0	0	0	0	0	0	0
Lower Murray Swamps	0	0	0	0	0	0	0	0
Country Towns	0	0	0	0	0	0	0	0
All Other Purposes	58	21	0	0	0	227	305	0
Total South Australia	**58**	**21**	**0**	**0**	**0**	**227**	**305**	**0**
Queensland								
Condamine–Balonne	0	0	0	0	0	0	0	0
Border Rivers	6	0	0	0	0	0	6	0
Macintyre Brook	0	0	0	0	0	0	0	0
Moonie	0	0	0	1	0	0	1	0
Nebine	0	0	0	0	0	0	0	0
Warrego	0	0	0	16	0	0	16	0
Paroo	0	0	0	0	0	0	0	0
Total Queensland	**6**	**0**	**0**	**17**	**0**	**0**	**23**	**0**
Australian Capital Territory	**n/a**	**n/a**	**n/a**	**n/a**	**n/a**	**n/a**	**n/a**	**n/a**
Total Basin	**1,178**	**305**	**0**	**266**	**97**	**20**	**1,846**	**87**

1. New South Wales currently not reporting rules based environmental water including Barmah Millewa Forest Allocation.

Table 14: Environmental Water Use in 2010–11

System	Total use of water from Environmental Entitlements (GL)	Consumptive use of water from Environmental Entitlements (GL)	Consumptive Environmental Use not covered by an Entitlements (GL)	Total Consumptive Environmental Use (GL)	Percentage use of water from Environmental Entitlements (%)
New South Wales					
Intersecting Streams	0	0	0	0	0%
Border Rivers	0	0	0	0	0%
Gwydir	18	0	0	0	19%
Namoi–Peel	0	0	0	0	0%
Macquarie–Castlereagh–Bogan	60	0	0	0	55%
Barwon–Darling	8	0	0	0	100%
Lachlan	12	0	0	0	8%
Murrumbidgee	186	0	0	0	50%
Lower Darling	153	0	0	0	100%
Murray	164	0	0	0	118%
Total New South Wales	**601**	**0**	**0**	**0**	**59%**
Victoria					
Goulburn	9	9	0	9	7%
Broken	0	0	0	0	0%
Loddon	0	0	11	11	3%
Campaspe	0	0	0	0	0%
Wimmera–Mallee	44	0	0	0	107%
Kiewa	0	0	0	0	0%
Ovens	0	0	0	0	0%
Murray	143	59	0	59	44%
Total Victoria	**197**	**68**	**11**	**79**	**40%**
South Australia					
Metro–Adelaide & Associated Country Areas	0	0	0	0	0%
Lower Murray Swamps	0	0	0	0	0%
Country Towns	0	0	0	0	0%
All Other Purposes	304	0	0	0	100%
Total South Australia	**304**	**0**	**0**	**0**	**100%**
Queensland					
Condamine–Balonne	0	0	0	0	0%
Border Rivers	0	0	0	0	0%
Macintyre Brook	0	0	0	0	0%
Moonie	1	0	0	0	100%
Nebine	0	0	0	0	0%
Warrego	16	0	0	0	100%
Paroo	0	0	0	0	0%
Total Queensland	**17**	**0**	**0**	**0**	**76%**
Australian Capital Territory	n/a	n/a	n/a	n/a	n/a
Total Basin	**1,119**	**68**	**11**	**79**	**61%**

Table 15: Cap Adjustment for Environmental Water Use in 2010–11

System	Component of calculated Annual Diversion Target			Environmental Use of an Non-Environmental Allocation (Trade to Environment) (GL)	Non-Environmental Use of an Environmental Allocation (Trade from Environment) (GL)	Water within Cap Transferred to Snowy annual Allocation (GL)	Volume by which Cap is reduced for Environmental Entitlements and Use (GL)
	that was used for Environment under baseline conditions (GL)	relating to an Entitlement that has been Transferred to Environmental Use (GL)	relating to a water savings that has been Transferred to an Environmental Use (GL)				
New South Wales							
Intersecting Streams	0	0	0	0	0	0	0
Border Rivers	0	0	0	0	0	0	0
Gwydir	0	18	0	0	1	0	17
Namoi–Peel	0	0	0	0	0	0	0
Macquarie–Castlereagh–Bogan	0	60	0	0	0	0	60
Barwon–Darling	0	8	0	0	0	0	8
Lachlan	0	12	0	0	0	0	12
Murrumbidgee	0	178	0	75	5	86	334
Lower Darling	0	201	0	0	0	0	201
Murray	0	302	0	28	0	29	359
Total New South Wales	**0**	**779**	**0**	**102**	**6**	**115**	**991**
Victoria							
Goulburn Broken Loddon	0	2	0	0	0	24	27
Campaspe	0	0	0	0	0	0	0
Wimmera–Mallee	0	44	0	0	0	0	44
Kiewa Ovens Murray	27	53	0	0	0	21	101
Total Victoria	**27**	**100**	**0**	**0**	**0**	**45**	**172**
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 Purposes	0	70	0	0	0	0	70
Total South Australia	**0**	**70**	**0**	**0**	**0**	**0**	**70**
Queensland							
Condamine–Balonne	0	0	0	0	0	0	0
Border Rivers	0	6	0	0	0	0	6
Macintyre Brook	0	0	0	0	0	0	0
Moonie	0	0	0	0	0	0	0
Nebine	0	0	0	0	0	0	0
Warrego	0	0	0	0	0	0	0
Paroo	0	0	0	0	0	0	0
Total Queensland	**0**	**6**	**0**	**0**	**0**	**0**	**6**
Australian Capital Territory	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Total Basin	**27**	**955**	**0**	**102**	**6**	**160**	**1,238**

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

12. COMPARISON OF ACTUAL FLOWS WITH NATURAL FLOWS

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

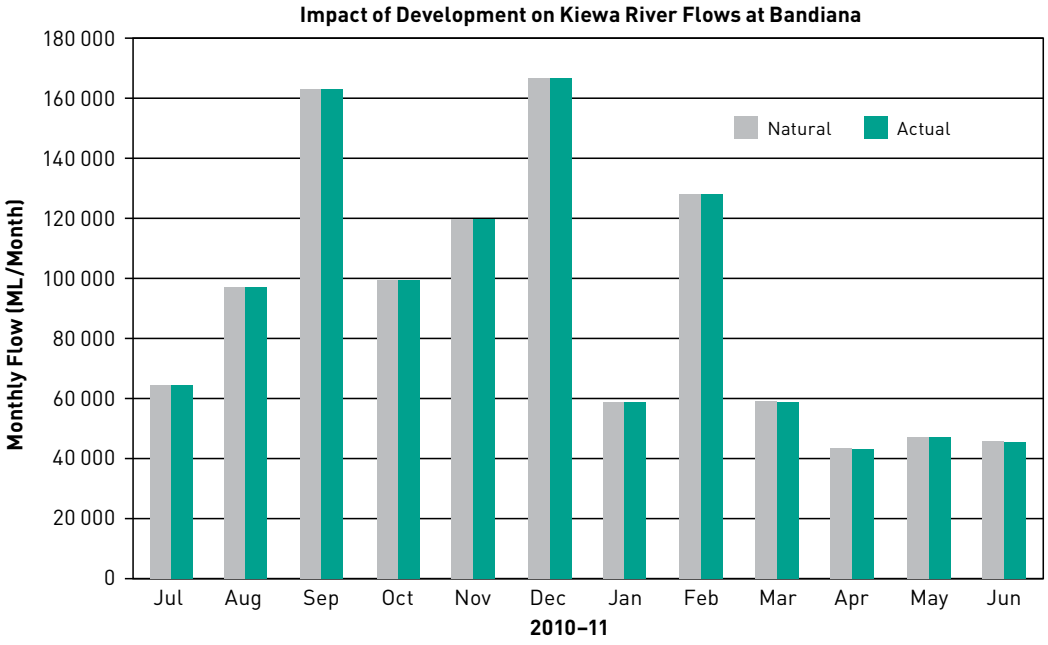
The natural flows are estimated from computer modelling studies. Many of the river models are incomplete, or not yet modified, to allow these numbers to be readily calculated for 2010–11. **Table 16** presents the 2010–11 annual flow volumes recorded and the natural flows at a number of selected key sites within the Murray–Darling Basin, whilst the impact of development can be seen graphically in **Figure 8** and **Figure 9**.

Table 16: Comparison of 2010–11 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	-97	n/a	n/a
Snowy Mountain Scheme to Murray River	587	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 Tributaries			
Barwon River at Mungindi + Boomi River	1,540	n/a	n/a
Inflows to Gwydir Wetland	173	n/a	n/a
Gwydir System Outflows to Barwon River	21	n/a	n/a
Namoi System Outflows to Barwon River	1,606	n/a	n/a
Inflows to Macquarie Marshes	887	n/a	n/a
Macquarie–Castlereagh–Bogan Outflows	2,063	n/a	n/a
Darling River Inflows to Menindee Lakes	1,840	n/a	n/a
Lachlan River at Coorong	120	n/a	n/a
Lachlan River at Booligal	204	n/a	n/a
Murrumbidgee River at Balranald	2,425	n/a	n/a
Lower Darling River at Burtundy	3,462	n/a	n/a
Victorian Tributaries			
Kiewa River at Bandiana	1,085	1,086	100%
Ovens River at Wangaratta	3,442	3,440	100%
Goulburn River at McCoys Bridge	3,199	5,693	56%
Campaspe River at Rochester	515	855	60%
Loddon River at Appin South	474	700	68%
Wimmera River at Horsham	303	487	62%
Queensland Tributaries			
Condamine–Balonne–Culgoa Flows at NSW Border	5,631	n/a	n/a
Macintyre River at Goondiwindi	3,005	n/a	n/a
Moonie River at Fenton	543	n/a	n/a
Warrego River at Cunnamulla	1,295	n/a	n/a
Paroo River at Caiwarro	486	n/a	n/a
River Murray			
Albury (Doctors Point)	5,223	7,594	69%
Yarrawonga	7,869	11,519	68%
Euston	11,937	n/a	n/a
South Australian Border	15,029	n/a	n/a
Barrages	12,849	n/a	n/a

1. na indicates data not available or not applicable.
2. Operational data, which may be subject to change.
3. Includes interstate trade.
4. Zero flows in some situations due to rounding off to nearest 1 GL.

