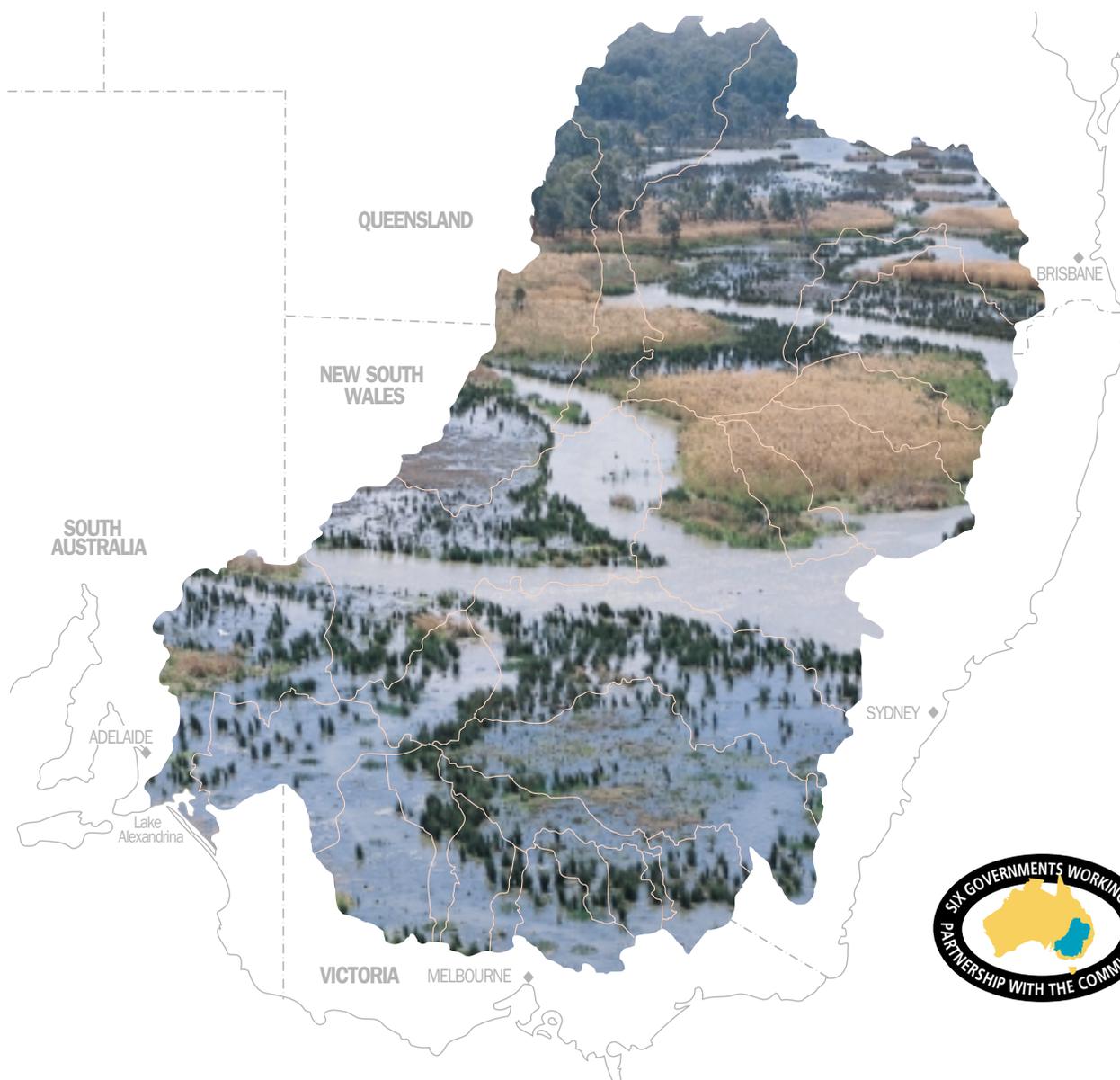




Review of Cap Implementation 1998/99

Report of the Independent Audit Group

*Including Responses by
the Five State and
Territory Governments*



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Independent Audit Group Members

Dr Wally Cox (Chair)

Paul Baxter

NOVEMBER 1999

Acknowledgments

The Independent Audit Group appreciated the cooperation of State Government agencies and the Murray-Darling Basin Commission.

The implementation of the Cap has not been without difficulty and has challenged the ingenuity and resources of Government administrators.

Information continues to be freely provided and the issues and the options for resolving them were discussed openly.



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Murray-Darling Basin Commission
GPO Box 409, Canberra ACT 2601
Tel: (02) 6279 0100
Fax: (02) 6248 8053
E-mail: info@mdbc.gov.au
Web Site: <http://www.mdbc.gov.au>

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Auditors' Foreword

November 1999

The Hon Warren Truss MP
Chairman
Murray-Darling Basin Ministerial Council
Parliament House
CANBERRA ACT 2600

Dear Minister

We have pleasure in submitting to you our 'Review of Cap Implementation 1998/99'.

Using draft Schedule F criteria the Lachlan and Barwon-Darling Rivers have breached the 20% trigger and a formal report to Council by New South Wales is now suggested.

Diversions in 1998/99 were within long term Cap targets in South Australia and within the climate adjusted Caps for the Goulburn/Broken, Murray/Ovens/Kiewa and Campaspe systems in Victoria, and the Murray, Macquarie, Namoi, Gwydir systems in New South Wales. The Murrumbidgee exceeded the climate adjusted Cap in 1998/99 but did not reach the 20% trigger.

The WAMPs for the Border Rivers and Condamine-Balonne are significantly behind schedule and are the subject of recommendations in our report.

The Water Management Plans for the Warrego/Paroo/Nebine and Moonie Rivers are expected to be completed by 30 June 2000.

Yours sincerely



DR WALLY COX
Chairman



PAUL BAXTER
Member





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Executive Summary

1998/99 was the second year of formal Cap implementation. Council has agreed to adopt Schedule F on a pilot basis for operationalising, monitoring and reporting on Cap implementation.

The IAG conducted its 1998/99 audit using draft Schedule F and the intent behind it. The ACT was included in the 1998/99 audit for the first time.

Implementation of the Cap has been more complex and resource demanding than expected by a number of the States.

The IAG is of the view that each Government should review the resources being provided to Cap implementation, particularly in those areas where the timetable for implementation has not been met.

Growth in on-farm storages in the Barwon-Darling, Border Rivers and Condamine-Balonne suggest that urgent management responses are required to establish diversion limits to ensure Cap objectives are achieved.

Total Basin diversions in 1998/99 were 11,201 GL compared with 11,924 GL in 1997/98.

The conclusions and recommendations reached by the Audit Group for the 1998/99 year by State and Territory are:

South Australia

- Diversion in 1998/99 was within the Cap.
- South Australia has a reliable system of measurement for urban and irrigation use (rehabilitated areas).
- There are proposals to further improve reliability of measurement in the lower Murray and in non-rehabilitated areas.
- Models in preparation to compare seasonal water use for irrigation and the climate adjusted Cap should be finalised in 1999/2000.
- The Cap for pumped irrigation in South Australia should be set at 440.6 GL rather than 90% of 489.6 GL. This is the same absolute number but a more appropriate description. It includes private industrial, recreation, environmental and stock and domestic water.
- A system of water management including allocation and measurement is under development for the lower Murray. This may lead to a request by South Australia to review the Cap figure of 83.4 GL (Note that the lower Murray Swamp Cap has reduced

to 77.8 GL and the pumped irrigation Cap has increased to 446.2 GL as a result of permanent intrastate trade).

- The South Australian country towns Cap should remain at 50 GL with no trade of this entitlement until the report currently in preparation is completed.
- A management framework should be developed to ensure long term Cap compliance for pumped irrigation.

Victoria

- Diversions from the Murray and Goulburn systems in 1998/99 were 1% above climate adjusted Cap targets and are within acceptable bounds for Cap management.
- Cumulative diversions in 1997/98 and 1998/99 are 160 GL in credit.
- Substantial progress has been made in developing climate-adjusted models and implementing management frameworks to achieve Cap compliance.
- Victoria has a reliable monitoring and reporting system in place for regulated valleys.
- Bulk water entitlements need to be finalised for the Ovens, Broken, and Loddon Basins and the Wimmera-Mallee system.

New South Wales

- Estimated diversions in 1998/99 were 6,275 GL compared to 6,580 GL in 1997/98.
- Resource constraints within the Department of Land and Water Conservation have affected Cap implementation, particularly the development of IQQM models to establish climate adjusted annual Cap targets.
- No analytical models have been approved yet for the estimation of annual Cap targets under Schedule F.
- Diversions in 1998/99 exceeded the annual climate adjusted Cap for the Murrumbidgee.
- Although 1998/99 Cap targets are not yet available for the Lachlan and Barwon-Darling, diversions in those valleys in 1998/99 exceeded the long term Cap estimates.
- No annual Cap targets are available for the northern rivers for 1998/99 because the water year in those valleys has not finished.
- On the basis of their 1997/98 diversions, the reporting provisions of the draft Schedule F have been triggered for the Lachlan and Barwon-Darling valleys.



- Crop areas within a number of valleys have shown significant growth since 1993/94. This may cause future triggering of the Cap when IQQM climate adjusted Caps have been established.
- The Barwon-Darling IQQM indicates that, with current development, long-term diversions in that valley would exceed the long-term Cap.
- The introduction of environmental flow rules across most valleys is noted. However, on the basis of one year's experience and the wet conditions that applied across these valleys in 1998/99, it is difficult to judge whether these rules will be effective in achieving compliance with the Cap.
- It is recommended that additional resources be dedicated to developing and validating IQQM models for the major valleys to establish climate adjusted Caps and a basis for managing available water resources.
- It is recommended that within the spirit of the draft Schedule F, New South Wales should report on the underlying reasons for excessive diversions on the Lachlan and Barwon-Darling including management actions proposed to bring diversions within Cap limits.
- This recommendation applies to both NSW and Queensland.

It is recommended that New South Wales and Queensland negotiate an agreement for the management of the Border Rivers Flow Management Plan including establishment of objectives, principles, process and deadlines for achievement of outcomes and report to the next Council meeting.

Queensland

- Diversions of an estimated 600 GL in 1998/99 compared with 740 GL for 1997/98.
- The draft WMPs for the Warrego/Paroo/Nebine and Moonie are expected to be available in early 2000 and the final plans by June 2000.
- It is not possible to provide dates for the finalisation of WAMPs for the Condamine-Balonne and Border Rivers.
- The draft Environmental Flow Technical Report of the Condamine-Balonne indicates that, under 1997 flow and development conditions, significant parts of the river, particularly the lower Balonne, are impacted.

- There has been further significant growth in on-farm storages.
- It is recommended that diversions by individual licence holders be Capped at 1997/98 levels until the WAMPs are finished.
- It is recommended that a moratorium be placed on additional floodplain harvesting.
- This recommendation applies to both NSW and Queensland.

It is recommended that New South Wales and Queensland negotiate an agreement for the management of the Border Rivers Flow Management Plan including establishment of objectives, principles, process and deadlines for achievement of outcomes and report to the next Council meeting.

- It is recommended that urgent action be taken to establish a regulatory environment that would enable Cap implementation including appropriate controls over floodplain water harvesting.
- It is recommended that the WAMP process be modified to:
 - Clarify the steps in the WAMP process;
 - Publish a catchment-wide audit of current arrangements at an early stage of the process;
 - Structure the planning process to provide government an opportunity to make in principle decisions on the basis of audit information; and
 - Establish an independent audit group to review and provide advice to government on the planning outcomes of each WAMP. Such a group could possibly be comprised of three eminent people sourced from the water industry, business and academic sectors.

Australian Capital Territory

- No Cap presently exists for the ACT.
- The IAG, having examined the options under consideration by the ACT and on the basis of the principles applying to other parts of the Basin and taking into account equity:
 - considers that Options 1 and 4 would not meet the six principles or 'tests' used to set the Cap in the other jurisdictions; and
 - recommends that the ACT brings forward a considered proposal on the Cap in the context of these six principles

as part of the forthcoming Five-year Review of the Operation of the Cap.

- For a Cap to be effective in the ACT, the ACT must have access to a broader water trading environment. It is therefore recommended that, as a matter of urgency, the arrangements for water trading between the ACT and NSW be agreed at the same time as the formal adoption of the Cap.
- As an example of the assessments that might be made in the future, the 1998/99 diversion was compared with the diversion expected under Option 2 and was found to be well below the Option 2 target.
- The ACT will need to consider its reporting arrangements to the Commission. Schedule F could be readily applied against a climate-adjusted model of the ACT's consumption levels.

General

The reporting provisions of the draft Schedule F have been triggered for the following New South Wales Valleys:

- Lachlan
- Barwon-Darling

To ensure a robust and transparent process it is therefore appropriate that reports be sought for these valleys from the appropriate contracting Government on the management response that will ensure Cap compliance in future years.

The reports should be provided to both the Commission and Council in accordance with the spirit of the draft Schedule F provisions.

It is the strongly held view of the IAG that unless an open and transparent process is continued then there will be a lack of confidence in Cap implementation.

The IAG also notes that the holding of the audit process in August/September each year comes before the completion of the irrigation year in the northern rivers in the Basin. Accordingly it is proposed that in future, the audit should be undertaken in late November to allow completion of diversion estimates for all valleys in the Basin.

The Murray-Darling Basin Commission was advised by New South Wales on 16 December 1999 that the Cap estimates and diversion record for 1997/98 for the New South Wales Lachlan Valley were incorrect. The revised data indicate that diversions in this valley would not have triggered the reporting provisions of the draft Schedule F.