Figure 8: Plots of Flows at Selected Sites Showing 2010–11 Actual and Natural (Modelled) Flows in Victoria



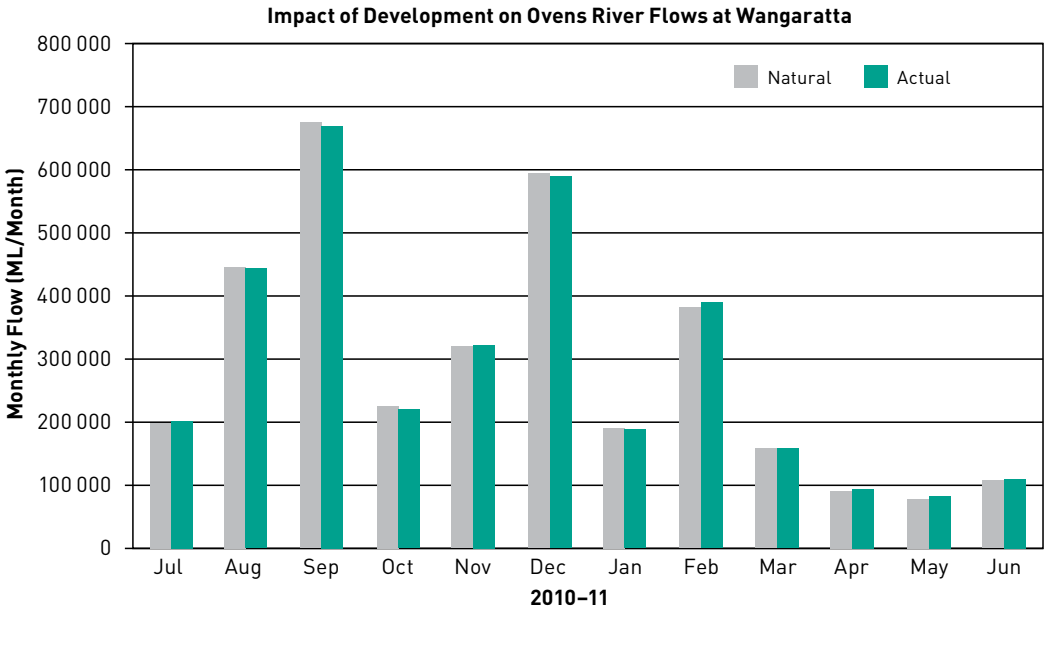
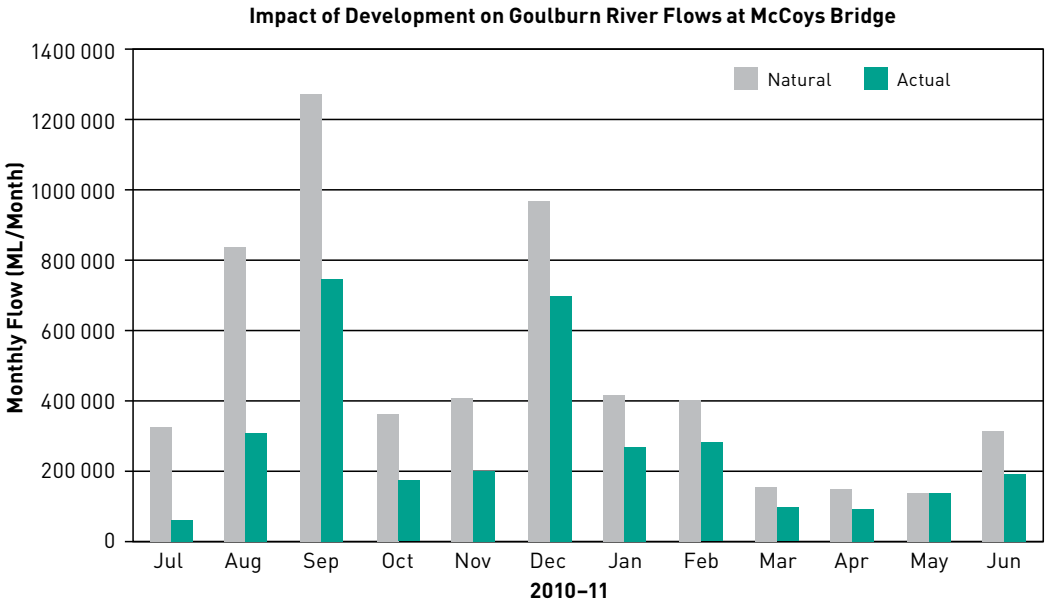


Figure 8: Plots of Flows at Selected Sites Showing 2010–11 Actual and Natural (Modelled) Flows in Victoria



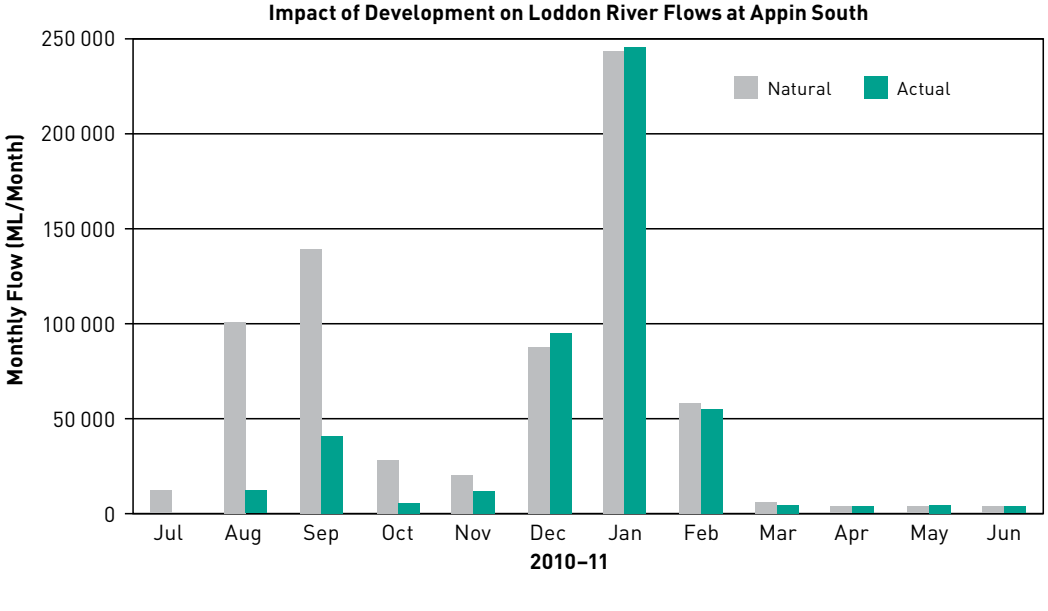
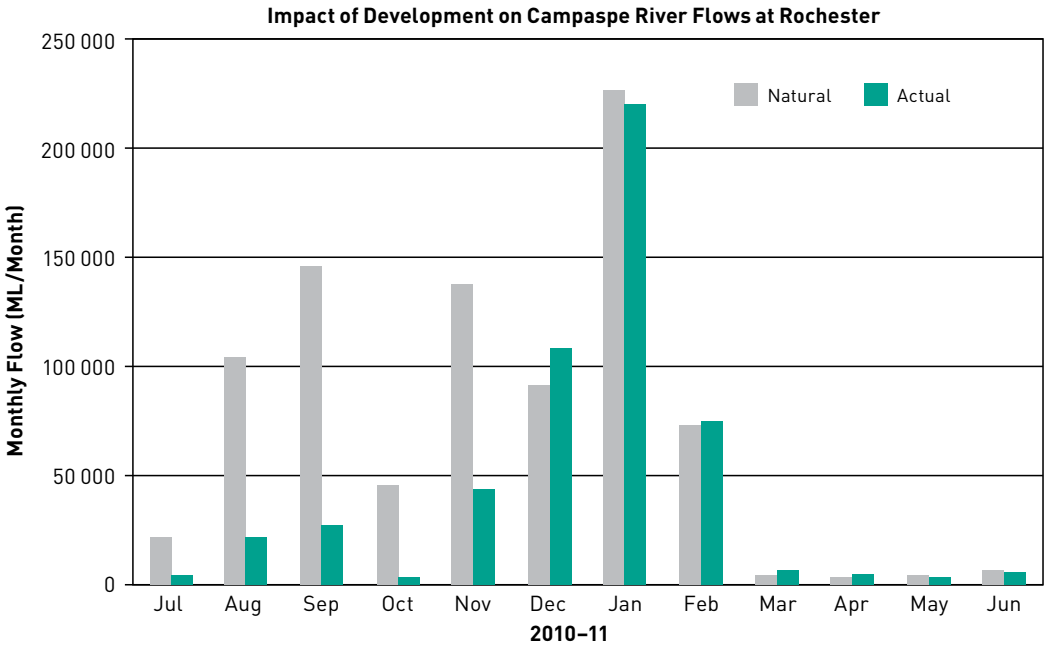


Figure 8: Plots of Flows at Selected Sites Showing 2010–11 Actual and Natural (Modelled) Flows in Victoria



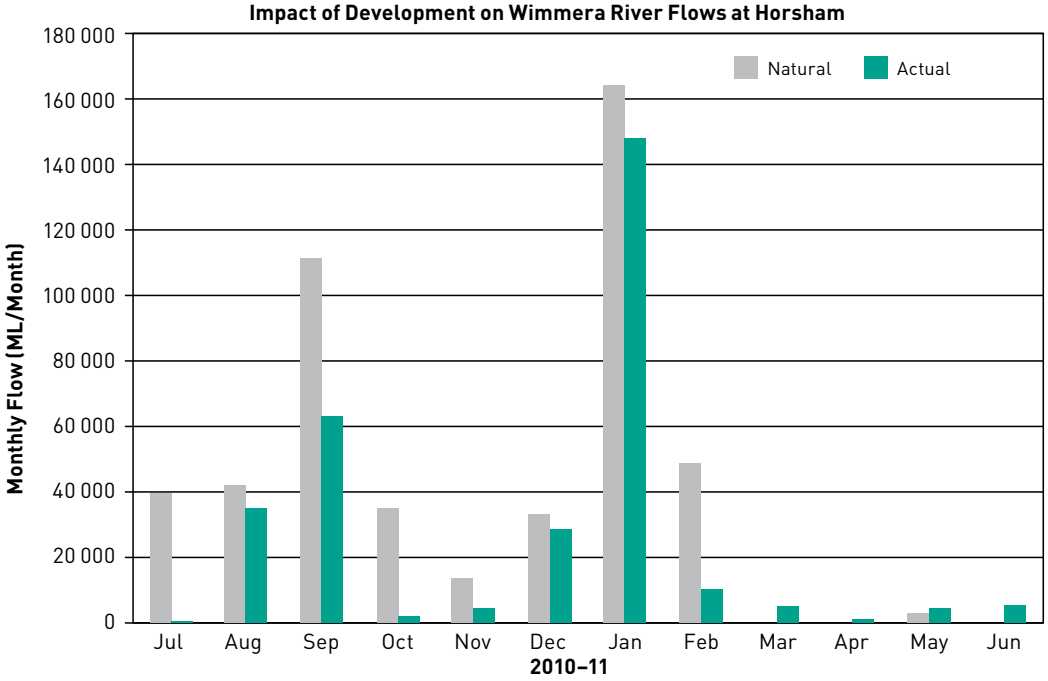
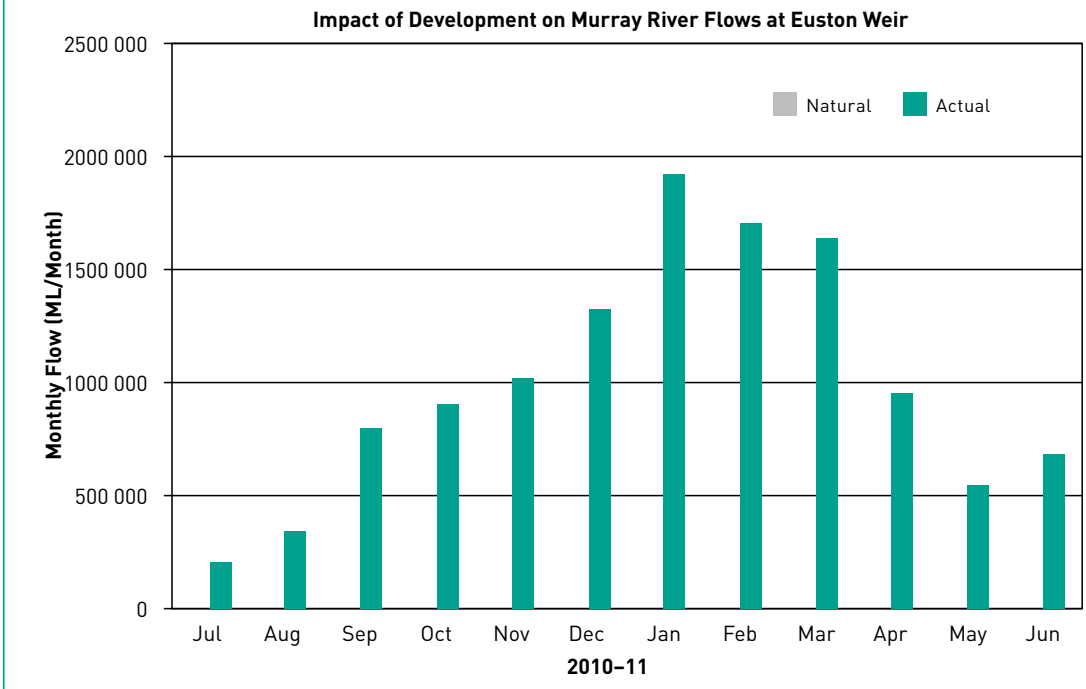


Figure 9: Plots of Flows at Selected Sites Showing 2010–11 Actual and Natural (Modelled) Flows in Murray River



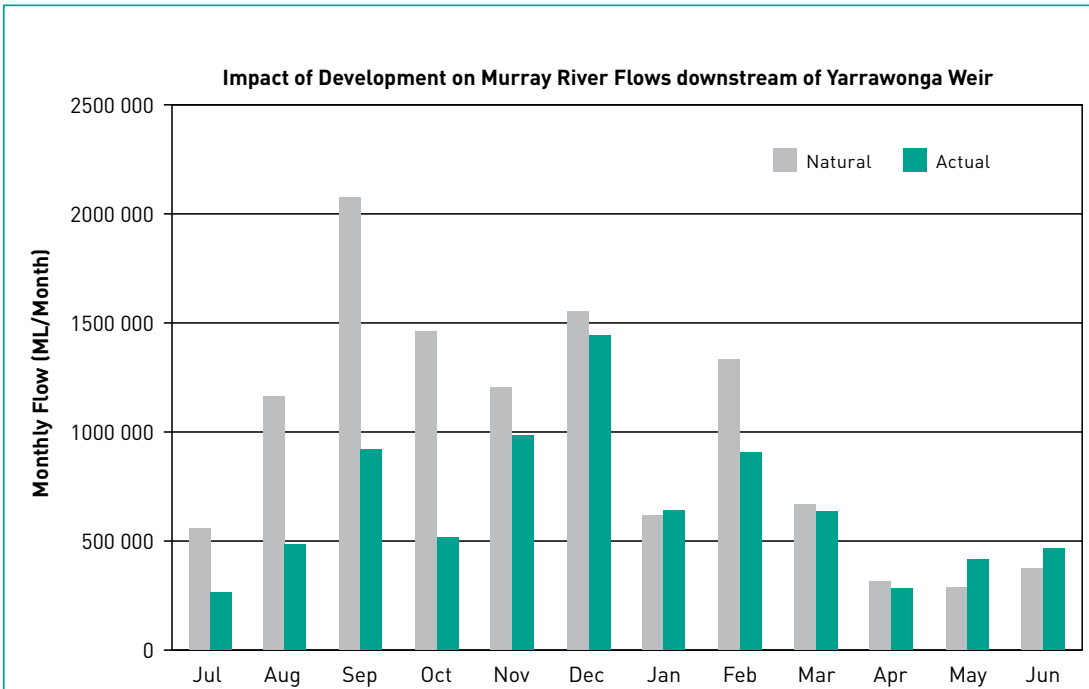
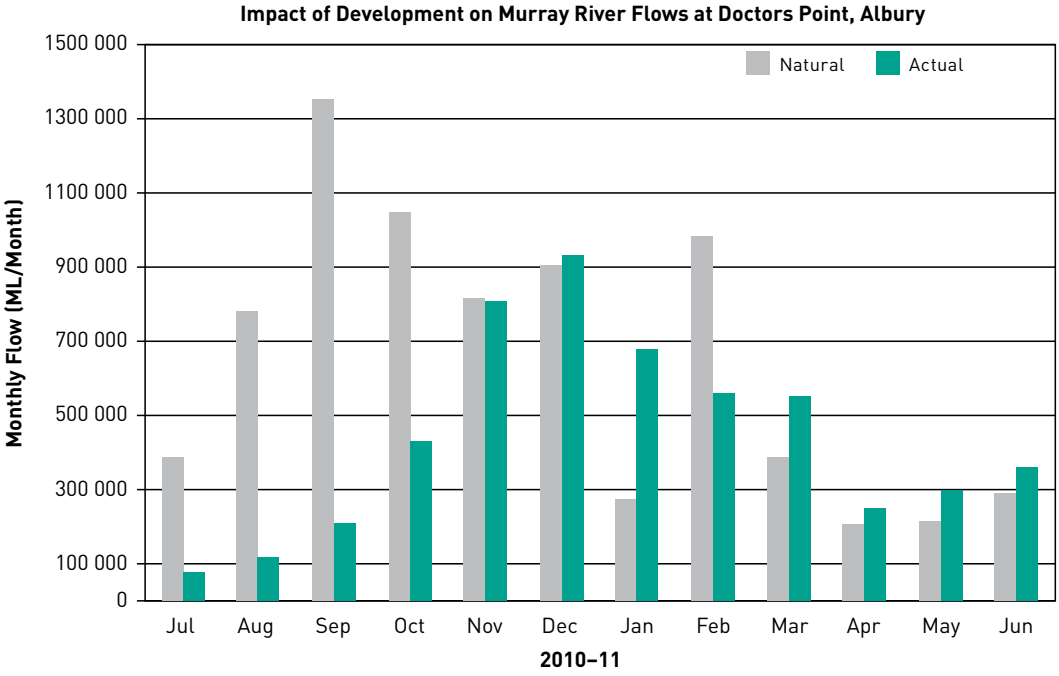
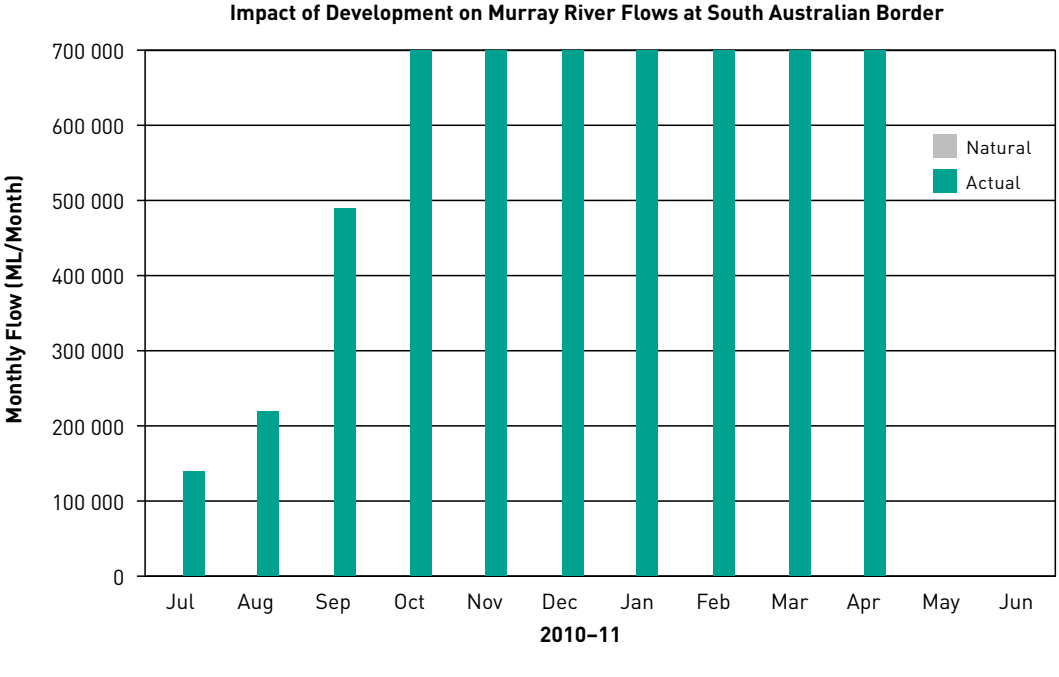


Figure 9: Plots of Flows at Selected Sites Showing 2010–11 Actual and Natural (Modelled) Flows in Murray River





13. IMPOUNDMENTS AND LOSSES IN MAJOR ON–STREAM STORAGES

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

Typically in periods of high rainfall and high riverine flow conditions, moderate to average volumes of water are diverted for irrigation use, 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 17**. The volumes reported indicate that the total volume in storage in the Basin in 2010–11 has increased from 8194 GL to 19752 GL (78% full). Total evaporative losses for major storages within the Basin were calculated by the respective States and are reported at 49 GL, representing 0.2% of total storage capacity and equal to 0.8 % of total diversion from the Basin. The net decrease in flow of 11607 GL due to increase in storages and evaporative losses equal to 0.8% of total Basin diversion.