The Lachlan Valley, along with the Barwon-Darling, is due to be the subject of a supplementary audit by the IAG in February 2000. The revised data produced by New South Wales will be considered by the IAG at this time.





1. Introduction

In November 1996, the Independent Audit Group (IAG) submitted its report 'Setting the Cap' (the IAG Report) to the Murray-Darling Basin Ministerial Council (the "Council"). This report addressed a number of issues arising out of the Council's decision to introduce an immediate moratorium on further increases in diversions of water from the rivers of the Murray-Darling Basin and Cap the future level of diversions.

The Council agreed that the IAG should have an ongoing role in auditing the implementation of the Cap.

Council has indicated to the IAG that it is important that an assessment be made of compliance with the Cap to ensure an accountable and transparent process is in place. While preliminary monitoring data is available for all streams, the final hydrographic data used for the formal reporting will not be completed until later this year. The IAG in carrying out this assessment has done so by reviewing with each State their arrangements for Cap implementation.

Council has also asked the IAG to review the Queensland Water Allocation and Management Planning (WAMP) process, and in time the outcomes of the process. This process, which involves significant community participation in

both Queensland and northern NSW, was due for completion about the middle of 1998 but has been delayed. It will be the foundation for determining the balance in Queensland between consumptive and instream use and Council has supported the auditing of both the process and outcomes.

Thus the Review of Cap Implementation 1998/99 by the IAG has been prepared in response to Council's request and is based upon information made available to the IAG by each of the States and the ACT. The report sets out the broad background to the review and the process used by the IAG in forming its views and final conclusions. It then comments on the current status of compliance with the Cap in each of the five jurisdictions involved. It should be noted that the ACT has been included in the audit process for the first time and that Cap targets for the ACT are still to be established.

The IAG team wishes to thank all States and the ACT for their cooperation in making both the data and officers available and for the open and frank way in which the review was conducted. The IAG also wishes to acknowledge the assistance provided by the officers of the Murray-Darling Basin Commission (MDBC) in the preparation of this report. The views expressed however are entirely those of the Independent Audit Group.





2. Background

The MDBMC at its June 1995 meeting decided to introduce a Cap on diversion of water from the Murray-Darling Basin. A Cap on the volume of diversions associated with the 1993/94 level of development was seen as an essential first step in establishing management systems to achieve healthy rivers and sustainable consumptive uses.

The two primary objectives driving the decisions to implement the Cap were:

1. to maintain and, where appropriate, improve existing flow regimes in the waterways of the Murray-Darling Basin to protect and enhance the riverine environment; and
2. to achieve sustainable consumptive use by developing and managing Basin water resources to meet ecological, commercial and social needs.

The November 1996 report of the IAG sought to resolve a number of practical and equity issues arising out of Council's decision to adopt the Cap. The Council agreed with all but four of the forty-nine recommendations in the 1996 IAG Report. The others were accepted at the July 1997 meeting of Council in modified form.

Significantly, the Council agreed with the definition of the Cap and the proposed implementation arrangements to be adopted in each of the then four main jurisdictions.

The adopted definition of the Cap on diversions, leaving aside equity issues, is:

'The Cap is the volume of water that would have been diverted under 1993/94 levels of development.'

'In unregulated rivers this Cap may be expressed as an end-of-valley flow regime.'

within the following criteria:

- to protect water quality and preserve the health of the river system, the Cap should ensure there is no net growth in diversions from the Murray-Darling Basin;
- the level of development against which to test for growth in water diversions be equivalent to 1993/94 levels of development;
- under the Cap, the amount of water that States would be entitled to divert from regulated streams in any year would be quantified using analytical models that incorporate weather conditions and which take into account:

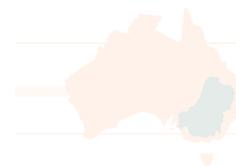
- the water supply infrastructure in place in 1993/94;
- the water allocation and system operating rules which applied in 1993/94;
- the entitlements that were allocated and the extent of their utilisation at 1993/94 levels of development;
- the underlying level of demand for water in 1993/94; and
- the system operating efficiency in 1993/94; and
- in unregulated rivers, end-of-valley flows may be used to define the Cap using analytical models incorporating the same points as above.

The Council also acknowledged that:

- for South Australia, Victoria, and New South Wales, Cap management will be in accordance with the agreed outcomes as specified by the Cap definition above;
- for the ACT the Cap will be defined following a review by the IAG and negotiations with the ACT Government; and
- for Queensland, any final agreement for the targeted outcomes will need to await the completion of the WAMP process being undertaken by that State, the outcome of which will be subject to consideration by Council.

For Queensland, Council has agreed that the WAMP process should ensure that Queensland balances consumptive and instream use. The IAG has supported the WAMP process noting that:

- it must accommodate instream use not only in Queensland but also in the Border Rivers under the control of the Border Rivers Commission and the rest of the Murray-Darling Basin;
- a management regime needs to be developed that includes pricing, property rights and measuring and reporting;
- the WAMP be fully implemented, including assessment of downstream impacts in NSW;
- the Precautionary Principle be applied through the establishment of an allocation to be held in reserve to minimise the risk of over allocation for consumptive use; and
- the final independent audit of the WAMP process is conducted, including modelling of impacts on downstream Basin flows.



After considering a number of equity issues, the Cap may be adjusted for certain additional developments, which occurred after 1993/94.

The Cap should restrain diversions, not development. With the Cap in place, new developments should be allowed, provided that the water for them is obtained by improving water use efficiency or by purchasing water from existing developments.

Because irrigation demand varies with seasonal conditions, the diversions permitted under the Cap will vary from year to year. The system used to manage diversions within the Cap will therefore need to be flexible.

For unregulated rivers with high seasonal variability, the Cap may be described in terms of end-of-valley flows and supporting flow management rules including diversion entitlements.

The **1997/98** Review of Cap Implementation identified that:

- significant progress continues to be made in Cap implementation;
- diversions in 1997/98 were below the Cap in South Australia and Victoria;
- in NSW using Schedule F criteria it is likely that the reporting provisions would have been triggered for the following valleys:
 - Murrumbidgee;
 - Lachlan;
 - Barwon-Darling;
 - Border Rivers; and
 - Possibly in the Gwydir and Namoi.
- the Queensland WAMPs for the Condamine-Balonne and Border Rivers were unlikely to be available before June and December 1999 respectively; and
- the draft WMPs for the Warrego/Paroo/Nebine and Moonie are unlikely to be completed until June 1999.

In our April 1999 interim audit of the Queensland WAMP and WMP process we indicated that the final WAMPs and WMPs were unlikely to be finalised before 30 June 2000 and draft reports would be available for Council between January and June 2000.

3. Audit Process

For the purposes of this 1998/99 audit of progress with the implementation of the Cap, the IAG has adopted a consultative approach designed to:

- clarify expected Cap outcomes for each State;
- gather available statistical information on actual levels of diversions in 1998/99 as a means of quantifying overall diversions and making some preliminary observations in terms of Cap compliance;
- identify progress made in implementing the proposed management rules for Capping water diversions;
- highlight particular problems being encountered by the relevant jurisdictions as regards the finalisation or implementation of the management rules; and
- update the status of the Queensland WAMPs and WMPs.

The ACT was included in the audit process for the first time in 1998/99.

The IAG met with representatives of each of the States and the ACT during the period 30 August to 2 September 1999. The format of each

meeting was to compare water usage in 1998/99 with Cap targets, to discuss progress with the establishment of models and management frameworks to achieve targets and to discuss issues of possible concern.

In the case of the ACT, the prime purpose of the meeting was to clarify the ACT's progress in establishing a Cap target and the proposed management framework to achieve this.

The IAG drafted its observations and conclusions on progress being made within each State and the ACT and then invited the States concerned and the ACT to make comments of a factual nature upon the IAG's findings. These observations on factual points were then considered by the IAG prior to finalising the report.

Through the factual review process and the meetings with State representatives, the opportunity has been provided for the States to bring forward additional material, which may be of assistance to the IAG.

While acknowledging the valuable contribution made by each of the States, the ACT and the members of the MDBIC staff, the findings and conclusions presented in this report are entirely those of the IAG.





4. Audit of 1998/99 Cap Implementation

South Australia

• The Cap

As a result of decisions by the Ministerial Council in December 1996 the components of the South Australian Cap are:

- a fixed allocation of 50 GL per year for country towns;
- a five year non tradeable rolling allocation of 650 GL over the five year period (notionally 130 GL per year) for metropolitan Adelaide; and
- an average of 524 GL per year allocation for irrigation including private, industrial, recreation, environment and stock and domestic (524 GL includes 440.6 GL pumped irrigation allocation and 83.4 GL for lower Murray swamps).

• 1998/99 Usage

South Australia in 1998/99 maintained its record of utilising less than the Cap in both the urban and irrigation sectors (**Table 1**) with 73% of the country urban water, 92% of the rolling five year average in Adelaide and 90% of the irrigation water.

• Administration of the Cap

South Australia continues to be well placed to manage the Cap. Water diverted from the Murray River for urban use is reliably measured and licences have now been issued to SA Water

for an allocation of 50 GL per year for country urban water and a non-tradeable 650 GL over a rolling five-year period for Adelaide.

In our 1997/98 IAG report, we recommended that the country urban water supply Cap be reviewed in light of advice that some of the historic water supply data had been included in both the country urban and Adelaide supply data as a result of confusion over water supplied from the Swan Reach pump station.

The IAG have now been advised that the modelling for Metropolitan Adelaide previously conducted was based on correct data and a 99% level of security. The modelling being completed for the Country Urban component has been based on the same philosophy as the Metropolitan modelling and indicates that peak consumption would be in the range of 42 to 52 GL. However, average consumption is in the order of 36 GL. The arrangements for trade are still to be resolved and the IAG await a report from South Australia on this matter. It may be appropriate for it to be considered as part of the 5 year review.

A preliminary study has now been conducted into the relationship between climatic factors and diversion for irrigation purposes. The study shows a good relationship between temperature and water use and on refinement could provide a basis for comparisons between seasonal diversion and Cap targets. It is expected that this modelling will be completed in 1999/2000.



TABLE 1 — South Australia Diversions for 1998/99 (GL)

	<i>Long Term Cap</i>	<i>Adjustments to Cap as a result of permanent and temporary trade</i>	<i>Use</i>	<i>Use as a % of Cap</i>
Adelaide				
— current year			152.9	
— rolling 5 years	650		599.4	92%
Country towns	50 ¹		36.5	73%
Irrigation (includes Private Industrial, recreational, environmental and Stock and Domestic)				
	524	+4.7 ²	476.8	90%
Total	704	4.7	666.2	

¹ Under review

² Preliminary data only

Interstate trading was down in 1998/99 compared to 1997/98 with 3.08 GL of net permanent trades and a preliminary estimate of 1.92 GL of net temporary trades into South Australia. This compares with a net 16.0 GL of temporary entitlements moving out of the State in 1997/98.

South Australia has also proposed that the fixed Cap for pumped irrigation of 440.6 GL be specified, rather than reported as 90% of 489.6 GL. This will avoid confusion in the future with regard to its relationship with individual entitlements. This is supported by the IAG as it increases clarity.

Work continues on developing management systems including measurement for the Murray Swamps. An indicative Cap target of 83.4 GL was set for the lower Murray Swamps. This has been reduced to 77.8 GL and the Cap for pumped irrigation has been increased to 446.2 GL as a result of permanent trading. Recent work suggests that the actual historic usage figure for the lower Murray swamps could have been higher and South Australia proposes to address this matter, perceived as an equity issue, as part of the Cap Review.

Information was provided to the IAG that while water use is within Cap limits there was an underlying rising trend in water use in the irrigation areas. In parallel with modelling for climate adjusted seasonal comparisons with the Cap, the IAG encourages South Australia to consider the necessary policy response to prevent possible breaches of the Cap in the future.

South Australia, through SA Water, has proposed to transport water from the Murray to other Basins, ie, Barossa Valley, Clare Valley. The IAG supports the accounting of diversions and trades as specified in the Draft Schedule F submitted to Council in May 1999.

- **Monitoring and Reporting**

The IAG were advised that a complete review of historic data had been conducted to ensure a high quality consistent data set for future use by MDBC and South Australia. This data is expected to be made available to MDBC late in 1999.

A modified computer based system for licensing and monitoring of water use will provide the basis for reporting of water use in the future.

Urban consumption and consumption in rehabilitated irrigation areas is reliably metered (97% metered). In non-rehabilitated areas, metering is at the main river pump stations and it is estimated that this exceeds actual extraction.

As a consequence, diversion estimates probably exceed real diversion and further build in conservatism in terms of meeting Cap targets. South Australia continues to make improvements to ensure that the standard of metering of direct diversions is brought to a satisfactory level.

With regard to Adelaide's consumption, the IAG is still of the view that it is desirable to develop a climate-adjusted model to enable early detection of any growth in consumption.

- **Proposals to Refine Implementation in 1999/2000**

South Australia will continue to improve its capacity to manage to Cap targets. In particular it is proposed to finalise a water management and allocation system, including direct measurement of water supply, for the Murray Swamps.

It is also proposed to finalise climate adjusted models for water consumption in the irrigation areas to enable seasonal comparisons of water use and the climate adjusted Cap.

- **IAG Assessment**

Consumption in 1998/99 was within the Cap in both urban and irrigation areas.

South Australia is best placed of all the States to quantify the Cap and reliably report against it.

The information provided by South Australia from modelling of water use for country urban use indicates that for a 99% level of security the long-term average Cap should be in the range of 42 to 52 GL/year. Until the IAG has reviewed the report under development in South Australia, it is not possible to either modify the current Cap of 50 GL or to remove the caveat on trading contained in previous IAG reports (see 1997/98 report).

With diversions now Capped at 440.6 GL/year for pumped irrigation on a climate adjusted basis, a management framework is required to ensure future Cap compliance, given the growth that has occurred in water use.

Reliable consumption measurement is in place for both SA Water and the rehabilitated irrigation areas with improvements projected for the non-rehabilitated and lower Murray irrigation areas.

The IAG commends South Australia for the work that has been done in implementing the Cap and putting in place the necessary administrative framework.

Conclusions/Recommendations

- Diversion in 1998/99 was within the Cap.
- South Australia has a reliable system of measurement for urban and irrigation use (rehabilitated areas).
- There are proposals to further improve reliability of measurement in the lower Murray and in non-rehabilitated areas.
- Models in preparation to compare seasonal water use for irrigation and the climate adjusted Cap should be finalised in 1999/2000.
- The Cap for pumped irrigation in South Australia should be set at 440.6 GL rather than 90% of 489.6 GL. This is the same absolute number but a more appropriate description. It includes private industrial, recreation, environmental and stock and domestic water.
- A system of water management including allocation and measurement is under development for the lower Murray. This may lead to a request by South Australia to review the Cap figure of 83.4 GL (Note that the lower Murray Swamp Cap has reduced to 77.8 GL and the pumped irrigation Cap has increased to 446.2 GL as a result of permanent intrastate trade).
- The South Australian country towns Cap should remain at 50 GL with no trade of this entitlement until the report currently in preparation is completed.
- A management framework should be developed to ensure long term Cap compliance for pumped irrigation.



Victoria

- **The Cap**

The Caps for Victorian valleys follow from the development of models. Modelling of the Goulburn/Broken/Loddon and Campaspe systems was completed in 1999 and the models are now to be submitted to the Murray-Darling Basin Commission for Audit. The long-term average Cap for the Goulburn/Broken/Loddon determined by the model is 2,084 GL/year. For the Campaspe the long-term average Cap remains at 122.3 GL.

The long term Cap for the Goulburn/Broken/Loddon as determined by the recently completed and calibrated model is an increase in the previously reported Cap number. The IAG has noted that the model has been formally submitted for approval to the Commission and therefore has agreed to adopt the revised Cap number on an interim basis for this audit.

Victoria is now in a position to report using Draft Schedule F with annual consumption compared with that year's climate adjusted Cap and cumulative differences (as debits or credits) compared with the Cap trigger of a 20% debit. The current estimates of the long term Cap in each system are:

Goulburn/Broken/Loddon System	2,084 GL per year
Murray/Kiewa/Ovens System	1,656 GL per year
Campaspe	122 GL per year
Wimmera-Mallee	162 GL per year

The interim Cap of 22 GL for Lake Mokoan has not been included in the Goulburn or Murray long term average Caps at this time.

- **1998/99 Diversions**

The gravity fed Goulburn and Murray Irrigation Districts account for more than 80% of Victoria's water use.

In 1998/99, diversion from the Goulburn/Loddon/Broken rivers was 1,660 GL compared with a climate adjusted Cap target for 1998/99 of 1,633 GL. The long-term average Cap is 2,084 GL (**Table 2**). The cumulative difference over the two year period is a credit of 36 GL compared with the Draft Schedule F trigger of a debit of 417 GL. The Goulburn/Loddon/Broken River is considered to be within acceptable bounds for Cap management.

In the Murray/Kiewa/Ovens 1,742 GL was diverted compared to a climate adjusted Cap of 1,732 GL, a one year debit of 10 GL, but a two year credit of 85 GL compared with a Draft Schedule F trigger of a 331 GL debit. The long term average Cap is 1,656 GL. The Murray/Kiewa/Ovens is considered to be within acceptable bounds for Cap management.

Diversions for the Campaspe system at 73 GL compare with the climate-adjusted target of 78 GL and the long term average Cap of 122 GL.

The Campaspe system now has a two year credit of 39 GL compared with a Draft Schedule F trigger of a 22 GL debit.

Diversions in the Wimmera-Mallee in 1998/99 are not yet available. However, savings due to pipelining are expected to result in diversions being below the Cap for this valley.

- **Administration of the Cap**

Victoria continues to implement its water reform package, commenced in 1990/91, and is

TABLE 2 — 1998/99 Diversions (preliminary values) Compared with Draft Schedule F Targets (GL/year)

Valley	Long Term Cap	1998/99 Cap Target*	Diversion**	Cap Credits (Cap Target less Diversion)		20% Schedule F Trigger
				1998/99	Cumulative since 1 July 97	
Goulburn/Loddon/Broken	2,084	1,633	1,660	-27	+36	-417
Murray/Kiewa/Ovens	1,656	1,732	1,742	-10	+85	-331
Campaspe	122	78	73	+5	+39	-22
Wimmera-Mallee	162					-32

* Annual Climate adjusted Cap target

** Does not include unregulated stream diversions

establishing bulk entitlements for all users. It is also establishing stream flow management plans to control water extraction on unregulated rivers not covered under bulk entitlements. The bulk entitlements specify a Cap on water use. This is complemented by a system of licences covering high and low security water, and management, monitoring and reporting systems to ensure Cap compliance. The reporting is based on the draft Schedule F criteria.

The IAG were advised that the bulk entitlement status is:

Goulburn Basin — Process completed and bulk entitlement order in place.

Murray (Victorian System) — Bulk entitlements have been granted.

Kiewa River — Bulk entitlements have been granted in the Upper Kiewa.

Ovens River — Scheduled to commence in October 1999 and be completed June 2001. In the interim, the Ovens only represents 2% of diversions and usage is Capped.

Broken Basin (including Lake Mokoan) — Scheduled to commence in October 1999 and be completed June 2001.

Campaspe System

- Coliban Water — Bulk entitlement Order has been granted.
- Goulburn-Murray Water — Bulk entitlement Order submitted for Governor in Council approval.

Loddon Basin — Start November 2000 and be completed in December 2002.

Wimmera-Mallee System — Commence June 2000 and completed in December 2001.

With bulk entitlements in place for the major systems, the remaining systems with bulk entitlements to be developed only represent some 4% of water use.

• *Monitoring and Reporting*

Reporting against the Cap requires a reliable system of measuring water use. Victoria is well placed in this respect as the bulk entitlement imposes legal obligations to keep accurate diversion records and to report annually on compliance with the bulk entitlement. A resource manager for each river valley reports annually on water diversions and use. The reporting format is compatible with Draft Schedule F reporting.

• *Proposals to Refine Implementation in 1999/2000*

Further changes proposed in 1999/00 include:

- re-calibration of the Murray/Kiewa/Ovens model which is expected to be completed by June 2000;
- bulk entitlement process for Loddon to start in November 2000 with an estimated completion date of December 2002;
- the bulk entitlement processes for the Ovens and Broken are expected to commence in October 1999 with completion in June 2001; and
- the Wimmera-Mallee bulk entitlement process is expected to commence in June 2000 and be completed by December 2001.

No major management changes are proposed in 1999/2000 as usage is in line with Cap targets.

• *IAG Assessment*

In 1998/99, diversions for the Goulburn/Loddon/Broken and Murray/Ovens/Kiewa were 1% over the climate adjusted Caps.

This compares with diversions in 1997/98 which were below the climate adjusted Caps and the system overall is in credit over the two years (**Table 2**).

The allocation of bulk entitlements for water management authorities and the associated management and accountability provisions enables monitoring of performance against Cap targets and management responses in cases of adverse trends.

Action is still required in the following areas, although it is acknowledged that this is of lower priority than the initial definition of Cap targets and allocation of bulk entitlements:

- recalibration of the Murray system models;
- finalisation of bulk entitlements for the Ovens River, Broken, Loddon Basin and the Wimmera-Mallee system;
- development of exchange rates for trading;
- development of Cap targets for the Wimmera-Mallee; and
- management arrangements consistent with the Cap for the unregulated components of the Goulburn/Loddon/Broken and Murray/Kiewa/Ovens.

Victorian implementation of the Cap has been exemplary with models developed for the main systems and a management regime based on



bulk entitlements for the major users. The Governor in Council Orders provides the legal basis for implementation including a requirement for monitoring and reporting to Schedule F targets.

The processes and information presented indicates that Victoria remains committed to holding diversions equivalent to those associated with the 1993/94 level of development.

Conclusions/Recommendations

- Diversions from the Murray and Goulburn systems in 1998/99 were 1% above climate adjusted Cap targets and are within acceptable bounds for Cap management.
- Cumulative diversions in 1997/98 and 1998/99 are 160 GL in credit.
- Substantial progress has been made in developing climate-adjusted models and implementing management frameworks to achieve Cap compliance.
- Victoria has a reliable monitoring and reporting system in place for regulated valleys.
- Bulk water entitlements need to be finalised for the Ovens, Broken, and Loddon Basins and the Wimmera-Mallee system.



New South Wales

- **The Cap**

Performance relative to the 1998/99 Cap is assessed for those valleys in the south of the State on the basis of a water year that runs from July to June. In the north of the State the water year runs from October to September. NSW has expressed a desire for the Cap audit process to be delayed in future years so that end of year data may be obtained for all river valleys in NSW. This is supported by the IAG.

The tools that are currently used by NSW to evaluate annual diversions relative to the 1993/94 level of development or the “benchmark” consist of:

- (i) monthly and daily hydrologic models; and
- (ii) climate-diversion relationships.

The Department of Land and Water Conservation (DLWC) is currently developing a suite of Integrated Quantity/Quality Models (IQQMs) for each of its major regulated valleys and the Barwon-Darling. At present preliminary IQQMs are available for Cap auditing in the Macquarie, Barwon-Darling and Lachlan Valleys. IQQMs for the Gwydir and Border Rivers will be available for Cap auditing later in 1999 subject to community consultation and appropriate configuration to reflect 1993/94 development.

For the Murray and Lower Darling, the MDBC’s Monthly Simulation Model will be used for Cap auditing. This model is currently being re-calibrated and will be fully available before June 2000.

For other valleys, hydrological models are not yet available. As an interim auditing tool, the DLWC has established “*climate-diversion relationship models*”. Climate-diversion relationship models have been established for the Murrumbidgee, Lachlan, Namoi and Peel Valleys and also for the Macquarie Valley. Because of the importance of resource availability in the northern rivers, it has not been possible to derive adequate climate-diversion relationships for the Border Rivers, Gwydir and Barwon-Darling River systems. For the 1998/99 year, pending completion of IQQM models, an informal assessment of the level of annual water extractions has been made for these valleys.

Table 3 provides a summary of the current auditing tools used in NSW and the latest advice on the timing for the development of more sophisticated models for relevant valleys.

- **1998/99 Usage**

Where possible, NSW has used both the climate-diversion relationship models and the IQQM models to determine whether individual valley diversions have exceeded the Cap. The climate-diversion relationship models provide information on Cap performance in any one year against a confidence band around the 1993/94 Cap figure. If diversions in the year fall within the band, the Cap is considered to have been met. If use was within the top half of the band and there is other evidence of growth in use (ie, increased area or changed cropping), management changes may be required despite compliance.

With the climate-diversion relationship models it is possible for the NSW authorities to monitor performance against the band over the year, and to introduce additional measures if it appears that the Cap will be exceeded.

NSW has also argued that the auditing of the Cap should not depend on short-term outcomes, but should be based on long term results. Thus, in addition to providing data which meets the Commission’s Schedule F compliance requirements, NSW will also monitor its compliance using hydrological models which compare the long term diversions that would occur with the current development, including environmental and operational rules, against the 1993/94 benchmark without environmental flow rules.

NSW has argued that the environmental flow and other operational rules, which have been introduced into most valleys in 1998/99, whilst not specifically designed as Cap management measures, do have the side effect of keeping long term average diversions below the Cap. As acknowledged by NSW, this is based upon the assumption that development remains at current levels.

Table 4 provides a summary of NSW diversions by river valleys. This table identifies those valleys where diversions are in credit or in debit against Cap values and whether or not those in debit have exceeded the Cap trigger which is set at a cumulative 20% of the long term Cap.

Murrumbidgee Valley

The Murrumbidgee valley was resource constrained early in the 1998/99 season, with an initial allocation of only 40%. Diversion in 1998/99 totalled 2,122 GL and there was also a net transfer out of the valley of 30 GL. On the basis of Draft Schedule F accounting, (and using the climate-diversion relationship model), there



TABLE 3 — NSW Interim Audit Tools

<i>Valley</i>	<i>IQM Suitable for 97/98 to 98/99 Cap Auditing</i>	<i>Current Auditing Tool</i>
Murray and Lower Darling	Existing monthly model available for 97/98 and 98/99 auditing. Upgraded model for 97/98 to 98/99 auditing by June 2000	Existing model.
Murrumbidgee	End March 2000	Climate-diversion relationship.
Lachlan	Existing model available for 97/98 auditing. Upgraded model for 97/98 to 98/99 auditing by December 1999	Existing model and Climate-diversion relationship.
Macquarie	Existing model available for 97/98 auditing. Upgraded model for 97/98 to 98/99 auditing by December 1999	Existing model and Climate-diversion relationship.
Peel	End March 2000	Climate-diversion relationship
Namoi	End March 2000	Monthly model and Climate-diversion relationship
Gwydir	End December 1999	No tool at present
Border Rivers	End December 1999	No tool at present
Barwon-Darling	Existing model available for 97/98 auditing. Upgraded model for 97/98 to 98/99 auditing by December 1999	Existing model.