Table 17: Impoundments and Losses in Major On–Stream Storages (greater than 10 GL capacity) in 2010–11

System	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)	% 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 Authority									
Lower Darling	Menindee Lakes[1]	1960	2,050	1,522	1,956	95%	434	0	434
Murray[2]	Dartmouth Reservoir	1979	3,906	1,254	2,491	64%	1,237	0	1,237
	Hume Reservoir	1936-61	3,038	804	2,805	92%	2,002	0	2,002
	Lake Victoria	1928	677	353	479	71%	127	0	127
Total Murray–Darling Basin Authority			**9,671**	**3,932**	**7,732**	**80%**	**3,799**	**0**	**3,799**
Snowy Mountains Scheme in Murray–Darling Basin									
Murrumbidgee River Valley	Jounama Pondage	1968	44	25	19	44%	-6	0	-6
	Talbingo Reservoir	1971	921	867	910	99%	44	6	50
	Tantangara Reservoir	1960	254	24	55	22%	31	0	31
	Tumut Pondage	1958	53	10	41	78%	31	0	31
Murray River Valley	Geehi Reservoir	1966	21	15	16	77%	1	0	1
	Tooma Reservoir	1961	28	15	17	60%	2	0	2
	Khancoban Pondage	1965	22	13	10	46%	-3	0	-3
Total Snowy Mountains Scheme			**1,342**	**968**	**1,069**	**80%**	**101**	**6**	**107**
Borders Rivers Commission									
Border Rivers	Glenlyon Dam	1976	254	56	251	99%	195	0	195
Total Border Rivers Commission			**254**	**56**	**251**	**99%**	**195**	**0**	**195**
New South Wales									
Border Rivers	Pindari Reservoir	1962-96	312	78	310	99%	231	0	231
Gwydir	Copeton Reservoir	1976	1,364	100	690	51%	590	0	590
Namoi–Peel	Chaffey Reservoir	1979	62	55	62	101%	7	0	7
	Keepit Reservoir	1960	423	120	416	98%	296	0	296
	Split Rock Reservoir	1987	397	14	83	21%	69	0	69
Macquarie–Castlereagh–Bogan	Burrendong Reservoir	1967	1,678	197	1,075	64%	877	0	877
	Windamere Reservoir	1984	368	68	168	46%	100	0	100
Lachlan	Carcoar Reservoir	1970	36	2	27	76%	25	0	25
	Lake Brewster	1952	153	2	1	1%	-1	0	-1
	Lake Cargelligo	1902	36	19	38	105%	19	0	19
	Wyangala Reservoir	1936-71	1,220	89	1,117	92%	1,028	0	1,028

System	Major On–Stream Storage	Comple-tion Date	Storage Capa-city (GL)	Volume of Storage at Beginning of Water Year (GL)	Volume of Storage at End of Water Year (GL)	% of Storage Full at End of Year (%)	Increase in Volume of Storage (GL)	Evapor-ation Losses (GL)	Net Reduc-tion in Flow due to Storage (GL)
Murrumbidgee[2]	Blowering Reservoir	1968	1,631	754	1,579	97%	825	0	825
	Burrinjuck Dam	1907-56	1,028	423	904	88%	481	0	481
	Tombullen Off–River Storage	1980	11	0	1	8%	1	0	1
	Hay Weir	1981	14	2	6	47%	4	0	4
Total New South Wales			**8,733**	**1,923**	**6,476**	**74%**	**4,553**	**0**	**4,553**
Victoria									
Goulburn–Broken–Loddon	Eildon Reservoir	1956	3,334	921	2,914	87%	1,994	-58	1,935
	Lake Mokoan	1971	365	0	0	0%	0	0	0
	Lake Nillahcootie	1967	40	12	41	102%	29	-3	26
	Cairn Curran Reservoir	1956	147	7	131	89%	125	0	125
	Tullaroop Reservoir	1959	73	4	70	96%	66	1	66
Campaspe	Lake Eppalock	1964	305	27	295	97%	268	-1	267
	Lauriston Reservoir	1941	20	15	20	99%	4	1	6
	Malmsbury Reservoir	1870	18	0	10	56%	10	1	11
	Upper Coliban Reservoir	1903	37	1	38	102%	37	1	38
Wimmera–Mallee	Lake Bellfield	1966	79	22	61	78%	39	3	42
	Lake Fyans	1916	18	6	13	72%	8	3	11
	Lake Lonsdale	1903	65	3	48	74%	45	12	58
	Lake Taylor	1923	34	23	22	66%	-1	5	5
	Pine Lake	1928	62	0	11	17%	11	0	11
	Tooloondo Reservoir	1953	92	0	0	0%	0	0	0
	Wartook Reservoir	1887	29	10	16	56%	6	10	16
Murray–Kiewa–Ovens	Rocky Valley Reservoir	1959	28	14	18	64%	5	-1	4
	Lake Buffalo	1965	24	14	14	58%	-1	-3	-3
	Lake William Hovell	1973	14	14	14	101%	0	-2	-2
Total Victoria			**4,785**	**1,093**	**3,737**	**78%**	**2,644**	**-30**	**2,615**
Queensland									
Condamine–Balonne	Beardmore Dam	1972	82	70	82	100%	12	37	49
	Chinchilla Weir	1974	10	8	10	100%	2	4	6
	Cooby Dam	1942	21	2	20	93%	17	2	19
	Jack Taylor Weir	1953-59	10	9	10	100%	1	3	4
	Leslie Dam	1985	106	10	105	99%	95	10	105
Macintyre Brook	Coolmunda Dam	1968	69	9	60	87%	51	19	70
Total Queensland			**298**	**107**	**286**	**96%**	**179**	**75**	**255**

System	Major On–Stream Storage	Comple-tion Date	Storage Capa-city (GL)	Volume of Storage at Beginning of Water Year (GL)	Volume of Storage at End of Water Year (GL)	% of Storage Full at End of Year (%)	Increase in Volume of Storage (GL)	Evapor-ation Losses (GL)	Net Reduc-tion in Flow due to Storage (GL)
Australian Capital Territory									
Murrumbidgee	Bendora Reservoir	1961	12	9	9	79%	0	0	0
	Corin Reservoir	1968	71	43	68	96%	25	-2	23
	Googong Reservoir	1979	121	59	121	100%	62	0	63
	Cotter	1912	4	4	3	82%	-1	0	-1
Total Australian Capital Territory			**207**	**115**	**201**	**97%**	**87**	**-2**	**84**
Total Basin			**25,290**	**8,194**	**19,752**	**78%**	**11,558**	**49**	**11,607**

1. Menindee Lakes capacity revised based upon 2003 survey
2. The data is from MDBA database as on 6 March 2012. Operational data, which may be subject to change.

14. GROUNDWATER USE IN THE BASIN

14.1 Context

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

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

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

14.2 Groundwater Data for 2010–11

The GTRG supplied the estimated data for sustainable yield (SY), allocation and usage of groundwater in 2010–11 for each Groundwater Management Unit (GMU) in the Basin. The data was further supplemented and analysed using Geographical Information System (GIS) techniques to assign the groundwater data to the designated Cap valleys. Some errors are inevitable in the groundwater data because of the absence of precise information to apportion the aquifers to Cap valleys. However, the analysis presented in **Table 18** is valuable in itself, as it gives a snapshot of the Basin–wide status of groundwater.

The estimated sustainable yields in Groundwater Management Units (GMU) of the Basin are reported to be 1840 GL. However, 1842 GL was already allocated in 2010–11, which is more than 100% of SY. But this allocation percentage does not take into account Victorian SY values as Victoria does not mange its groundwater on the basis of SY. The total usage of groundwater in the Basin was 511 GL, which was 28% of allocation and 28% of SY. The groundwater usage was 8% of surface water diversion in the Basin.

14.3 Groundwater Use since 1999–2000

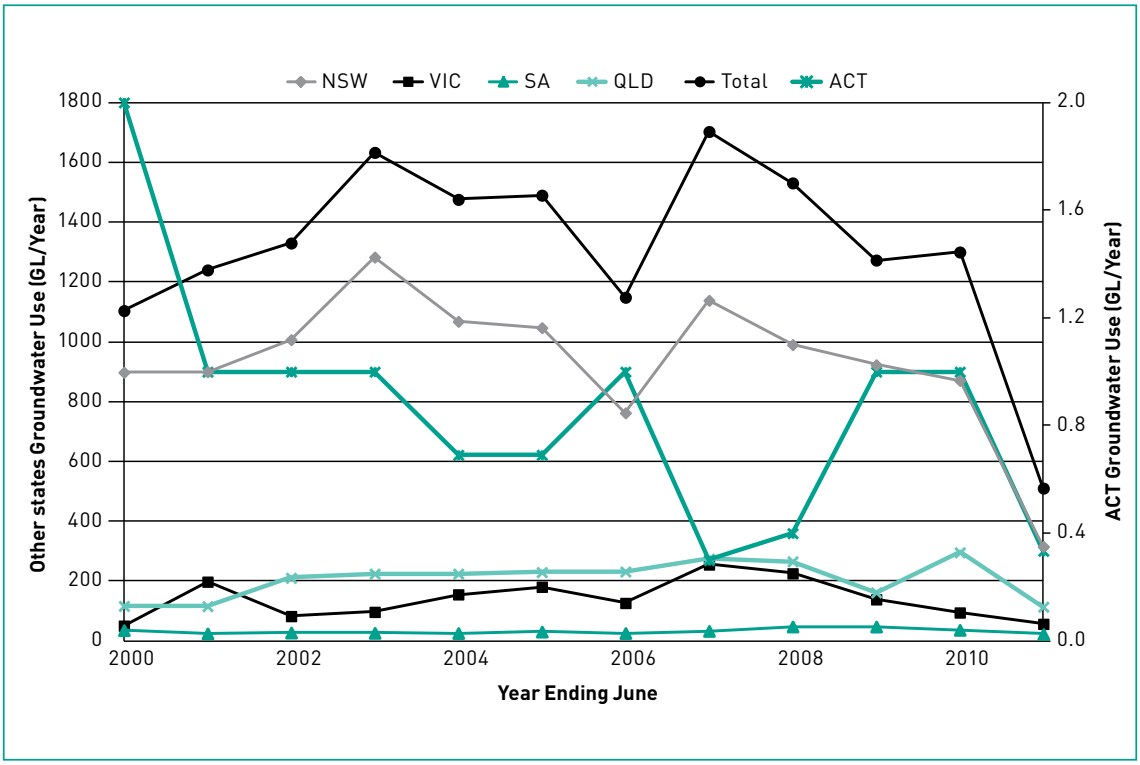
Figure 10 shows the use of groundwater in the Basin since 1999–2000, when groundwater reporting started. It is evident from this figure that the groundwater use has been steadily rising, but there is decline in 2010–11 water year. However, deficiency in groundwater data must be noted. Several factors account for this deficiency in data: including changes in groundwater systems, names, their boundaries and policies for determining sustainable yield. The translation factors for converting groundwater data based upon GMUs to that based upon Cap valleys were worked out in 1999–2000 based upon the GMU layer analysis facilitated by the data provided by National Land and Water Resources Audit that year. However, these translational factors have not been able to cope with the changes since then. So the groundwater data depicted in **Table 18** and **Figure 10** need to be viewed with extreme caution.