TABLE 4 — NSW Valley Diversions (GL)

<i>Designated River Valley</i>	<i>Long Term Diversion Cap</i>	<i>1998/99 Cap Target</i>	<i>1998/99 Diversion</i>	<i>Net Trade Out of Valley</i>	<i>Cap Credits (Cap Target less Diversion)</i>			<i>Trigger Exceeded</i>
					<i>1998/1999</i>	<i>Cumulative since 1 July 1997</i>	<i>20% Schedule F Trigger</i>	
NSW Murray	1,871	1,872	2,022	-2	-148	6	-374	No
Murrumbidgee	2,186	1,970 ¹	2,122	30	-182 ¹	-240 ¹	-437	No
Lowbidgee	?	?	416	0	?	?	?	?
Lachlan	254	276 ¹	282	0	-6 ¹	-55 ²	-51	Yes
Macquarie	464	?	336	0	?	-27 ²	-93	No
Namoi/Peel	251	230 ¹	237	0	-7 ¹	114 ²	-50	No
Gwydir	403	?	295	0	?	?	-81	?
Border Rivers	195	?	166	0	?	?	-39	?
Barwon-Darling	177-192	?	246	0	?	-48 ²	-35	Yes
Lower Darling	86	236	153	-12	95	174	-17	No

1. Calculated by climate-diversion relationship model only
2. Excludes differences for 1998/99 water year

was a cumulative debit of 240 GL against the climate adjusted Cap. However this falls within the 20% Draft Schedule F Cap trigger which is set at 20% of the currently estimated long-term Cap of 2,186 GL. During the year, record plantings of rice were recorded at 87,671 hectares (up 1.5% on the previous record in 1996/97).

Existing management rules in the Murrumbidgee Valley indicate a 100% limit to the announced allocation, a 300 GL limit to off-allocation supplies and the exclusion of high security licences from off-allocation access, with the environmental flow rules (EFR) introduced in the Murrumbidgee Valley in 1998/99. Long term modelling indicates that the combination of management rules with the EFR would result in expected long-term average diversions being approximately 4% below the Cap.

Further refinement to the management rules is expected in 1999/2000, which the NSW authorities believe will continue to keep the diversions in the Murrumbidgee within the long term Cap.

Lowbidgee

A Cap auditing methodology is in the process of being established for Lowbidgee. It is likely that auditing will be based on the results of hydrologic modelling. However, an IQQM module for Lowbidgee (as part of the Murrumbidgee IQQM project) is not expected to be available until the 1999/2000 season. Whilst it is not possible to assess with certainty that the Lowbidgee has complied with the Cap, access to surplus flows has remained largely unchanged since 1993/94.

Murray Valley

The Murray Valley was also resource constrained in 1998/99 with an initial allocation of 0%. This was raised to 83% and final consumptive use for the year was 2,022 GL. There was also a net transfer into the valley of 2 GL. Current estimates of Draft Schedule F accounting using the Murray Monthly Simulation Model (MSM) indicate a credit to the end of 1998/99 of 6 GL.

Existing management rules in the Murray Valley include a 100% allocation limit, a carryover of up to 20% of licensed entitlement and a 269 GL off-allocation access limit.

Lachlan Valley

Total usage from the Lachlan Valley for the year was 282 GL. When plotted against a climate-diversion relationship, this level of use is well

within the estimated Cap band. However current estimates of Draft Schedule F accounting using the Lachlan IQQM indicate a debit of 55 GL to the end of 1997/98 (and an estimated debit of 61 GL to the end of 1998/99). This exceeds the 20% trigger mechanism for Cap exceedance of 51 GL.

Existing management rules in the Lachlan Valley include a 100% limit to the announced allocation, a 30 GL limit to off-allocation access and carryover of up to 30% of the licensed entitlement, and the exclusion of high security licences from off-allocation access.

Macquarie Valley

Total consumptive use in 1998/99 was 336 GL. No estimate of Cap from the IQQM will be available for 1998/99 until the climate data can be updated. However, the estimate of Draft Schedule F accounting to the end of 1997/98 indicates a debit of 27 GL.

Namoi/Peel Valleys

Total usage from the Namoi/Peel Valleys for the year was 237 GL. This is well below the estimate of the Cap from the climate-diversion relationship model. Current estimates of Draft Schedule F accounting indicate a credit of 114 GL to the end of 1997/98.

Gwydir Valley

Total usage from the Gwydir Valley for the year was 295 GL. This appears to be well below the long-term diversion Cap of 403 GL. The Gwydir Valley IQQM is currently being developed and no formal assessment of Cap compliance or Schedule F accounting is possible at this time.

Following the introduction of the Gwydir Wetlands Management Plan in 1996, long term modelling using a monthly time step model indicated that the combined suite of management rules would result in expected long term average diversions approximately 12% below Cap.

Border Rivers

Total usage from the Border Rivers for the year was 166 GL. The Border Rivers' IQQM is currently being developed and no assessment of Cap compliance or Schedule F accounting is possible until the IQQM becomes available. However, in the year there was a minor decrease in the area under irrigation and thus the overall trend in terms of diversions is thought to be stable.



Barwon-Darling

Total usage from the Barwon-Darling for the year was 246 GL. Extensive infrastructure development since 1993/94 indicates that users in the Barwon-Darling river system are likely to be continually exceeding the Cap. Estimated irrigated crop area for the 1998/99 season was 29,000 ha, which is an increase of around 30% from 1993/94 development. Current estimates of Draft Schedule F accounting (using the Barwon-Darling IQQM) indicate a debit of 48 GL to the end of 1997/98 which exceeds the estimated trigger for Cap exceedance of 35 GL.

Lower Darling

Diversions in 1998/99 were 153 GL. Whilst the MDBC's Monthly Simulation Model (MSM) has not been recalibrated or formally approved for use, preliminary results of the MSM indicate that the Lower Darling was 95 GL below the Cap for 1998/99 and has a credit of 174 GL since the commencement of the permanent Cap in 1997/98. It is envisaged that auditing will be carried out using the MSM as soon as recalibration can be completed to represent 1993/94 and current conditions.

- *Administration of the Cap*

NSW has adopted a series of water management and allocation rules for purposes of managing the level of diversions within the Cap requirement. These rules, which include the environmental flow rules (EFRs), are designed to ensure that diversions from the various valleys comply with the Cap in the longer-term. These current management rules are designed to reduce diversions to irrigators by a long-term average of up to 10% with a range of 4% to 10% against the 1993/94 benchmark year.

Apart from the EFRs, the form of the other management rules that have been applied by NSW during 1998/99 has not differed significantly from those used in the previous year. These along with the EFRs are projected to keep diversions within the Cap, notwithstanding that there may be movement around the long term Cap average on a year to year basis.

In order to administer the Cap and adjust its management rules in an appropriate fashion without causing a "boom or bust" approach to economic activity in the State, NSW authorities are developing a three-year management cycle, viz:

- End of year 1 — actual diversions compared with expected diversions with on-farm development, management and flow rules in

place. If diversions are above expectations, areas being planted and other factors, which may be influencing growth, will be monitored closely during the first half of Year 2 to see if changes persist. Models can then be used to assess the long-term impact of these changes on diversions.

- By December of Year 2 — if growth in diversions has been shown to have occurred and to be likely to continue and the long term Cap is judged to have been exceeded, a response directed at reducing the amount of water available for diversion is determined using computer models or other appropriate tools. These proposals will be discussed with the relevant River Management Committee for comment and advice.
- Year 3 — the adopted proposals are implemented for Year 3.

The importance placed upon the use of models throughout this management response process highlights the importance of NSW completing its current modelling work as a matter of extreme urgency and having appropriately skilled resources within DLWC to administer and manage this process.

- *Monitoring and Reporting*

In the previous year's audit report of the IAG it was noted that NSW would need to develop appropriate models in order to reflect the 1993/94 level of development and test performance against the Cap on a valley by valley basis. Some progress has been made against this program in 1998/99. However, it is clear that there is still much to be done in this area. As highlighted in **Table 3**, NSW anticipates completing some of these IQQM models later this year. This task will include the need to gain approval from the relevant community committees and to appropriately configure the models in order for them to be relevant to the monitoring and reporting task.

It is of some concern therefore that NSW continues to have limited resources to complete these tasks. Recent announcements that DLWC will incur further staff reductions must place in some doubt the ability of the Department to complete all tasks that currently require its attention in the next six months. Continued delays in completion of this modelling work only serves to create further uncertainty in the rural communities drawing from the Basin's water resources and concern within the IAG that the present piecemeal approach to reporting may be masking longer term problems in terms of Cap compliance.

On a more positive note, it is encouraging to see NSW attempt to report its diversions in the draft Schedule F format. This has been taken as a further indication of NSW's desire to meet the expectations placed upon it in terms of managing Cap compliance. However, resource constraints may mitigate against these best of intentions.

- ***Proposals to Refine Implementation in 1999/2000***

The major focus for refinement in 1999/2000 is the completion of the modelling for each of the valleys and further refinement of the management rules for those valleys where the Cap trigger has been exceeded. The first step for these valleys where the trigger has been exceeded will be to model the likely long-term consequences under the NSW valley management plans. This will place pressure upon available resources within DLWC if they are to meet the expectations of the Commission for an early explanation of the apparent exceedance of the Cap or an appropriate management response to that Cap exceedance.

There continues to be a danger in the approach adopted by NSW that the modelling of long term outcomes may fail to identify more fundamental shifts in planning and future intentions by irrigators, particularly if they believe that they can continue to increase their water diversion activity without fear that there will be a "day of reckoning". The IAG continues to be of the view that NSW should, in addition to placing reliance on long term models, also examine and assess other forward looking indicators of irrigator behaviour. These indicators could include investment in new crop growing areas, larger water storage facilities, and greater capacity pumping equipment. Until the irrigator community can see examples of decisive action by NSW authorities against excessive diversions, notwithstanding the impact that this may have on existing irrigator infrastructure and investment, they will continue to believe that diversion activity can continue to grow with a high degree of impunity. There is a "demonstration effect" which can work against the integrity of the Cap if an appropriate response is not seen to come from any of the governments involved in the Basin. At the same time there is a demonstration effect that can work to support the Cap if appropriate action is applied without fear or favour. It remains to be seen whether NSW's approach has sent an appropriate signal to the irrigator community or whether there are elements in this community who will see the failure of authorities to act as a sign of weakness and indecision from which they can benefit.

- ***IAG Assessment***

NSW is to be commended for its reporting to the draft Schedule F and for the provision of useful background information upon which the IAG could make an assessment of its performance. Unfortunately, the quality of the statistical data available, particularly in terms of the definition of the Cap for the year and the performance against the Cap remains less than satisfactory. The intentions of NSW to provide appropriate information and to apply the Cap are not questioned. However, it is readily apparent that NSW has not provided sufficient resources to complete the task, notwithstanding that this issue has been raised previously in IAG reports. Recent announcements that there is to be yet a further cut back in staff in DLWC is a matter of grave concern for the timely completion of the modelling that is required to maintain and report on the Cap application.

The IAG also notes that NSW has implemented its environmental flow rules across most valleys and that it has introduced additional management rules designed to reduce diversions by up to 10%. Many of these mechanisms particularly by their nature and operation have little impact in the short term when there are wet conditions and the flows are high. The IAG would encourage a continued use of a suite of management tools to err on the side of caution in assessing growth in climate adjusted diversions until such time as it can be seen that the EFRs actually achieve a long term outcome that falls below the relevant Cap.

Diversions exceed the estimated Cap trigger mechanism for the Lachlan and Barwon-Darling. In addition the IAG believes that notwithstanding that the long term Cap trigger has yet to be tripped, the Murrumbidgee valley should also be placed on close watch. NSW should now bring forward to the Council and Commission its advice on how it proposes to deal with this problem in the Lachlan and Barwon-Darling valleys.

With the current delay in completing IQQM models and determining the long term Cap for many river valleys, the IAG has some concern about the potential for infrastructure being established by irrigators which cannot be supported in the longer term once the Cap and actual diversions against the Cap have been determined. The IAG does not doubt that NSW also has a concern about this lack of appropriate monitoring information. However, to ensure the compliance of other governments who comprise the Murray-Darling Basin Ministerial Council



and to demonstrate to certain elements within the irrigation community that the Cap will be enforced, there is a need for the NSW authorities to adopt a more conservative approach where it appears, using other indicators, that the Cap has been or may be about to be breached against the 20% trigger.

There are a number of remaining unresolved issues concerning the establishment of diversion Caps for Border Rivers. It is clear that progress to resolve these problems is very slow and partial evidence suggests that infrastructure development has been moving at a pace which will clearly be outside the Cap once the Cap is defined. It is a matter of some urgency that the NSW and Queensland Governments jointly develop an action plan and program to resolve these outstanding issues.

Conclusions/Recommendations

- Estimated diversions in 1998/99 were 6,275 GL compared to 6,580 GL in 1997/98.
- Resource constraints within the Department of Land and Water Conservation have affected Cap implementation, particularly the development of IQQM models to establish climate adjusted annual Cap targets.
- No analytical models have been approved yet for the estimation of annual Cap targets under Schedule F.
- Diversions in 1998/99 exceeded the annual climate adjusted Cap for the Murrumbidgee.
- Although 1998/99 Cap targets are not yet available for the Lachlan and Barwon-Darling, diversions in those valleys in 1998/99 exceeded the long term Cap estimates.
- No annual Cap targets are available for the northern rivers for 1998/99 because the water year in those valleys has not finished.

- On the basis of their 1997/98 diversions, the reporting provisions of the draft Schedule F have been triggered for the Lachlan and Barwon-Darling valleys.
- Crop areas within a number of valleys have shown significant growth since 1993/94. This may cause future triggering of the Cap when IQQM climate adjusted Caps have been established.
- The Barwon-Darling IQQM indicates that, with current development, long-term diversions in that valley would exceed the long-term Cap.
- The introduction of environmental flow rules across most valleys is noted. However, on the basis of one year's experience and the wet conditions that applied across these valleys in 1998/99, it is difficult to judge whether these rules will be effective in achieving compliance with the Cap.
- It is recommended that additional resources be dedicated to developing and validating IQQM models for the major valleys to establish climate adjusted Caps and a basis for managing available water resources.
- It is recommended that within the spirit of the draft Schedule F, New South Wales should report on the underlying reasons for excessive diversions on the Lachlan and Barwon-Darling including management actions proposed to bring diversions within Cap limits.
- This recommendation applies to both NSW and Queensland.

It is recommended that New South Wales and Queensland negotiate an agreement for the management of the Border Rivers Flow Management Plan including establishment of objectives, principles, process and deadlines for achievement of outcomes and report to the next Council meeting.

Queensland

- **The Cap**

In line with Council's earlier decisions, the Queensland Cap is to be established in accordance with the pilot provisions of Schedule F following the completion of the Water Allocation and Management Planning (WAMP) and Water Management Planning (WMP) processes. The IAG has supported the WAMP/WMP process noting:

- it must accommodate instream use not only in Queensland but also in the Border Rivers under the control of the Border Rivers Commission and the rest of the Murray-Darling Basin;
- it must include both licensed diversions from streams and the currently unlicensed floodplain water harvesting;
- a management regime needs to be developed that includes pricing, property rights and measuring and reporting;
- there needs to be assessment of downstream flow and diversion impacts in NSW;
- the Precautionary Principle is applied through the establishment of an allocation to be held in reserve to minimise the risk of over allocation for consumptive use; and
- a final independent audit of the WAMP process should be conducted, including modelling of impacts on downstream Basin flows.

- **1998/99 Diversions**

Diversions for 1993/94 to 1998/99 are summarised in **Table 5**. The provisional diversions for 1998/99 at 600 GL reflects a year, which started with full storages and above average rainfall. The categories of diversions are summarised in **Table 6**. Water harvesting continues to be the main category of diversion (468 GL) and this would be even higher if unlicensed floodplain diversions were included.

The Cap in Queensland will be defined as end-of-valley flow objectives and management rules. Unfortunately it is not possible to compare end-of-valley flows in 1998/99 against those objectives as they are still to be established. Waterharvesting diversions in 1998/99 were about 25% of the recorded flow.

Diversions in 1998/99 were below the 1997/98 record and reflected full storages coming into the year, average waterharvesting opportunity and irrigation need. Further growth in on-farm

storages occurred during the year. In the Balonne, provisional figures indicate that storages increased from 475 GL in 1997/98 to 675 GL in 1998/99. On-farm storages in the Border Rivers increased from 210 to an estimated 230 GL over the same period. Total on-farm storage in the Queensland part of the Basin has now increased from 360 GL in 1993/94 to 1,050 GL in 1998/99.

The growth in storages and diversions is within the legal and administrative arrangements that existed at the 1993/94 benchmark used to establish the Cap. Queensland has complied with the interim moratorium of not issuing new licences. Sleeper and dozer licences however are being activated and in high run-off years this has led to a significant increase in diversion. This issue is raised again later.

- **Progress with the WAMP process**

The IAG has been asked by the MDBMC to audit the WAMP process and outcomes.

In this report, an update of the status of the WAMP process on Basin rivers is provided.

Schedule F adopted by the Council for trial implementation during the 1998/99 season includes sub-clause 7(3) "*on or before 30 June 1999 the Government of Queensland will prepare and publish water management plans and water allocation plans for all river valleys in Queensland*".



TABLE 5 — Queensland Basin Diversions (GL)

<i>Year</i>	<i>Diversions</i>
1993/94	338
1994/95	175
1995/96	520
1996/97	467
1997/98	741
1998/99	600 (est.)

TABLE 6 — Queensland Basin Diversions Categories (GL)

<i>Diversion Category</i>	<i>1998/99 (Est.)</i>
Irrigation Area Channels	40
Private Diversions	50
Water Harvesting	468
Unregulated Stream Licences	30
Urban and Industrial	12
Total	600

In their March 1999 "Progress Report on the Queensland WAMP and WMP Process" the IAG advised that draft WAMPs and WMPs should be available for Council consideration between late 1999 and mid 2000 and finalised before 30 June 2000.

Queensland provided to the IAG a summary report on progress with the WAMPs and WMPs. The current status is summarised in **Table 7**.

Condamine-Balonne

The Condamine-Balonne WAMP has seen the completion of the IQQM hydrologic model, development of a range of flow management and consumption scenarios and extensive consultation with the Community Reference Panel.

The following technical reports have been finalised or near finalised: Environmental Flows, Water Availability and Entitlement Performance, Social Assessment, Economic Assessment, Indigenous. All reports are expected to be published and released as a package in October 1999.

The IAG was advised that the Queensland EPA propose to have an independent review of the

Environmental Flows Technical Report conducted. In view of the importance of this report and a requirement for the IAG to produce an independent audit report it is proposed that the IAG and EPA work on terms of reference for a single review.

The draft Environmental Flows Technical Report made available to the IAG indicates that river health associated with 1997 levels of development and flow is impacted at a number of the reference sites particularly in the Lower Balonne.

The IAG was advised that the release of the draft Environmental Flow Technical Report has triggered a variety of responses within the Community Reference Panel and some water user groups.

In view of this it was not possible to determine when a draft WAMP and final WAMP would be available for Council consideration.

Border Rivers

Considerable progress has occurred on technical work that will underpin decisions on end-of-valley flow Caps.

TABLE 7 — Queensland Water Resource Plans Progress report as at 9/9/99

	<i>Condamine-Balonne</i>	<i>Border Rivers</i>	<i>Warrego/Paroo/Nebine</i>	<i>Moonie</i>
Process	WAMP	WAMP	WMP Draft Plan due early 2000	WMP Draft Plan due early 2000
Hydrologic Analysis	<ul style="list-style-type: none"> Calibrated daily flow model (IQQM & specific) completed Quality assurance checks underway on representation of licences in model Water availability & Entitlement Performance Technical Report finalised 	<ul style="list-style-type: none"> Calibrated daily flow model (IQQM) and reports completed Current development scenario completed Regulated areas modelled plus sensitivity on unregulated upland areas 	<ul style="list-style-type: none"> Data collection for daily flow model (IQQM) is near completion unregulated 	<ul style="list-style-type: none"> Calibration of daily flow model (IQQM) due Oct 1999 unregulated
Environmental Analysis	Final version of Environmental Flows Technical Report to be completed September 1999	<ul style="list-style-type: none"> Expert Panel workshops held Current Ecological Condition report due October 1999 	<ul style="list-style-type: none"> Overview document finalised to first draft Science forum to be held October 1999 	<ul style="list-style-type: none"> Overview document completed Aug 1999 Science forum to be held October 1999
Economic Analysis	Economic and Social Assessment Technical Reports finalised	<ul style="list-style-type: none"> Social & Economic methodologies agreed to between DNR & DLWC Data collection commenced 	N/A	N/A
Consultation	<ul style="list-style-type: none"> All draft technical reports presented to Community Reference Panel Indigenous Technical Report finalised 	<ul style="list-style-type: none"> Community Reference Panel of key Stakeholders formed and meetings have been held First Indigenous Working Party meeting held Aug 1999 	<ul style="list-style-type: none"> Public meetings held February 1999 Paroo & Warrego Community Reference Panels to be finalised late 1999 	<ul style="list-style-type: none"> Public meetings held February 1999 First Community Reference Panel meeting held May 1999

WAMP: Water Allocation and Management Planning • WMP: Water management Plan • IQQM: Integrated Quantity Quality Model

The IQQM model has been completed and validated for 1995/96 conditions, an indigenous working party has been established, a methodology has been developed for the socio-economic assessments and the Technical Advisory Panel has an assessment of current ecological conditions for a number of sites.

Progress on completing the Border Rivers Flow Management Plan is at risk.

The IAG was advised that philosophical issues between New South Wales and Queensland were affecting progress. In particular the IAG understands that New South Wales has indicated that it would not participate in a process that would consider further water use development. Despite this the IAG understands that the relevant State agencies will work together to:

- identify flow statistics that are environmental performance indicators for a range of sites;
- calculate flow statistics for Border Rivers and other Murray-Darling valleys for natural, 1991 development and current development conditions;
- assess current ecological conditions of Border Rivers catchment; and
- benchmarking and construction of impact assessment diagrams and relate these to possible future development scenarios.

Queensland representatives were unable to predict, in view of the unresolved issues with New South Wales, any firm timeframe for the completion of the Border Rivers Flow Management Plan and the end-of-valley flow Cap targets.

Warrego/Paroo/Nebine and Moonie WMPs

In its March 1999 Progress Report the IAG advised that draft management plans were likely to be available early in 2000 and final plans by June 2000.

The IAG was advised that significant progress had occurred with overview reports completed (Moonie) or nearly completed (Warrego/Paroo/Nebine). The IQQM model for the Moonie is expected to be available in October 1999 and data collection for the Warrego, Paroo and Nebine IQQM models is near completion.

The IAG understands that the previous advice to Council of draft plans early in 2000 and final plans by June 2000 remains firm.

- ***Management Issues following Establishment of the Cap***

While the Cap is established as end-of-valley river flow objectives, a management framework

integrating licensing, metering, and operating rules will be required to achieve Cap objectives.

The IAG was advised that draft legislation is expected to be available as an “*exposure draft*” for public consultation. It is the IAG’s understanding that this will provide the basis for establishing the regulatory framework for management of various aspects of water resource management including licence conditions, property rights, and trading. Importantly it will include the ability to manage (and control) water diversion from floodplain harvesting. This is essential as storage for floodplain harvesting in the upper Condamine is currently estimated at 120 GL compared to 44 GL in 1993/94. This growth has the potential to significantly affect downstream flows including security of access and environmental flow impacts.

- ***IAG Assessment***

The Water Management Plans for the Warrego/Paroo/Nebine and Moonie Rivers are on schedule for completion by 30 June 2000 as previously advised in the IAG March 1999 Progress Report.

Queensland is unable to provide a date for completion of the WAMPs. Council, in recognising Queensland’s equity argument, supported the WAMP process as an effective method of determining end-of-valley flows. Council was advised that draft WAMPs for the Border Rivers and the Condamine-Balonne would be available by 30 June 1997. More than two years later, and despite significant progress particularly on the Condamine-Balonne WAMP, there is no clear date for completion of the WAMPs.

Since 1993/94 there has been:

- an increase from 360 GL to 1,050 GL in on-farm storages for river diversions;
- an increase from 44 GL to 120 GL in floodplain storages. There are no constraints on water diversion from floodplains as it remains unlicensed; and
- a significant increase in diversions, although no direct valid comparisons are available due to differences in rainfall and flow conditions.

The growth in diversions and on-farm storages, as reported in the IAG 1997/98 report, while compliant with the interim moratorium announced as part of the process in establishing the Cap, will increase the difficulty of, and reduce management flexibility in determining Cap outcomes. There is in fact a definite risk that development that occurs before the WAMPs are complete could impact on the primary objective



of the WAMP process, which is to achieve a balance between consumptive use and instream use. It also significantly affects the security of access for downstream users.

This concern is reinforced by the information provided in the draft Condamine-Balonne Environmental Flows Technical Report made available to the IAG. It indicates that under 1997 flow and development conditions, many parts of the river particularly the lower Balonne are impacted. Significant growth in on farm storage development has occurred since 1997.

It is the view of the IAG that sufficient technical information is now available to make an in-principle decision about further growth in the Condamine-Balonne catchment and that a regulatory framework be introduced immediately to limit stream diversions and growth in floodplain diversions in the catchment.

The WAMPs can then be finalised to determine end-of-valley stream flows (and diversions). The diversions may well need to be less than those occurring at present.

In the case of the Border Rivers it is the view of the IAG that it is imperative that NSW and Queensland cooperate on a whole of catchment Flow Management Plan. In view of the difficulties currently experienced at State agency level, the IAG suggests that senior officials of the two States meet prior to the next Council meeting to:

- define Flow Management Plan objectives;
- establish principles to guide the study;
- agree on the process to be utilised; and
- establish deadlines for the study outcomes.

In view of Queensland's experience to date in developing WAMPs in both the Condamine-Balonne and Border Rivers catchments, the IAG recommends that Queensland consider:

- Clarification of the steps in the WAMP process;
- Publishing a catchment-wide audit of current arrangements at an early stage of the process;
- Structuring the planning process to provide government an opportunity to make in principle decisions on the basis of audit information;
- Establishing an independent audit group to review and provide advice to government on the planning outcomes of each WAMP. Such a group could possibly be comprised of three eminent people sourced from the water industry, business and academic sectors.

Conclusions/Recommendations

- Diversions of an estimated 600 GL in 1998/99 compared with 740 GL for 1997/98.
- The draft WAMPs for the Warrego/Paroo/Nebine and Moonie are expected to be available in early 2000 and the final plans by June 2000.
- It is not possible to provide dates for the finalisation of WAMPs for the Condamine-Balonne and Border Rivers.
- The draft Environmental Flow Technical Report of the Condamine-Balonne indicates that, under 1997 flow and development conditions, significant parts of the river, particularly the lower Balonne, are impacted.
- There has been further significant growth in on-farm storages.
- It is recommended that diversions by individual licence holders be Capped at 1997/98 levels until the WAMPs are finished.
- It is recommended that a moratorium be placed on additional floodplain harvesting.
- This recommendation applies to both NSW and Queensland.