Table 18: Basin–wide Groundwater data for 2010–11 aligned along the designated Cap valleys

Designated River Valley System	Sustainable yield estimate (GL)	Groundwater Allocation (GL)	Groundwater Use (GL)	Surface Water Use (GL)
New South Wales				
Intersecting Streams[4]	37	2	0	3
Border Rivers	37	8	1	192
Gwydir	74	75	42	271
Namoi–Peel	208	268	76	270
Macquarie–Castlereagh–Bogan	164	147	24	183
Barwon–Darling	13	1	0	95
Lachlan	323	299	62	90
Murrumbidgee	0	0	0	1,461
Lower Darling	360	390	89	28
Murray	137	167	21	689
Total New South Wales	**1,353**	**1,358**	**316**	**3,283**
Victoria				
Goulburn Broken Loddon	121	122	34	544
Campaspe	26	18	4	18
Wimmera–Mallee	3	9	1	10
Kiewa Ovens Murray	99	84	17	563
Total Victoria	**248**	**233**	**57**	**1,136**
South Australia				
Total South Australia[3]	**53**	**52**	**23**	**361**
Queensland				
Condamine–Balonne	171	190	113	1,064
Border Rivers	7	7	1	411
Macintyre Brook	0	0	0	10
Moonie	0	0	0	29
Nebine	0	0	0	0
Warrego	0	0	0	11
Paroo	0	0	0	0
Total Queensland	**179**	**197**	**114**	**1,525**
Australian Capital Territory	7	1	0	6
Total Basin	**1,840**	**1,842**	**511**	**6,311**

1. Refer **Table 2.**
2. Groundwater figures for New South Wales and Queensland are approximate as they do not include all the groundwater systems within the Cap valley (not all groundwater systems are within a recognised GMU boundary).
3. It is not sensible to divide South Australia Groundwater use into designated valleys.
4. Intersecting Streams include New South Wales Moonie Valley Groundwater data.

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



CONCLUSION

The information and data contained within this report provides a comprehensive review of water use and management for the 2010–11 water year for the Murray–Darling Basin, as per the requirements of Schedule E (former Schedule F) to the Murray–Darling *Basin Agreement*. Significant progress have made in developing and accrediting the Cap models, which are used for Cap compliance. Out of 24 Cap valleys, Caps have not been defined in 1 valley and 2 other valleys do not require a Cap model. The remaining 21 Cap valleys have 23 models as two valleys comprise 2 sub valleys and have separate Cap models. Out of 23 Cap models, 16 Cap valley models have been audited and 15 approved (1 more, Macquarie ready for approval), 4 Cap models are being audited and 3 models (NSW Border Rivers, Metro Adelaide and ACT) are yet to be submitted for audit.

Total surface water use in the Murray–Darling Basin in 2010–11 was 6311 GL and groundwater use was 511 GL.

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

Water allocation rules in Murray Darling Basin have been tightened to implement the Cap. Due to high rainfall, water availability was very good.

However, the use of allocated water in the 2010–11 water year was only 30%. This was lowest utilisation since 1997–98.

The accuracy of diversion measurements was ±14% in the 2010–11 water year.

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

Interstate water trading between New South Wales, Victoria and South Australia continued to develop in 2010–11.

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

The total volume of water in major storages within the Basin in 2010–11 increased from 8194 GL to 19752 GL (78% full). Total evaporative losses for major storages within the Basin were 49 GL, representing 0.2% of total storage capacity and 0.8% of total Basin diversion.

All Cap valleys for which Cap have been defined were within their Cap. There was large Basin–wide Cap credit.

The groundwater information in 2010–11 was not completely available. Based upon the limited information, the allocation of groundwater in the Basin was 1842 GL and usage was 511 GL.

Total water made available from entitlements for environmental use was 1,866 GL and total use of this water was 1,119 GL. Total Cap adjustments for Environmental water use was 1,218 GL.

The monitoring of Cap compliance within the Murray–Darling Basin is a large, complex, and challenging task, which has required substantial resources, cooperation and management from all the Governments.

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

GLOSSARY

AHD	Australian Height Datum
Announced Allocation	The percentage of water entitlement declared available for diversion from a regulated stream in a season.
AT	Annual Trigger
Annual Allocation	The annual volume of water available for diversion from a regulated stream by an entitlement holder.
Authorised Use	Total of the water allocated in the valley plus off–allocation and water harvesting use plus unregulated stream use not in allocation and system losses not in allocation.
Border Rivers	The rivers and tributaries forming, or intersecting the border between New South Wales and Queensland.
BRWSS	Border Rivers Water Supply System
Bulk Entitlement	A perpetual entitlement to water granted to water authorities by the Crown of Victoria under the Water Act 1989.
Carryover	An unused entitlement from one season that can be used in the next year.
CA	Continuous Accounting.
Channel Capacity	The maximum rate at which water can be delivered through a river reach or an artificial channel.
CEWH	Commonwealth Environment Water Holder
CIT	Central Irrigation Trust
COAG	Council of Australian Governments.
CWAS	Critical Water Allocation Scheme
Diversion	The movement of water from a river system by means of pumping or gravity channels.
Diversion Licence	Specified licences issued for a specified annual volume and diversion rate.
DERM	The Department of Environment and Resource Management (of Queensland)
DNR	The Department of Natural Resources (of New South Wales).
DNRW	The Department of Natural Resources and Water (of Queensland).
DSE	The Department of Sustainability and Environment (of Victoria).
Dozer Allocation	An allocation that is not fully utilised.
DWLBC	The Department of Water, Land and Bio-diversity Conservation (of South Australia).
DWE	The Department of Water and Energy (of New South Wales)
EC (Unit)	Electrical conductivity unit 1 EC = 1 micro-Siemens per centimetre measurement at 25° Celsius. Commonly used to indicate the salinity of water.
ELMA	Environmental Land Management Allocation
EWA	Environmental Water Allocation

End–of–valley Flows	The flow regime at the end of a valley.
Floodplain Harvesting	The diversion of water from a floodplain into storage(s).
Gigalitre (GL)	One thousand million or 10^9 litres.
GIS	Geographical Information System
G–MW	Goulburn–Murray Water (of Victoria).
GMU	Groundwater Management Unit
GSM	Goulburn Simulation Model
GTRG	Groundwater Technical Reference Group
Gravity Districts	Districts which use gravity to divert the flow of water from the river.
High Security Entitlement	An entitlement which does not vary from year to year and is expected to be available in all but the worst droughts.
High Reliability Water Share	Legally recognised, secure entitlement to a defined share of water, as governed by the reserve policy
IAG	Independent Audit Group.
Impoundment	The Storage of water diverted from a water course
IQQM	Integrated Quantity Quality Model
Irrigation	Supplying land or crops with water by means of streams, channels or pipes
LMRIA	Lower Murray Reclaimed Irrigation Areas
LSD	Land Surface Diversion
Low Reliability Water Share	Legally recognised, secure entitlement to a defined share of water available after full high reliability water allocation, as governed by the reserve policy. Previously known as sales water.
LV	Licensed Volume.
MDB	Murray Darling Basin
MDBA	Murray–Darling Basin Authority.
MDBC	Former Murray–Darling Basin Commission.
MDBMC	Murray–Darling Basin Ministerial Council.
Megalitre (ML)	One million or 10^6 litres.
MoU	Memorandum of Understanding
MSM	Murray Simulation Model
Ministerial Council, The	Murray–Darling Basin Ministerial Council.
Murray–Darling Basin Agreement	The Agreement between the Governments of the four Basin States and the Commonwealth. The current Agreement is the 2009 Agreement.
Off–Allocation	When unregulated tributary inflows or spills are sufficient to supply irrigation needs and downstream obligations.
On–Farm Storage	Privately owned storages used to harvest surplus flows or to store unused allocations for use in the following season.
Overdraw	Water diverted in one season against a prospective allocation in the subsequent year.
Overland Flow	Water that runs off the land following rainfall, before it enters a watercourse, and floodwater that erupts from a watercourse or lake onto a floodplain.

Permanent Transfer	The transfer of water entitlements on a permanent basis. The right to permanent transfers allows irrigators to make long–term adjustments to their enterprise and enables new operators to enter the industry.
Private Diverters	Licensed to operate privately owned pumps or diversion channels; includes river pumpers and diverters as well as town water supplies.
Property Right	In this context, the right to ownership of allocated volumes of water.
RAMSAR Wetland	A wetland listed on the register of internationally significant wetlands established by the Convention at Ramsar.
REALM	Resource Allocation Model
Regulated Streams–Waterways	Streams where users are supplied by releases from storage. A water licence for a regulated stream specifies a base water entitlement defining the licence holder's share of the resources from a stream.
RMIF	River Murray Improvement Flows
Riparian	Of, inhabiting or situated on the bank and floodplain of a river.
RIT	Renmark Irrigation Trust.
ROP	Resource Operation Plan
RWUEI	Rural Water Use Efficiency Initiative
Salinity	The concentration of dissolved salts in groundwater or river water usually expressed in EC units.
Sleeper Allocation	An allocation that does not have a history of water usage.
SY	Sustainable Yield
Temporary Transfer	Water entitlements transferred on an annual basis.
TLM	The Living Murray
Unregulated Streams	Streams that are not controlled or regulated by releases from major storages.
Utilisation	The amount of water available for diversion that is actually diverted.
Water Entitlement	The legal right of a user to access a specified amount of water in a given period.
Water–Harvesting	The diversion of water from an unregulated stream in Queensland in which the access to water is defined by a diversion rate and a starting flow in the stream; and also a volumetric limit where Resource Operations Plans have been implemented.
WRP	Water Resources Planning. It is a process currently underway in Queensland to enable the acceptable level of allocatable water to be determined for a river system. This methodology will determine what part of the flow regime should be preserved for environmental flows, and what part can be made available for consumptive use.
WMRWG	Water Market Reform Working Group.
WUE	Water Use Efficiency.