It is recommended that New South Wales and Queensland negotiate an agreement for the management of the Border Rivers Flow Management Plan including establishment of objectives, principles, process and deadlines for achievement of outcomes and report to the next Council meeting.

- It is recommended that urgent action be taken to establish a regulatory environment that would enable Cap implementation including appropriate controls over floodplain water harvesting.
- It is recommended that the WAMP process be modified to:
 - Clarify the steps in the WAMP process;
 - Publish a catchment-wide audit of current arrangements at an early stage of the process;
 - Structure the planning process to provide government an opportunity to make in principle decisions on the basis of audit information;
 - Establish an independent audit group to review and provide advice to government on the planning outcomes of each WAMP. Such a group could possibly be comprised of three eminent people sourced from the water industry, business and academic sectors.

Australian Capital Territory

• The Cap

The ACT became a full participant in the Murray-Darling Basin Commission in March 1998. At that time the ACT Government undertook to participate in the Cap initiative. However to this time, there has been no decision as to what is to be ACT's Cap. Net ACT consumption is approximately 0.3% of overall Basin water use.

The major consumptive use of water in the ACT is the urban water supply to Canberra and Queanbeyan managed by ACTEW Corporation. Net diversions for the last fifteen years for urban water supply have been around 30 GL per year with an additional 5 GL per year estimated for all other consumptive diversions (see **Table 8**).

Around 50% of the urban water diversions in the ACT are returned to the Basin by way of the Lower Molonglo Water Quality Control Centre and Queanbeyan Sewage Treatment Works. The return of this water to the Basin has meant that the net diversions are used as the accepted means of assessing the use of water for consumptive purposes in the Territory.

• Administration of the Cap

The ACT Water Resources Act 1998 was passed in November 1998. The Act deals with both groundwater and surface water and contains

provision for the licensing and measurement of extractive water use. The ACT government is in the process of implementing this licensing procedure and expects to confirm a licence with ACTEW Corporation in December 1999 as the provider of domestic use, water treatment and reticulation services. The Act also requires that environmental flows must be provided for before any other use. Environmental flow guidelines provide for the protection of flows up to the 80th percentile and, except in water catchments, only 10% of flows over the 80th percentile are available for consumptive use. Of the total ACT water resources of 439 GL per year; these guidelines allocate an average of over 266 GL to the environment leaving around 172 GL notionally available for consumptive use.

• Issues with Adoption of the Cap

The ACT Government has stated its commitment to the concept of the Cap and its willingness to be included in the Cap review process. However, the ACT Government believes that there are four possible options of what might be considered as the Cap for the ACT.

These options are:

1. the 1993/94 level of water use in the ACT, that is an average Cap value of 29 GL per year;
2. the historical use for consumptive purposes prior to the introduction of water conservation measures in the early 1990s, giving an average Cap of 38 GL per year;



TABLE 8 — Diversions for Consumptive Use within the ACT and Queanbeyan (GL/year)

Year	Gross Diversion	Less Returns to System			Net Diversion
		Lower Molonglo WQCC	Queanbeyan STW	Other Diversions	
1989/90	65.4	29.9	3.4	5.0	37.2
1990/91	77.3	33.1	3.4	5.0	45.8
1991/92	60.0	33.3	3.4	5.0	28.4
1992/93	50.2	34.8	3.4	5.0	17.0
1993/94	59.4	32.7	3.4	5.0	28.3
1994/95	60.6	30.1	3.4	5.0	32.1
1995/96	53.3	32.2	3.5	5.0	22.5
1996/97	61.8	33.7	3.4	5.0	29.7
1997/98	73.1	30.7	3.2	5.0	44.2
1998/99	54.4	32.7	3.4	5.0	23.4

3. a Cap based upon potential growth in population and economic activity to the year 2050, resulting in an average Cap value of 61 GL per year; or
4. the residual available water after allowing for environmental flows under the existing Environmental Guidelines, resulting in a Cap value of 172 GL per year.

The ACT has argued its case for adoption of at least options 2, 3 or 4 as outlined above on equity and consistency grounds. From an equity perspective, the ACT has noted that:

- through direct intervention by way of a public awareness campaign and pricing strategy, urban consumptive levels were significantly reduced in the early 1990s and the ACT should have the benefit from this saving in terms of its Cap;
- the potential for the ACT to obtain additional significant efficiencies in its net consumption of water is limited because of the highly urban and therefore piped nature of its water supplies whereas other Cap participants have significant rural irrigation use which lends itself to improvements in efficiency;
- under a NSW ban on trading from unregulated streams, the ACT cannot purchase additional water from other parts of the Basin — the Murrumbidgee above Burrinjuck Reservoir is unregulated; and
- under the existing Seat of Government Acceptance Act 1909 (Commonwealth), the Commonwealth has paramount rights to the waters of the Queanbeyan and Molonglo Rivers for the purpose of ensuring the Territory will have adequate water resources.

In terms of consistency with other jurisdictions, the ACT notes that:

- South Australia was not restricted to an absolute Cap based on 1993/94 consumption;
 - Queensland successfully argued on equity grounds that it should be allowed to examine possible further consumptive use of water in its State; and
 - other jurisdictions have had the flexibility to apply savings under the Cap to new development opportunities in a manner that is not available to the ACT.
- *Discussion of Issues*

In its November 1996 Report, *Setting the Cap*, the IAG outlined six principles or 'tests' against which to assess equity and consistency issues.

These six principles were:

1. no further change be made to flow regimes that would contribute to deterioration of water quality and environment protection (instream, floodplain or estuarine);
2. water allocations be made with extreme sensitivity to the effects on the environment (Precautionary Principle);
3. water is allocated to the highest value use (allocative efficiency);
4. statutory and agreed property rights be recognised;
5. water management processes be transparent and auditable; and
6. a system of administration be implemented which is easily understood and which minimises time and costs (administrative efficiency).

The ACT has put forward four possible options which might be considered as being the ACT's Cap. In terms of Option 1 the benefits of the efficiencies achieved by the ACT in the early 1990s would effectively be lost to the ACT, although the environment and other downstream users have benefited from this saving. In similar circumstances where South Australia initiated reductions in its consumptive use prior to the establishment of the Cap, the IAG has accepted the equity argument that these savings should be credited to that State. To maintain consistency this would suggest that Option 1 should be disregarded as a potential definition of the Cap for the ACT and that at least those efficiencies achieved in the period just prior to the Cap being introduced should be included in the ACT Cap.

Option 4 is based on the assumption that all the available water after allowing for environmental flows which have been set by the ACT Government, should be allowed for consumptive use. This would increase present consumptive use levels from around 30 GL per year to around 172 GL per year.

At the time of setting the Cap in 1996, South Australia presented similar arguments to the IAG. However, it was noted at the time that to adopt this approach would not only run counter to the spirit of the Cap and the Precautionary Principle, but would be counter to that State's own concern about the environmental impact of excessive consumptive use of the water from the Basin. Similarly in the ACT, to adopt Option 4 would not only be inconsistent with the previous

TABLE 9 — An example of a Cap applied to the ACT. Diversions since July 1997 compared with the Option 2 targets (GL)

<i>Long Term Diversion Under Option 2</i>	<i>1998/99 Option 2 Target*</i>	<i>Diversion</i>	<i>Credits (Option 2 Target less diversion)</i>		
			<i>1998/99</i>	<i>Cumulative since 1 July 97</i>	<i>20% Long-term Option 2 Diversion trigger</i>
38	38.2	23.4	14.8	+21.8	-7.6

* Annual Climate adjusted Option 2 target

recommendations of the IAG as confirmed by the Ministerial Council, but would run counter to the ACT's own claim to be striving towards a more environmentally sensitive use of water from the Basin.

The two remaining options need to be given careful consideration in the context of the six principles outlined above. Consideration of these options would need to include discussion on the ability for the ACT to purchase water to meet any future growth needs should a Cap be adopted which reflects consumption levels consistent with Option 2.

There has been some suggestion that the ACT can not trade water from the regulated section of the Murrumbidgee to the unregulated section above Burrinjuck Reservoir. It is not clear that the current rules that apply in NSW actually prevent such trade, however this matter would have to be resolved as part of the process of setting a Cap for the ACT.

At this time, the IAG would welcome formal arguments from the ACT on the level of the Cap recognising the implications of the six principles or 'tests' that have been used in agreeing on the Cap in the other jurisdictions.

- **Monitoring and Reporting**

The ACT proposes to use a climate adjusted Cap based upon a model to be jointly developed with the Murray-Darling Basin Commission. The ACT is at present establishing a system of licences for all users of water in the ACT and these licences will be in place by late 1999. These will be climate adjusted volumetric licences and the ACT will be able to report its consumptive usage against information provided by licence holders. As ACTEW Corporation will be the main licensed user of water from the system, the level of accuracy from this monitoring process should be high.

- **1998/99 Diversions**

Net Diversions by the ACT in 1998/99 was 23.4 GL. As an example of the assessment that might be made in the future, this diversion was compared with the level of diversion expected under Option 2. The 1998/99 diversion is 14.8 GL below the Option 2 climate adjusted target. **Table 9** summarises the ACT's performance against Option 2 since July 1997. It reveals that if the ACT adopts a Cap based on Option 2, it would have already built up a credit of 21.8 GL.

- **Other Issues**

The definition of the Cap, when agreed, will cover both ACT and Queanbeyan's use of water from the system. Their usage will be expressed in net terms as the ACT returns such a high proportion of its water back to the river system via the Lower Molonglo Water Quality Control Centre and the Queanbeyan Sewage Treatment Works. Reuse of water in the ACT is one option that is being progressively adopted, particularly for some industry purposes and also for the watering of parks and recreational areas. To the extent that such reuse reduces the return of water to the river system, it will be considered as consumption for the purposes of the Cap.

There have also been proposals whereby ACTEW would provide piped water from the Queanbeyan and Cotter River catchments to nearby country urban centres including Yass and Goulburn. These options are still under consideration. However they could impact upon the water available under the Cap for use within the ACT. Consideration would therefore need to be given as to how such transfers of water might be considered. For country towns falling within the Basin, one option would be for their allocation under the Cap to be transferred to the ACT subject to appropriate exchange provisions. For Goulburn which lies outside the Basin, further consideration may have to be given to the implications for the Cap in the ACT.



- ***IAG Assessment***

The IAG notes ACT's commitment to the Cap and to the principles behind the Cap. The IAG also notes the current action within the ACT to licence existing and future water users and to collect relevant information on water use. This monitoring and reporting system should be in operation over the next 12 months.

The determination of what is to be the Cap in the ACT will need to be resolved preferably before licences are allocated later in 1999. Of the options that are currently under consideration, the IAG does not favour Options 1 and 4. The IAG would welcome a considered submission from the ACT on this issue as part of the Five-year Review of the Operation of the Cap, which will be undertaken later this year.

Conclusions/Recommendations

- No Cap presently exists for the ACT.
- The IAG, having examined the options under consideration by the ACT and on the basis of the principles applying to other parts of the Basin and taking into account equity:

- considers that Options 1 and 4 would not meet the six principles or 'tests' used to set the Cap in the other jurisdictions; and
- recommends that the ACT bring forward a considered proposal on the Cap in the context of these six principles as part of the forthcoming Five-year Review of the Operation of the Cap.

- For a Cap to be effective in the ACT, the ACT must have access to a broader water trading environment. It is therefore recommended that, as a matter of urgency, the arrangements for water trading between the ACT and NSW be agreed at the same time as the formal adoption of the Cap.
- As an example of the assessments that might be made in the future, the 1998/99 diversion was compared with the diversion expected under Option 2 and was found to be well below the Option 2 target.
- The ACT will need to consider its reporting arrangements to the Commission. Schedule F could be readily applied against a climate-adjusted model of the ACT's consumption levels.



5. Diversions from the Murray-Darling Basin in 1998/99

Murray-Darling Basin diversions in 1998/99 are estimated to be 11,201 GL. From **Figures 1 and 2** it can be seen that this is about 1,733 GL less than the record diversion in 1996/97 and that there have been seven years with higher diversions. The reduction in diversions from 1996/97 is due to the water supply restrictions caused by the drought in the Goulburn, Murray and Murrumbidgee valleys and by the wet conditions in the Lachlan, Macquarie, Namoi and Gwydir valleys, which have suppressed demand.

Of the total water usage in 1998/99, New South Wales diverted 56%, Victoria 32%, South

Australia 6%, Queensland 5% and the Australian Capital Territory 0.2%. Diversions from the individual valleys are presented in **Table 10**.

In many northern streams the water year runs from October to September and, of necessity, the data for these streams are incomplete for 1998/99. However diversions in these streams at the end of the year are typically low. Also diversions for the unregulated streams are still unavailable and are not included. For this reason the diversions in **Table 10** will differ from those that will eventually be published in the 1998/99 Water Audit Monitoring Report.

TABLE 10 — Murray-Darling Basin Diversions in 1998/99

(Note these figures are preliminary and do not include unregulated stream diversions)

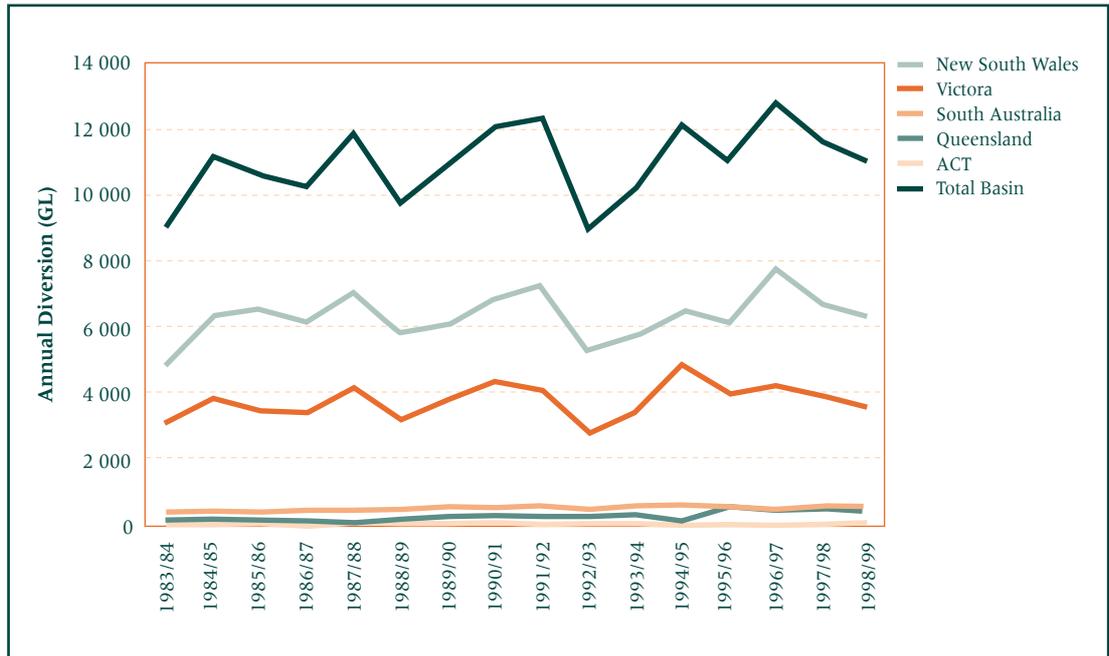
<i>System</i>	<i>Total Diversion (GL)</i>	<i>Percentage of Basin Diversion %</i>
New South Wales		
Border Rivers	166	
Gwydir	295	
Namoi/Peel	237	
Macquarie	336	
Barwon-Darling	246	
Lachlan	282	
Murrumbidgee	2,122	
Lowbidgee	416	
Lower Darling	153	
Murray	2,022	
Total NSW	6,275	56.0%
Victoria		
Goulburn/Loddon/Broken	1,660	
Campaspe	73	
Wimmera-Mallee	162*	
Murray/Kiewa/Ovens	1,742	
Total Victoria	3,637	32.5%
South Australia		
Country Towns	36	
Metro-Adelaide	153	
Other	477	
Total South Australia	666	5.9%
Queensland	600**	5.4%
Australian Capital Territory	23	0.2%
Total Basin	11,201	100.0%

* No data available yet for Wimmera-Mallee. Long term average value used.

** Total diversion (regulated + unregulated) for Queensland is a provisional figure only (water year ends on 30 September 1999)

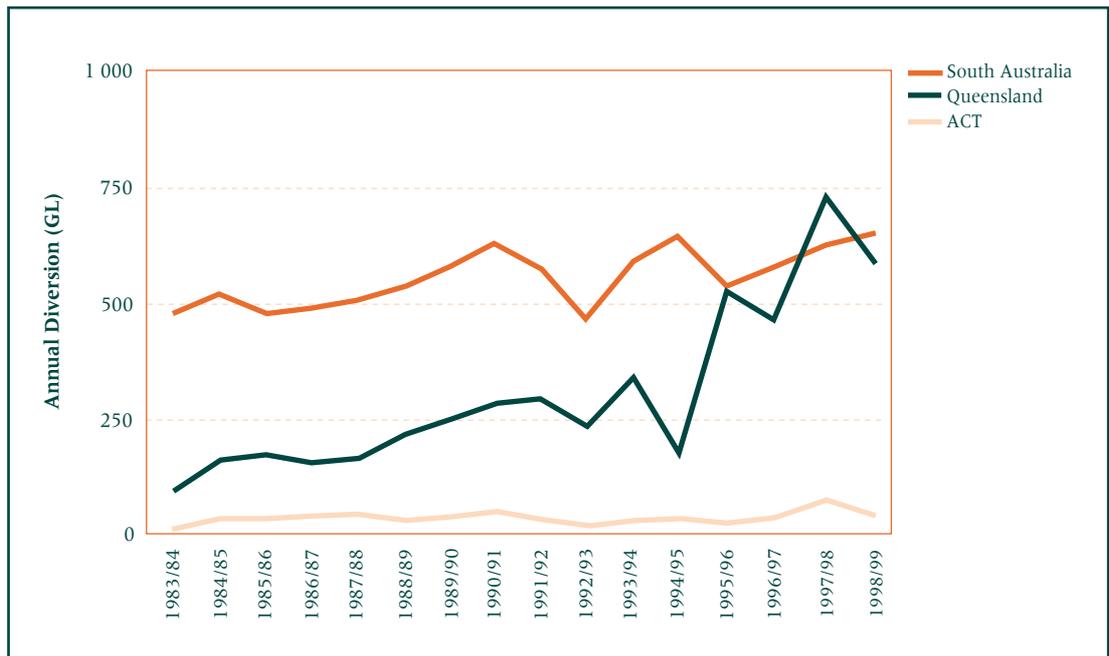


FIGURE 1 — Murray-Darling Basin Diversions — 1983/84 to 1998/99



NB: ACT diversions prior to 1994/95 are, in part, based upon extrapolations from more recent data.

FIGURE 2 — Murray-Darling Basin Diversions — 1983/84 to 1998/99 (usage under 1 000 GL/yr)



NB: ACT diversions prior to 1994/95 are, in part, based upon extrapolations from more recent data.



Responses by the Five State and Territory Governments

The five State and Territory Governments prepared written responses to the Independent Audit Group's Report which was presented to the Murray-Darling Basin Ministerial Council in November 1999. The Council agreed to publish these responses as an appendix to the Independent Audit Group's Report.



SOUTH AUSTRALIA

The IAG has confirmed that all South Australian diversions from the River Murray for 1998/99 were within the Cap targets and that an effective and reliable system has been implemented to monitor these diversions. In preparing their assessment the IAG has noted that actions already in progress will:

- lead to improved reliability of measurement of diversions for the Lower Murray Swamps and the small areas of highland irrigation yet to be rehabilitated; and
- establish a climate adjusted cap target for all highland irrigation.

South Australia is firmly committed to these actions.

The IAG also raise three issues requiring significant further action although it is recognised that some actions have already been initiated. These issues are:

Lower Murray Swamp Allocations and Cap

The IAG note that the current review of water allocation and management for the Lower Murray Swamp irrigation area may result in a proposal to revise the Cap target for this component.

This possibility was identified when the Cap was first proposed in 1995 and the initial Cap figure of 83.4 GL was put forward as a preliminary estimate pending further work to better define the actual net diversions. There is currently no method available to monitor net water diversions in this area and it is assumed that this interim Cap figure is fully utilised.

The local community has prepared a Land and Water Management Plan for the area in consultation with the relevant authorities and negotiations are now under way to identify appropriate water allocations based on Best Practice Irrigation. Once these have been agreed, a proposal for any revision of the current Cap figure (should this be necessary) will be prepared

for the Commission. It is anticipated that this will be completed prior to the next IAG review.

Country Towns Cap

South Australia accepts the proposal by the IAG that the Cap for Country Urban diversions should remain at 50 GL but not be tradeable until a report on the validity of the current Cap figure is completed.

Long term simulations of urban demand using different modelling techniques have been completed recently. The outcomes of these simulations are currently being assessed and a formal submission on the appropriate Cap figure for the Country Urban diversions will be provided to the Commission in the near future. This will allow a recommendation to be put to the Ministerial Council Meeting 28.

Management Framework for Long Term Cap Compliance

The IAG has urged that an appropriate management framework be developed to ensure that diversions for pumped irrigation can be maintained within the Cap target in the long term.

This issue has already been recognised by the South Australian authorities and the Water Allocation Plan being prepared by the River Murray Catchment Water Management Board will identify a range of measures to ensure continued Cap compliance. The initial draft Water Allocation Plan will be completed before January 2000 and the final Plan will be submitted to the Minister for endorsement in mid-2000 after extensive community consultation.

Summary

South Australia has ensured that diversions from the River Murray remain within our Cap targets and is actively working towards the improvements suggested by the IAG.





VICTORIA

Victoria continued implementing the Cap in 1998/99 with the completion of Bulk Entitlements for the Murray and Campaspe systems and further development of climate adjusted models. Diversions since 1997/98 from each of the four designated valleys comply with the Cap.

Diversions from the Goulburn/Broken/Loddon and Murray/Kiewa/Ovens valleys were slightly over target, but were well within acceptable bounds in 1998/99. Cumulative diversions from each of these valleys since 1997/98 are in credit compared with their Cap targets.

As in the previous year, diversions from the Campaspe valley were below the Cap target in 1997/98 reflecting the effects of demand management and tariff reforms in the upper catchment.

Although annual diversion targets are not yet available for the Wimmera-Mallee valley, diversions have continued to reduce as a result of pipelining in the Domestic and Stock system. Significant savings in distribution losses have been returned to the environment in the form of increased environmental flows in the Wimmera and Glenelg Rivers. This has ensured that Wimmera-Mallee diversions remained within Cap in 1997/98.

The IAG has noted that the climate adjusted model covering the Goulburn/Broken/Loddon and Campaspe valleys is now calibrated to 1993/94 level of development and has been submitted to the Murray Darling Basin Commission for audit. Work will continue on improvements to the Broken and Loddon components of this model and on the calibration of the Wimmera-Mallee model as Bulk Entitlements are progressed in these systems.

Victoria will continue to rely on the MDBC model of the Murray system to provide Cap targets for the Victorian component of this Valley.

Sufficient information was provided to the IAG to allow Cap triggers to be calculated using either the standard deviation of model error method in the current Schedule F or the 20% of long-term Cap method in the proposed modifications to Schedule F. Victoria notes that the IAG has chosen to apply the 20% method and supports the adoption of this method in Schedule F.

Victoria will continue to provide accurate and timely water audit information as required. The data provided for the IAG audit is by necessity preliminary due to the audit being conducted in August. Victoria would be able to supply more accurate diversion data to the IAG if it conducted its tour of the States in late September or early October.



NEW SOUTH WALES

NSW continues to base its Cap management strategy on maintaining current development long-term average diversions to levels that are on or below Cap.

Consequently, Cap auditing in NSW consists of the Schedule F annual auditing requirements together with expected long-term diversion auditing, which in allowing for climatic variation and multi-year storage effects quantifies whether the Schedule F declarations of Cap exceedance are appropriate over the long-term or just short term anomalies.

Key conclusions of the IAG report and DLWC's comments are as follows:

Resource Constraints within the DLWC have affected Cap implementation, particularly the development of IQQM's to establish climate adjusted annual Cap targets.

Whilst it is acknowledged that resourcing within the DLWC has led to some delays in completion of the models, and consequently the availability of robust Schedule F Cap auditing tools, management rules aimed at implementing Cap have occurred in all but the NSW Border Rivers and the Barwon-Darling. Further, given the complex nature of IQQM development, the community-based development of many of the management rules, and the whole of government approach to Cap management, provision of additional resources within the DLWC may not necessarily lead to reduced completion times.

No analytical models have been approved yet for the estimated annual Cap targets under Schedule F.

Agreed.

Diversions for 1998/99 exceeded the annual climate adjusted Cap for the Murrumbidgee

Agreed. However, the large rainfall volume that occurred during June 1999 biases the estimate of Cap exceedance. In addition, the Murrumbidgee monthly model still indicates that, with the Cap management responses and the environmental flow rules so far introduced, long-term average Valley diversions will remain under Cap for current levels of development.

The full effect of the Environmental Flow Rules are yet to become apparent, and the introduction of new rules such as the reduction of the 1999/00 season off-allocation availability from 300 GL to 220 GL needs to be taken into consideration.

Although 1998/99 Cap targets are not yet available for the Lachlan and Barwon-Darling, diversions in those valleys in 1998/99 exceeded the long-term Cap estimates.

Agreed for the Barwon-Darling. Whilst acknowledging that the Lachlan Valley has exceeded the Schedule F reporting trigger for 1997/98, NSW is not prepared to accept that this will remain the case over the two year period from 1997/98 to 1998/99. NSW can only agree to the IAG's conclusions if the cumulative Cap total remains above the Cap trigger after the Lachlan IQQM has been updated for 1998/99 climatic conditions.

No annual Cap targets are available for the northern rivers for 1998/99 because the water year in those valleys has not finished.

Agreed.

On the basis of their 1997/98 diversions, the reporting provisions of the draft Schedule F have been triggered for the Lachlan and Barwon-Darling valleys.

Agreed.

Crop areas within a number of valleys have shown significant growth since 1993/94. This may cause future triggering of the Cap when climate adjusted Caps have been established.

Agreed. However, in the Murrumbidgee and Murray valleys only information on rice areas has been available and there are considerable areas of other crops irrigated. Whilst this information has indicated a general increase in rice areas, additional information on other crops would be required in order to determine whether the rice area increase has led to growth in diversions. Further, this information needs to be considered in conjunction with management rules that have been progressively implemented over recent seasons, such as the Environmental Flow Rules.



This conclusion is also based on irrigation behaviour identical to 1993/94.

The Barwon-Darling IQQM indicates that, with current development, long-term diversions in that valley would exceed the long-term Cap.

Agreed.