Appendix A: Cap Register[3]—Annual Cap Adjustments for Trade (GL)

System	1997–98	1998–99	1999–00	2000–01	2001–02	2002–03	2003–04
New South Wales							
Intersecting Streams[1]	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Border Rivers	0.0	-1.6	-3.5	-8.5	-8.7	-13.5	-3.4
Gwydir	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Namoi–Peel	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Macquarie–Castlereagh–Bogan	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Barwon–Darling–Lower Darling	5.4	13.0	9.0	21.9	7.8	0.0	0.0
Lachlan	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Murrumbidgee	-33.4	-38.0	-113.7	-21.4	31.5	-14.5	-34.7
Murray	30.2	6.8	105.8	-12.9	-33.3	30.8	34.9
Total NSW	**2.2**	**-19.8**	**-2.4**	**-20.9**	**-2.7**	**2.8**	**-3.2**
Victoria							
Goulburn–Broken–Loddon cap valley	-3.1	3.3	-7.8	-0.8	0.8	-4.4	-59.7
Campaspe	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Wimmera–Mallee	0.0	0.0	0.0	0.0	0.0	0.8	0.7
Murray–Kiewa–Ovens Cap valley	17.7	11.9	0.7	-1.6	-10.4	-17.4	34.2
Total Victoria	**14.6**	**15.2**	**-7.1**	**-2.4**	**-9.7**	**-21.1**	**-24.8**
South Australia							
Metro–Adelaide & Associated Country Areas	0.0	0.0	0.0	0.0	12.0	11.0	9.4
Lower Murray Swamps	-2.6	-3.4	-4.5	-4.7	-4.1	-5.0	-22.1
Country Towns	0.0	0.0	0.0	0.0	-12.0	-11.0	-9.4
All Other Purposes	-14.1	7.0	10.8	20.0	9.9	9.7	41.5
Total South Australia	**-16.8**	**3.6**	**6.3**	**15.2**	**5.8**	**4.7**	**19.4**
Queensland							
Condamine–Balonne	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Border Rivers–Macintyre Brook	0.0	1.6	3.5	8.5	8.7	13.5	3.5
Moonie	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Nebine	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Warrego	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Paroo	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Queensland	**0.0**	**1.6**	**3.5**	**8.5**	**8.7**	**13.5**	**3.5**
Australian Capital Territory	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Basin	**0.0**	**0.6**	**0.4**	**0.4**	**2.1**	**0.0**	**–5.1**

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

3 The Cap Register in Appendix A–H is an extract from Cap Register 25 stored in MDBA's document management system –TRIM under reference: E2009–0257

Appendix A: Cap Register—Annual Cap Adjustments for Trade (GL) continued.

System	2004–05	2005–06	2006–07	2007–08	2008–09	2009–10	2010–11
New South Wales							
Intersecting Streams[1]	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Border Rivers	-6.4	-11.6	-6.7	-14.8	-9.5	-8.6	-19.6
Gwydir	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Namoi–Peel	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Macquarie–Castlereagh–Bogan	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Barwon–Darling–Lower Darling	-1.1	0.0	0.0	0.0	-27.1	-68.4	37.1
Lachlan	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Murrumbidgee	8.0	-5.9	-96.8	-139.1	-390.0	-110.8	-57.2
Murray	-0.8	0.1	44.2	-19.9	-138.1	-70.1	-49.2
Total NSW	**-0.2**	**-17.4**	**-59.3**	**-173.7**	**-564.7**	**-257.8**	**-89.5**
Victoria							
Goulburn–Broken–Loddon cap valley	-76.6	19.3	-62.3	-218.1	-106.9	-100.5	-135.2
Campaspe	0.0	0.0	0.0	21.9	28.7	26.4	0.1
Wimmera–Mallee	-0.4	0.0	1.3	1.1	1.6	0.0	0.0
Murray–Kiewa–Ovens Cap valley	53.8	-9.1	36.1	171.6	258.2	51.2	325.0
Total Victoria	**-23.2**	**10.3**	**-25.0**	**-23.5**	**181.5**	**-22.9**	**189.9**
South Australia							
Metro–Adelaide & Associated Country Areas	8.8	16.0	0.0	0.0	0.0	0.0	0.0
Lower Murray Swamps	-32.6	-35.5	-29.4	-21.4	-9.1	-30.26	-59.59
Country Towns	-5.0	-8.0	10.7	6.1	6.1	6.6	2.3
All Other Purposes	45.3	23.0	91.3	192.1	371.8	290.9	-67.7
Total South Australia	**16.5**	**-4.5**	**72.6**	**176.8**	**368.7**	**267.3**	**-125.0**
Queensland							
Condamine–Balonne	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Border Rivers–Macintyre Brook	6.4	11.6	6.7	14.8	9.5	8.6	19.6
Moonie	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Nebine	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Warrego	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Paroo	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Queensland	**6.4**	**11.6**	**6.7**	**14.8**	**9.5**	**8.6**	**19.6**
Australian Capital Territory	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Basin	**-0.6**	**-0.1**	**-5.0**	**-5.7**	**-5.0**	**-4.9**	**-5.0**

1. No Cap yet has been set for these valleys

Appendix B: Cap Register—Annual Cap Targets (GL) Adjusted for Trade and Environmental Allocations

System	1997–98	1998–99	1999–00	2000–01	2001–02	2002–03	2003–04
New South Wales							
Intersecting Streams	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Border Rivers	272	223	219	237	314	150	173
Gwydir	637	303	533	347	457	468	185
Namoi–Peel	367	351	380	373	369	310	247
Macquarie–Castlereagh–Bogan	386	592	411	575	577	263	270
Barwon–Darling–Lower Darling	237	519	328	499	214	149	210
Lachlan	427	323	287	377	446	249	94
Murrumbidgee	2,557	2,551	2,018	2,716	2,672	2,091	1,812
Murray	1,820	2,075	1,819	2,006	1,891	393	1,530
Total NSW	**6,703**	**6,937**	**5,996**	**7,130**	**6,939**	**4,072**	**4,520**
Victoria							
Goulburn–Broken–Loddon cap valley	1,985	1,653	1,590	1,679	1,587	1,005	1,621
Campaspe	127	85	80	108	112	88	83
Wimmera–Mallee	152	155	113	63	79	56	63
Murray–Kiewa–Ovens Cap valley	1,853	1,721	1,594	1,758	1,833	1,904	1,635
Total Victoria	**4,117**	**3,614**	**3,377**	**3,608**	**3,611**	**3,053**	**3,402**
South Australia							
Metro–Adelaide & Associated Country Areas[1]							
Lower Murray Swamps	92	91	90	89	90	89	67
Country Towns	50	50	50	50	38	39	41
All Other Purposes	412	445	450	473	457	488	495
Total South Australia	**554**	**586**	**590**	**613**	**585**	**616**	**603**
Queensland							
Condamine–Balonne	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Border Rivers–Macintyre Brook	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Moonie	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Nebine	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Warrego	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Paroo	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Total Queensland	**0**	**0**	**0**	**0**	**0**	**0**	**0**
Australian Capital Territory[2]	53	41	37	34	37	51	43
Total Basin	**11,427**	**11,177**	**9,999**	**11,385**	**11,171**	**7,792**	**8,569**

1. See appendix F.
2. ACT has yet to develop a Cap model. No model target was available for 2010–11.The past targets worked out from an Authority model has been recognised as part of the Cap agreement for the ACT.

Appendix B: Cap Register—Annual Cap Targets (GL) Adjusted for Trade and Environmental Allocations continued

System	2004–05	2005–06	2006–07	2007–08	2008–09	2009–10	2010–11
New South Wales							
Intersecting Streams	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Border Rivers	209	190	84	172	158	145	240
Gwydir	191	347	110	108	232	106	383
Namoi–Peel	288	328	164	197	239	235	381
Macquarie–Castlereagh–Bogan	183	389	120	219	145	113	592
Barwon–Darling–Lower Darling	153	223	23	185	168	129	297
Lachlan	60	168	86	96	61	58	120
Murrumbidgee	1,376	2,460	1,076	842	628	666	1,090
Murray	1,426	1,690	210	338	285	839	978
Total NSW	**3,885**	**5,793**	**1,873**	**2,157**	**1,915**	**2,291**	**4,079**
Victoria							
Goulburn–Broken–Loddon cap valley	1,643	1,591	632	772	588	1,126	1,265
Campaspe	81	47	20	44	48	47	59
Wimmera–Mallee	68	35	18	38	22	32	42
Murray–Kiewa–Ovens Cap valley	1,571	1,726	1,409	940	902	1,291	1,211
Total Victoria	**3,363**	**3,399**	**2,079**	**1,795**	**1,560**	**2,496**	**2,578**
South Australia							
Metro–Adelaide & Associated Country Areas[1]							
Lower Murray Swamps	57	59	27	9	8	28	35
Country Towns	43	42	41	37	37	38	36
All Other Purposes	452	448	392	354	425	517	266
Total South Australia	**551**	**549**	**460**	**400**	**469**	**583**	**336**
Queensland							
Condamine–Balonne	n/a	n/a	n/a	n/a	n/a	n/a	1,728
Border Rivers–Macintyre Brook	n/a	n/a	n/a	n/a	184	175	601
Moonie	n/a	n/a	12	85	36	76	77
Nebine	n/a	n/a	2	6	5	10	3
Warrego	n/a	n/a	46	77	19	94	94
Paroo	n/a	n/a	2	4	1	2	0
Total Queensland	**0**	**0**	**63**	**172**	**245**	**357**	**2,503**
Australian Capital Territory[2]	38	40	51	27	30	29	29
Total Basin	**7,837**	**9,781**	**4,525**	**4,549**	**4,219**	**5,755**	**9,526**

1. See appendix F.
2. ACT has yet to develop a Cap model. No model target was available for 2010–11.The past targets worked out from an Authority model has been recognised as part of the Cap agreement for the ACT.

Appendix C: Cap Register—Annual Diversions (GL)

System	1997–98	1998–99	1999–00	2000–01	2001–02	2002–03	2003–04
New South Wales							
Intersecting Streams	3	3	3	3	3	3	3
Border Rivers	211	192	206	257	208	147	129
Gwydir	566	340	481	458	496	272	203
Namoi–Peel	340	357	385	390	398	329	208
Macquarie–Castlereagh–Bogan	442	396	437	522	597	411	219
Barwon–Darling–Lower Darling	266	428	260	487	202	127	293
Lachlan	429	293	301	423	457	253	59
Murrumbidgee	2,585	2,505	1,875	2,747	2,348	1,793	1,775
Murray	1,890	2,000	1,234	2,070	2,113	879	1,312
Total NSW	**6,733**	**6,513**	**5,183**	**7,356**	**6,823**	**4,213**	**4,200**
Victoria							
Goulburn–Broken–Loddon cap valley	1,909	1,699	1,553	1,569	1,700	1,076	1,596
Campaspe	105	83	80	112	129	85	80
Wimmera–Mallee	184	159	103	68	84	60	66
Murray–Kiewa–Ovens Cap valley	1,743	1,804	1,555	1,712	1,916	1,755	1,478
Total Victoria	**3,941**	**3,745**	**3,292**	**3,461**	**3,829**	**2,976**	**3,219**
South Australia							
Metro–Adelaide & Associated Country Areas	153	153	139	104	82	165	82
Lower Murray Swamps	92	91	90	89	90	89	67
Country Towns	35	36	37	38	36	39	35
All Other Purposes	384	409	377	431	413	443	423
Total South Australia	**664**	**689**	**642**	**662**	**621**	**736**	**607**
Queensland							
Condamine–Balonne	545	467	366	360	162	123	575
Border Rivers–Macintyre Brook	186	123	163	288	163	78	204
Moonie	8	8	8	31	6	6	26
Nebine	0	0	0	0	0	0	0
Warrego	2	10	3	9	10	7	11
Paroo	0	0	0	0	0	0	0
Total Queensland	**741**	**609**	**541**	**688**	**341**	**214**	**815**
Australian Capital Territory	44	23	27	34	36	40	28
Total Basin	**12,123**	**11,580**	**9,684**	**12,201**	**11,650**	**8,180**	**8,870**

Appendix C: Cap Register—Annual Diversions (GL) continued

System	2004–05	2005–06	2006–07	2007–08	2008–09	2009–10	2010–11
New South Wales							
Intersecting Streams	3	3	3	3	3	3	3
Border Rivers	134	162	155	141	146	131	192
Gwydir	199	264	173	123	187	91	271
Namoi–Peel	225	269	201	177	223	205	270
Macquarie–Castlereagh–Bogan	102	224	252	75	106	112	183
Barwon–Darling–Lower Darling	186	199	17	221	159	150	123
Lachlan	36	128	66	46	40	26	90
Murrumbidgee	1,618	2,200	960	515	602	910	1,461
Murray	1,241	1,667	602	244	341	439	689
Total NSW	**3,744**	**5,116**	**2,430**	**1,544**	**1,807**	**2,067**	**3,283**
Victoria							
Goulburn–Broken–Loddon cap valley	1,553	1,592	651	684	628	804	544
Campaspe	41	21	14	24	27	26	18
Wimmera–Mallee	50	60	19	45	11	9	10
Murray–Kiewa–Ovens Cap valley	1,493	1,578	1,406	801	837	971	563
Total Victoria	**3,137**	**3,252**	**2,090**	**1,553**	**1,504**	**1,810**	**1,136**
South Australia							
Metro–Adelaide & Associated Country Areas	72	74	203	89	150	57	56
Lower Murray Swamps	57	59	27	15	10	14	14
Country Towns	39	40	41	37	37	38	34
All Other Purposes	453	417	355	282	288	371	257
Total South Australia	**620**	**590**	**626**	**423**	**485**	**480**	**361**
Queensland							
Condamine–Balonne	167	186	57	776	190	1,049	1,064
Border Rivers–Macintyre Brook	192	125	71	210	157	122	421
Moonie	23	2	9	41	29	43	29
Nebine	0	0	0	0	0	1	0
Warrego	11	3	21	23	6	15	11
Paroo	0	0	2	4	1	2	0
Total Queensland	**392**	**316**	**160**	**1,054**	**383**	**1,232**	**1,525**
Australian Capital Territory	27	32	25	16	19	17	6
Total Basin	**7,921**	**9,306**	**5,331**	**4,590**	**4,197**	**5,606**	**6,311**

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

System	Long Term Cap	Schedule E Trigger	1997–98	1998–99	1999–00	2000–01	2001–02	2002–03	2003–04
New South Wales									
Intersecting Streams	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Border Rivers	221	-44	61	31	13	-20	106	3	44
Gwydir	350	-70	71	-37	52	-111	-39	197	-18
Namoi–Peel	364	-73	27	-7	-5	-16	-30	-19	39
Macquarie–Castlereagh–Bogan	492	-98	-57	196	-26	53	-20	-148	51
Barwon–Darling–Lower Darling	331	-66	-29	92	68	12	11	22	-83
Lachlan	335	-67	-2	30	-14	-47	-11	-4	36
Murrumbidgee	2,358	-472	-28	45	143	-32	324	298	36
Murray	1,908	-382	-69	76	586	-64	-223	-486	219
Total NSW	**6,359**	**-1,272**	**-26**	**427**	**816**	**-223**	**119**	**-138**	**324**
Victoria									
Goulburn–Broken–Loddon cap valley	2,034	-407	76	-46	36	110	-114	-71	26
Campaspe	122	-24	23	1	0	-4	-17	3	3
Wimmera–Mallee	159	-32	-32	-4	10	-5	-5	-4	-3
Murray–Kiewa–Ovens Cap valley	1,702	-340	110	-83	39	46	-83	150	157
Total Victoria	**4,017**	**-803**	**176**	**-131**	**85**	**147**	**-218**	**77**	**183**
South Australia									
Metro–Adelaide & Associated Country Areas[1]			128	84	74	109	31	31	111
Lower Murray Swamps	94	-19	0	0	0	0	0	0	0
Country Towns	50	-10	15	14	13	12	3	0	5
All Other Purposes	450	-90	28	36	73	43	44	45	72
Total South Australia	**594**	**-119**	**171**	**134**	**161**	**164**	**78**	**75**	**188**
Queensland									
Condamine–Balonne	729	-146	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Border Rivers–Macintyre Brook	245	-49	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Moonie	33	-7	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Nebine	3	-1	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Warrego	39	-8	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Paroo	0	0	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Total Queensland	**1,049**	**-210**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
Australian Capital Territory[2]	40	-8	8	17	10	0	0	10	16
Total Basin	**12,060**	**-2,412**	**329**	**447**	**1,072**	**88**	**-21**	**25**	**711**

1. Metro Adelaide has a five-year rolling Cap of 650 GL and does not accumulate Cap credit.
2. ACT has yet to develop a Cap model. No model target (hence any cap credit) was available for 2010–11.The past credits worked out from an Authority model has been recognised as part of the Cap agreement for the ACT.

Appendix D: Cap Register—Annual Cap Credits (GL) continued

System	Long Term Cap	Schedule E Trigger	2004–05	2005–06	2006–07	2007–08	2008–09	2009–10	2010–11
New South Wales									
Intersecting Streams	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Border Rivers	221	-44	75	28	-71	31	12	14	48
Gwydir	350	-70	-7	83	-64	-15	44	15	111
Namoi–Peel	364	-73	63	59	-36	20	16	30	111
Macquarie–Castlereagh–Bogan	492	-98	80	165	-132	144	39	1	409
Barwon–Darling–Lower Darling	331	-66	-33	24	6	-35	9	-21	173
Lachlan	335	-67	23	40	20	50	21	32	29
Murrumbidgee	2,358	-472	-242	259	116	327	26	-244	-372
Murray	1,908	-382	185	23	-392	94	-56	400	289
Total NSW	**6,359**	**-1,272**	**144**	**681**	**-554**	**616**	**111**	**227**	**799**
Victoria									
Goulburn–Broken–Loddon cap valley	2,034	-407	90	-2	-20	88	-40	322	721
Campaspe	122	-24	40	26	6	21	21	21	41
Wimmera–Mallee	159	-32	19	-25	-1	-7	11	23	33
Murray–Kiewa–Ovens Cap valley	1,702	-340	78	148	3	139	65	320	648
Total Victoria	**4,017**	**-803**	**227**	**147**	**-11**	**241**	**56**	**686**	**1,443**
South Australia									
Metro–Adelaide & Associated Country Areas			187	232	100	164	87	93	95
Lower Murray Swamps	94	-19	0	0	0	-6	-2	14	21
Country Towns	50	-10	4	2	0	0	0	0	1
All Other Purposes	450	-90	-1	31	37	72	136	146	9
Total South Australia	**594**	**-119**	**189**	**265**	**136**	**231**	**221**	**253**	**126**
Queensland									
Condamine–Balonne	729	-146	n/a	n/a	n/a	n/a	n/a	n/a	665
Border Rivers–Macintyre Brook	245	-49	n/a	n/a	n/a	n/a	27	53	180
Moonie	33	-7	n/a	n/a	3	43	7	33	48
Nebine	3	-1	n/a	n/a	2	6	5	9	3
Warrego	39	-8	n/a	n/a	25	54	13	79	82
Paroo	0	0	n/a	n/a	0.15	0.08	0	0	0
Total Queensland	**1,049**	**-210**	**0**	**0**	**31**	**103**	**52**	**174**	**978**
Australian Capital Territory	40	-8	10	8	26	11	11	12	23
Total Basin	**12,060**	**-2,412**	**570**	**1,101**	**-372**	**1,202**	**452**	**1,352**	**3,369**

1. Metro Adelaide has a five–year rolling Cap of 650 GL and does not accumulate Cap credit.
2. ACT has yet to develop a Cap model. No model target (hence any cap credit) was available for 2010–11.The past credits worked out from an Authority model has been recognised as part of the Cap agreement for the ACT.

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

System	Long Term Cap	Schedule E Trigger	1997–98	1998–99	1999–00	2000–01	2001–02	2002–03	2003–04
New South Wales									
Intersecting Streams	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Border Rivers	221	-44	61	93	105	86	192	195	239
Gwydir	350	-70	71	34	86	-25	-63	133	115
Namoi–Peel	364	-73	27	20	15	-1	-31	-50	-11
Macquarie–Castlereagh–Bogan	492	-98	-57	139	113	167	147	-2	49
Barwon–Darling–Lower Darling	331	-66	-29	63	130	142	154	176	93
Lachlan	335	-67	-2	28	15	-32	-43	-47	-11
Murrumbidgee	2,358	-472	-28	17	160	128	452	750	787
Murray	1,908	-382	-69	6	592	528	306	-180	38
Total NSW	**6,359**	**-1,272**	**-26**	**401**	**1,217**	**993**	**1,113**	**975**	**1,299**
Victoria									
Goulburn–Broken–Loddon cap valley	2,034	-407	76	30	66	176	63	-8	18
Campaspe	122	-24	23	24	24	20	3	6	9
Wimmera–Mallee	159	-32	-32	-36	-27	-32	-37	-41	-44
Murray–Kiewa–Ovens Cap valley	1,702	-340	110	27	66	113	30	179	336
Total Victoria	**4,017**	**-803**	**176**	**45**	**130**	**277**	**59**	**136**	**319**
South Australia									
Metro–Adelaide & Associated Country Areas			128	84	74	109	31	31	111
Lower Murray Swamps	94	-19	0	0	0	0	0	0	0.0
Country Towns	50	-10	15	28	42	54	56	56	61
All Other Purposes	450	-90	28	64	137	180	224	269	341
Total South Australia	**594**	**-119**	**171**	**176**	**253**	**343**	**312**	**356**	**513**
Queensland									
Condamine–Balonne	729	-146	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Border Rivers–Macintyre Brook	245	-49	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Moonie	33	-7	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Nebine	3	-1	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Warrego	39	-8	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Paroo	0	0	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Total Queensland	**1,049**	**-210**	**0**	**0**	**0**	**0**	**0**	**0**	**0.0**
Australian Capital Territory	40	-8	8	26	36	36	37	47	63
Total Basin	**12,060**	**-2,412**	**329**	**648**	**1,635**	**1,649**	**1,520**	**1,514**	**2,194**

1. Metro Adelaide has a five-year rolling Cap of 650 GL and does not accumulate Cap credit.
2. Caps for Moonie Warrego, Paroo and Nebine are annual and do not accumulate Cap credit
3. ACT has yet to develop a Cap model. No model target (hence any cap credit) was available for 2010–11.The past cumulative credits worked out from an Authority model has been recognised as part of the Cap agreement for the ACT.