The introduction of environmental flow rules across most valleys is noted. However, on the basis of one year's experience and the wet conditions that applied across the valley in 1998/99, it is difficult to judge whether these rules will be effective in achieving compliance with the Cap.

NSW is not implementing the environmental flow rules as a Cap response measure. The rules are aimed at protecting the health of individual rivers, not about achieving Cap compliance. NSW has used the Cap as a benchmark against which to assess the impact of the environmental flow rules on water users' access to water. However, based on an assessment of the levels of development which currently exist within each valley and the use of simulation models, the long-term effects of Cap management and environmental flow rules on

valley diversions can be quantified. Consequently NSW believes that, given sufficient time and providing that development levels remain at levels similar to current, the effects of the new water management arrangements will become apparent under the existing Schedule F reporting methodology.

It is recommended that within the spirit of the draft Schedule F, New South Wales should report on the underlying reasons for excessive diversions on the Lachlan and Barwon-Darling including management actions proposed to bring diversions within Cap limits.

Agreed.

It is recommended that New South Wales and Queensland negotiate an agreement for the management of the Border Rivers Flow Management Plan including establishment of objectives, principles, processes and deadlines for achievement of outcomes and report to the next Council meeting.

Agreed — the process for a Flow Management Plan is well under way.





QUEENSLAND

The decision made by the Murray-Darling Basin Ministerial Council on 30 June 1995 to introduce a Cap on water diversions effectively reaffirmed 'holds' already previously placed on the issue of new licences in Queensland. Queensland's Cap arrangements were revised and presented to the Ministerial Council meeting on 28 June 1996, when it became obvious that establishing the final Cap arrangements across the Basin would take longer than expected.

The revised moratorium still applies, and while work on finalising Cap directions continues, Queensland continues to operate under the revised moratorium arrangements. It recognises Queensland's development history and equity position. The need to address the equity issue was clearly recognised by the Ministerial Council in its original decision to introduce a Cap.

Development of a Cap on water diversions in Queensland's section of the Murray-Darling Basin is proceeding based on comprehensive water allocation planning processes accepted by the Ministerial Council's Independent Audit Group.

1. *Interim Capping of Diversions*

The IAG has recommended that diversions by individual licence holders be Capped at 1997/98 levels until the WAMPs are finished and that a moratorium be placed on additional floodplain harvesting.

Although storage capacity has continued to develop over the last year, diversions are managed by licensed access rules that limit and control opportunities to divert from highly variable unregulated streams. Consequently, it can be observed that the total diversions for 1998/99 are less than the previous year because of less favourable conditions for diverting streamflows. This demonstrates that the volume diverted in any year is not solely related to the available storage capacity.

Despite this, following the production of a draft environmental flow technical report for the Condamine-Balonne basin, Queensland has been

concerned that the outcomes of the WAMP process might be unduly compromised by the growth in diversions that have occurred whilst the WAMP has been under development. Accordingly, the Minister for Natural Resources in Queensland is moving to:

- review the general WAMP process being applied in all catchments with a view to accelerating its rate of progress and to enable the setting of key policy decisions (based on a catchment-wide audit of current conditions and trends) at a much earlier stage of the process;
- indicate, through the media, that people in the Condamine-Balonne should re-evaluate their intentions to invest in any further works that will lead to further increases in diversions or harvesting of floodplain flows, as such investments are likely to be at risk given that the sustainable limits of resource usage in the basin may have been reached or even exceeded; and
- require the Department of Natural Resources to more rigorously apply the terms and conditions of water licences in the Condamine-Balonne.

Queensland does not support the arbitrary interim Capping of diversions by individual licence holders based on 1997/98 levels, but remains committed to developing practical and effective approaches to managing extractions in consultation with the community through its WAMP and WMP processes.

2. *Legislative Basis for WAMPs and Floodplain Management*

The IAG has recommended that urgent action be taken to establish a regulatory environment that would enable Cap implementation including appropriate controls over floodplain water harvesting.

Queensland continues to operate under the revised moratorium arrangements (presented to the Ministerial Council meeting on June 1996)



relating to issue of further water licences within the Murray-Darling Basin.

Work is under way to establish a statutory basis for WAMPs in Queensland as a matter of priority. Peak groups are currently being consulted on a number of policy issues in relation to the proposed legislative amendments. An Exposure Draft Bill is expected to be released for consultation by the end of 1999.

The proposed amendments will now include provision for the management and control of the harvesting of overland flows, particularly in river basins where a WAMP is in place. A number of local consultative management planning exercises presently under way will continue to address particular floodplain management issues in the meantime.

Through its WAMP and WMP processes, the State Government is also working with the community to examine the significance and sensitivity of floodplain management issues at the basin-wide scale and the appropriate long-term management responses. The proposed changes to the legislation are planned to include scope for incorporating floodplain management strategies within the framework of a WAMP or WMP for a basin.

3. WAMP Process

The IAG has recommended that the WAMP process be modified to:

- *Clarify the steps in the WAMP process*
- *Publish a catchment-wide audit of current arrangements at an early stage of the process*
- *Structure the planning process to provide government an opportunity to make in principle decisions on the basis of audit information*
- *Establish an independent audit group to review and provide advice to government on the planning outcomes of each WAMP. Such a group could possibly be comprised of three eminent people sourced from the water industry, business and academic sectors.*

Queensland is currently reviewing the experiences to date in the development of WAMPs with a view to identifying current difficulties and successes and examining possible ways to improve, streamline and clarify the WAMP planning process.

To clarify the steps undertaken within the WAMP process, Queensland is examining redefining the process in terms of two distinct phases that clearly differentiate between the initial assessment, review and policy setting phase and the subsequent implementation phase. Completion of the first phase of the WAMP process would present the community and the Government with a much earlier assessment of the current condition and trends apparent in each river catchment, as well as a description of the likely potential for further water extractions.

This approach to WAMPs should also provide government with the opportunity to set key policy directions for a catchment at an earlier point in the process, and respond strategically to the technical assessments made during the first part of the process.

Subject to the outcomes of the review, Queensland is hoping to implement the streamlined WAMP process as soon as possible to all catchments where WAMPs are under way including the Condamine-Balonne basin. This would mean that greater emphasis would be given to completing the first phase as soon as possible in all catchments where planning processes are under way.

In addition, two other independent reviews are presently being undertaken to further streamline the WAMP process. The first of these reviews is looking at the effectiveness of community engagement practices in the WAMP process, and will include the identification and assessment of potential alternative consultative approaches. This review could include an evaluation of the concept of establishing an independent audit group to provide advice to the State government on the planning outcomes of each WAMP.

The second independent review being undertaken by Queensland involves looking at adopting a more standardised methodology for predicting the long-term environmental condition of a river basin based on hydrologic and other assessments, whilst still recognising the special characteristics of each catchment.

The outcomes of these reviews are expected to lead to a more streamlined and effective WAMP process.

4. Current Progress

The IAG has noted that WMPs for the Warrego/Paroo/Nebine and Moonie are expected to be finalised by June 2000, but that it is not possible to provide dates for the finalisation of WAMPs for the Condamine-Balonne or Border Rivers.

The Moonie WMP is well advanced with a daily flow model and an Overview Report on the water resources, the water related environmental features and environmental and social issues now been completed. A Community Reference Panel has been formed and first met in May 1999, with further meetings planned before Christmas.

An Overview Report for the Warrego/Paroo/Nebine WMP is being finalised and Community Reference Panels for each sub-catchment are expected to meet in the latter months of 1999.

An environmental forum for the two WMP areas is being organised through the CRC for Freshwater Ecology, and is planned for November 1999 and the WMPs are currently due for completion by June 2000.

The timing of completion of the Condamine-Balonne WAMP and Border River Flow Management Plan will depend on the outcomes of the review of the WAMP process outlined above, and the timing within which such changes can be implemented.

The IAG recommend that New South Wales and Queensland negotiate an agreement for the

management of the Border Rivers Flow Management Plan including establishment of objectives, principles, process and deadlines for achievement of outcomes and report to the next Council meeting.

New South Wales and Queensland are working together in a whole-of-catchment approach to resource management planning processes in the Border Rivers. In order to reach a common position, both States have made compromises that are likely to lead to a planning process and policy responses that may be different from those applying elsewhere in Qld and NSW.

Considerable progress has been made with the completion of a daily flow model (IQQM) and a recent agreement between the States on the principles, objectives, planned future stages and milestones associated with the proposed Flow Management Planning process. The two States have agreed to adopt a revised planning approach that is based on the streamlined WAMP process being considered by Queensland elsewhere in the State. The estimated date of release of the draft Flow Management Plan is mid 2000.



AUSTRALIAN CAPITAL TERRITORY

Significant progress toward the development of an ACT Cap has been achieved in the last 12 months and the participation of the Independent Audit Group (IAG) has aided significantly in that process.

The Review of Cap Implementation 1998/99, Report of the Independent Audit Group (the Report) is a good reflection of progress to date. The Report indicates that an ACT Cap should be resolved by December 1999 to allow the issue of

licenses from that time. This is not entirely accurate. In fact, licenses can be issued with confidence prior to the resolution of a Cap if the Report recommendation that the ACT Cap is not less than Option 2 (38 GL) is adopted.

The Report invites the ACT to progress discussion through a submission to the Five-year Review of the Operation of the Cap. The ACT intends to make such a submission.

Glossary

<i>Announced allocation</i>	The percentage of water entitlement declared available for diversion from a regulated stream in a season.
<i>Annual allocation</i>	The annual volume of water available for diversion from a regulated stream by an entitlement holder.
<i>Border Rivers</i>	The rivers and tributaries forming, or intersecting the border between NSW and Queensland.
<i>Bulk entitlement</i>	A perpetual entitlement to water granted to water authorities by the Crown of Victoria under the Water Act 1989.
<i>Carryover</i>	Unused allocation that can be used in a subsequent year.
<i>Channel Capacity</i>	The maximum rate at which water can be delivered through a river reach or an artificial channel.
<i>Climate adjusted Cap</i>	The quantity of water that would have been diverted in a given year assuming a specified level of development (eg 1993/94) and estimated from the climatic data such as temperature and rainfall observed in that year.
<i>Diversion</i>	The movement of water from a river system by means of pumping or gravity channels.
<i>Diversion licence</i>	Specified licences issued for a specified annual volume and diversion rate.
<i>Dozer allocation</i>	An allocation that is not fully utilised.
<i>End-of-valley flows</i>	The flow regime at the end of a valley.
<i>GL</i>	Gigalitre: one thousand million or 10 ⁹ litres.
<i>Gravity districts</i>	Districts which use gravity to divert the flow of water from the river.
<i>High security entitlement</i>	An entitlement which does not vary from year to year and is expected to be available in all but the worst droughts.
<i>IAG</i>	Independent Audit Group
<i>IQQM</i>	The NSW daily timestep hydrological model — Integrated Quantity Quality Model.
<i>Irrigation</i>	Supplying land or crops with water by means of streams, channels or pipes.

<i>1993/94 level of development</i>	The development that was in place in 1993/94 that influenced water use including: water supply infrastructure, water entitlements allocated and the extent of their utilisation, water allocation rules, system operating rules, the underlying level of demand for water and the system operating efficiency.
<i>Irrigation</i>	Supplying land or crops with water by means of streams, channels or pipes.
<i>MDBC</i>	Murray-Darling Basin Commission.
<i>MDBMC</i>	Murray-Darling Basin Ministerial Council.
<i>Ministerial Council, the</i>	Murray-Darling Basin Ministerial Council.
<i>Murray-Darling Basin Agreement</i>	The agreement between the Governments of the four Basin States and the Commonwealth. The current Agreement is the 1992 Agreement.
<i>Off-allocation</i>	When unregulated tributary inflows or spills are sufficient to supply irrigation needs and downstream obligations periods of off-allocation can be declared. On such occasions, water used by irrigators with on-farm storage is not counted against an irrigator's allocation
<i>On-farm storage</i>	Privately owned storages used to harvest surplus flows or to store unused allocations for use in the following season.
<i>Permanent transfer</i>	The transfer of water entitlements on a permanent basis. The right to permanent transfers allows irrigators to make long term adjustments to their enterprise and enables new operators to enter the industry.
<i>Private diverters</i>	Licensed to operate privately owned pumps or diversion channels; includes river pumpers and diverters as well as town water supplies.
<i>Property right</i>	In this context, the right to ownership of allocated volumes or water.
<i>Pumped irrigation</i>	In South Australia, this term refers to all River Murray irrigation other than that from the Lower Murray Swamps. It also includes minor stock and domestic, industrial, recreational and environmental allocations.



<i>Regulated streams/waterways</i>	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.
<i>Riparian</i>	Of, inhabiting or situated on the bank and floodplain of a river.
<i>Sales water</i>	In Victoria, water that may be purchased by an irrigator in addition to the basic water right. Access to sales water is announced each season as a percentage of water right depending on the available resource.
<i>Schedule F</i>	The schedule to the Murray-Darling Basin Agreement containing the rules for monitoring and reporting on the Cap on diversions.
<i>Sleeper allocation</i>	An allocation that does not have a history of water usage.
<i>Standard deviation of model error</i>	A measure of the accuracy of the analytical models in determining the annual diversions.
<i>Temporary transfer</i>	Water entitlements transferred on an annual basis.
<i>Unregulated streams</i>	Streams which are not controlled or regulated by releases from major storages.
<i>water entitlement</i>	The legal right of a user to access a specified amount of water in a given period.
WAMP	Water Allocation and Management 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.
WMP	Water Management Plan. This Queensland process is similar to the WAMP although it does not involve the same complexity and detail of hydrologic modelling and environmental studies and will not result in any changes to the way existing entitlements are made.