Appendix E: Cap Register—Cumulative Cap Credits (GL) continued

System	Long Term Cap	Schedule E Trigger	2004–05	2005–06	2006–07	2007–08	2008–09	2009–10	2010–11
New South Wales									
Intersecting Streams	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Border Rivers	221	-44	314	342	271	302	313	328	375
Gwydir	350	-70	108	191	127	112	156	171	282
Namoi–Peel	364	-73	52	110	74	94	110	140	251
Macquarie–Castlereagh–Bogan	492	-98	130	294	162	307	346	347	757
Barwon–Darling–Lower Darling	331	-66	60	84	90	54	63	42	215
Lachlan	335	-67	12	52	72	122	143	174	204
Murrumbidgee	2,358	-472	545	804	920	1,247	1,274	1,030	658
Murray	1,908	-382	223	246	-146	-52	-108	292	580
Total NSW	**6,359**	**-1,272**	**1,442**	**2,123**	**1,569**	**2,185**	**2,296**	**2,524**	**3,323**
Victoria									
Goulburn–Broken–Loddon cap valley	2,034	-407	107	105	86	174	133	456	1,177
Campaspe	122	-24	49	75	81	102	123	143	184
Wimmera–Mallee	159	-32	-25	-50	-51	-57	-47	-24	9
Murray–Kiewa–Ovens Cap valley	1,702	-340	414	562	565	704	769	1,089	1,737
Total Victoria	**4,017**	**-803**	**545**	**692**	**681**	**922**	**978**	**1,664**	**3,107**
South Australia									
Metro–Adelaide & Associated Country Areas			187	233	100	164	87	93	95
Lower Murray Swamps	94	-19	0	0	0	-6	-8	6	27
Country Towns	50	-10	65	67	67	67	67	67	69
All Other Purposes	450	-90	340	371	407	480	616	762	771
Total South Australia	**594**	**-119**	**592**	**670**	**574**	**705**	**762**	**928**	**961**
Queensland									
Condamine–Balonne	729	-146	n/a	n/a	n/a	n/a	n/a	0.0	665
Border Rivers–Macintyre Brook	245	-49	n/a	n/a	n/a	0	27	80	260
Moonie	33	-7	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Nebine	3	-1	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Warrego	39	-8	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Paroo	0	0	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Total Queensland	**1,049**	**-210**	**0**	**0**	**0**	**0**	**27**	**80**	**925**
Australian Capital Territory	40	-8	73	81	107	118	129	141	164
Total Basin	**12,060**	**-2,412**	**2,653**	**3,567**	**2,932**	**3,931**	**4,194**	**5,337**	**8,480**

1. Metro Adelaide has a five-year rolling Cap of 650 GL and does not accumulate Cap credit.
2. Caps for Moonie Warrego, Paroo and Nebine are annual and do not accumulate Cap credit.
3. ACT has yet to develop a Cap model. No model target (hence any cap credit) was available for 2010–11.The past cumulative credits worked out from an Authority model has been recognised as part of the Cap agreement for the ACT.

Appendix F: Cap Register for Metropolitan Adelaide

Year	South Australia—Metropolitan Adelaide Diversion	Gross Metro–Adelaide & Associated Country Areas (rolling 5–year Cap is 650 GL)	First Use License	Net Metro–Adelaide & Associated Country Areas (rolling 5–year Cap is 650 GL)
1997–98	*Annual Diversion*	153	0	153
	Diversion—5 Years to 1997–98	555	0	555
1998–99	*Annual Diversion*	153	0	153
	Diversion—5 Years to 1998–99	598	0	598
1999–00	*Annual Diversion*	139	0	139
	Diversion—5 Years to 1999–00	577	0	577
2000–01	*Annual Diversion*	104	0	104
	Diversion—5 Years to 2000–01	614	0	614
2001–02	*Annual Diversion*	82	12	70
	Diversion—5 Years to 2001–02	631	12	619
2002–03	*Annual Diversion*	165	11	154
	Diversion—5 Years to 2002–03	642	23	619
2003–04	*Annual Diversion*	82	9	73
	Diversion—5 Years to 2003–04	572	32	539
2004–05	*Annual Diversion*	72	9	63
	Diversion—5 Years to 2004–05	504	41	463
2005–06	*Annual Diversion*	74	16	58
	Diversion—5 Years to 2005–06	475	57	418
2006–07	*Annual Diversion*	203	0	203
	Diversion—5 Years to 2006–07	595	45	550
2007–08	*Annual Diversion*	89	0	89
	Diversion—5 Years to 2007–08	520	34	486
2008–09	*Annual Diversion*	150	0	150
	Diversion—5 Years to 2008–09	588	25	563
2009–10	*Annual Diversion*	57	0	57
	Diversion—5 Years to 2009–10	573	16	557
2010–11	*Annual Diversion*	56	0	56
	Diversion—5 Years to 2010–11	555	0	555

Appendix G: Cap Register—Annual Cap Adjustments (GL) for Environmental Use

System	2004–05	2005–06	2006–07	2007–08	2008–09	2009–10	2010–11
New South Wales							
Intersecting Streams	0	0	0	0	0	-16	0
Border Rivers	0	0	0	0	0	0	0
Gwydir	0	0	0	0	0	0	-17
Namoi–Peel	0	0	0	0	0	0	0
Macquarie–Castlereagh–Bogan	0	0	0	-1	0	-4	-60
Barwon–Darling–Lower Darling	0	0	0	0	-11	-22	-209
Lachlan	0	0	0	0	0	0	-12
Murrumbidgee	0	-20	-20	-5	-13	-92	-334
Murray	0	-2	0	0	-3	-12	-359
Total NSW	**0**	**-22**	**-20**	**-6**	**-28**	**-146**	**-991**
Victoria							
Goulburn–Broken–Loddon cap valley	-18	-16	-4	-9	-7	-16	-27
Campaspe	0	0	0	0	0	0	0
Wimmera–Mallee	-7	-3	-7	-3	-3	-17	-44
Murray–Kiewa–Ovens Cap valley	-8	-7	-7	-12	-24	-43	-101
Total Victoria	**-34**	**-26**	**-18**	**-25**	**-35**	**-75**	**-172**
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 Purposes	0	0	0	-1	-50	-83	-70
Total South Australia	**0**	**0**	**0**	**-1**	**-50**	**-83**	**-70**
Queensland							
Condamine–Balonne	0	0	0	0	0	0	0
Border Rivers–Macintyre Brook	0	0	0	0	0	0	-6
Moonie	0	0	0	0	0	0	0
Nebine	0	0	0	0	0	0	0
Warrego	0	0	0	0	0	0	0
Paroo	0	0	0	0	0	0	0
Total Queensland	**0**	**0**	**0**	**0**	**0**	**0**	**-6**
Australian Capital Territory	0	0	0	0	0	0	0
Total Basin	**-34**	**-47**	**-38**	**-32**	**-112**	**-304**	**-1,238**

Appendix H: Cap Register—Difference in Cumulative Cap Credits between Cap Register 2009–10 and Cap Register 2010–11 (GL)

System	Cumulative Cap Credit upto year 2009–10 in WAM Report 2009–10	Cumulative Cap Credit upto year 2009–10 in WAM Report 2010–11	Difference in Cumulative Cap Credit	Difference due to			
				Model Cap Targets	Cap Adjustment for Trade	Cap Adjustment for Environment	Diversions
New South Wales							
Intersecting Streams	n/a	n/a	n/a	0	0	0	0
Border Rivers	n/a	327	n/a	2,144	0	0	128
Gwydir	170	171	1	439	0	0	438
Namoi–Peel	222	140	-82	372	0	0	454
Macquarie–Castlereagh–Bogan	336	347	11	14	0	0	3
Barwon–Darling–Lower Darling	-4	42	46	46	0	0	0
Lachlan	163	174	11	5	0	0	-7
Murrumbidgee	1,170	1,030	-141	-140	0	-1	0
Murray	662	292	-370	-370	0	0	0
Total NSW	**2,719**	**2,524**	**-523**	**366**	**0**	**-1**	**889**
Victoria							
Goulburn–Broken–Loddon cap valley	446	456	10	10	0	0	0
Campaspe	146	143	-3	42	0	0	44
Wimmera–Mallee	157	-24	-181	-10	0	-171	0
Murray–Kiewa–Ovens Cap valley	1,075	1,089	14	14	0	0	0
Total Victoria	**1,824**	**1,664**	**-160**	**56**	**0**	**-171**	**44**
South Australia							
Metro–Adelaide & Associated Country Areas	93	93	0	0	0	0	0
Lower Murray Swamps	6	6	0	0	0	0	0
Country Towns	67	67	0	0	0	0	0
All Other Purposes	762	762	0	0	0	0	0
Total South Australia	**928**	**928**	**0**	**0**	**0**	**0**	**0**
Queensland							
Condamine–Balonne	n/a	0	n/a	0	0	0	0
Border Rivers–Macintyre Brook	80	80	0	0	0	0	0
Moonie	n/a	n/a	n/a	0	0	0	0
Nebine	n/a	n/a	n/a	0	0	0	0
Warrego	n/a	n/a	n/a	0	0	0	0
Paroo	n/a	n/a	n/a	0	0	0	0
Total Queensland	**80**	**80**	**0**	**0**	**0**	**0**	**0**
Australian Capital Territory	141	**141**	**0**	0	0	0	0
Total Basin	**5,692**	**5,337**	**-683**	**422**	**0**	**-173**	**933**

Australian Government