Review of Cap Implementation 2001/02
Report of the Independent Audit Group
Including Special Audits of the Lachlan and Gwydir Valleys and Responses by the Five State and Territory Governments

March 2003
Integrated catchment management in the Murray–Darling Basin

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

- **Learning approach**
  - We will learn from our failures and successes.
  - We will learn from each other.
Review of Cap Implementation
2001/02

Report of the Independent Audit Group

Including Special Audits of the Lachlan and Gwydir Valleys and Responses by the Five State and Territory Governments

Independent Audit Group Members

Dr Wally Cox (Chair)
Paul Baxter

MARCH 2003
Acknowledgments

The Independent Audit Group appreciated the cooperation of State and Territory Government agencies and the Murray-Darling Basin Commission. The implementation of the Cap continues to challenge 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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March 2003

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 2001/02.

The Ministerial Council in August 2000 formally adopted Schedule F which specifies the Audit arrangements and this Audit has been carried out in accordance with these provisions.

The IAG notes that Cap arrangements have not been finalised by the ACT and Queensland Governments and for the Border Rivers within New South Wales.

Yours sincerely

DR WALLY COX
Chairman

PAUL BAXTER
Member
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Executive Summary

Following the adoption of Schedule F by the Council for operationalising, monitoring and reporting on Cap implementation, this audit was conducted in line with the requirements of Clause 13 of the Schedule.

The 2001/02 audit identified progress in each of the States and the ACT in establishing and/or operationalising the Cap. There is however a number of strategic issues that need to be addressed. These are:

- the establishment of Cap targets in Queensland, New South Wales and the ACT;
- accreditation of models for Cap assessment;
- quality management systems for collection and reporting of diversion data.

Work is progressing in Queensland, New South Wales and the ACT to establish Cap targets. In Queensland, draft Water resource Plans are out for public comment and discussions are required between the New South Wales and Queensland Governments to establish Caps for the Border Rivers.

Finalisation of a Cap for the ACT is dependent on the establishment of a water trading framework including rules, exchange rates, recording of entitlements and Cap adjustments.

The IAG recommends that the ACT and New South Wales representatives establish the necessary framework to enable trade between them and to enable the ACT to finalise its Cap.

Accreditation of models has commenced with four models assessed and one approved by the Commission with three requiring some adjustments.

As Cap compliance is determined by comparing diversions against modelled targets it is essential that the models be independently verified and accredited. Increased emphasis is required on achieving accreditation.

The IAG recommends that the ACT and the ACT, where relevant, submit valley models for independent verification with a view to 50% of the models being accredited by 30 June 2003 and 100% compliance by 30 June 2004.

In 2000/01 the IAG recommended that each of the States and the ACT develop Quality Management Systems for licensing and collection, storage and retrieval of diversion data.

Concern was expressed that this implied ISO certification.

While desirable this is not essential and the IAG supports the draft Data Management System Protocol developed by the Commission and States/Territory, but considers that such a system should include periodic internal audit by the responsible agency as would apply to any other strategic management system.

The IAG supports the draft Data Management System Protocol and recommends that it be enhanced by the inclusion of an internal audit provision.

The conclusions and recommendations reached by the Audit Group for the 2001/02 year by State and Territory are:

South Australia

- Diversion in 2000/02 was within the Cap.
- Diversion from the Murray/Kiewa/Ovens valley was below the climate-adjusted annual Cap targets for 2001/02.
- Cumulative diversions for the Murray/Kiewa/Ovens and the Campaspe valleys were above the annual Cap targets for 2001/02.
- Substantial progress has been made in developing climate-adjusted models and implementing management frameworks to achieve Cap compliance.
- Bulk water entitlements need to be finalised for the Ovens River, Broken. Wimmera-Mallee and Loddon Basins.

Victoria

- Diversion from the Murray/Kiewa/Ovens valley was below the climate-adjusted annual Cap targets for 2001/02.
- Cumulative diversions for the Murray/Kiewa/Ovens and the Campaspe valleys were in credit while the Goulburn/Broken/Loddon valley has a 35 GL cumulative debit which is substantially less than the Schedule F trigger of 412 GL.
- Substantial progress has been made in developing climate-adjusted models and implementing management frameworks to achieve Cap compliance.
- Bulk water entitlements need to be finalised for the Ovens River, Broken. Wimmera-Mallee and Loddon Basins.
• Models for the Goulburn/Broken/Loddon and Campaspe valleys are expected to gain accreditation by March 2003.

New South Wales

• Diversions in 2001/02 were 6637 GL compared to 7157 GL in 2000/01.
• IQQM Cap models have now been prepared for all river valleys, with the exception of the Murray and the Peel Rivers, and these models await calibration and/or approval under Schedule F by the Commission.
• The Lachlan IQQM model has been approved by the Murray-Darling Basin Commission under the Schedule F provisions, the first model across the Basin to achieve this milestone.
• The Lachlan cumulative deficit is 79 GL and exceeds the trigger of 66 GL for a Special Audit to be undertaken.
• Following the Special Audit, on the basis of available information, the IAG determines that the Lachlan Valley is in breach of the long-term diversion Cap. The IAG notes that NSW has recently announced new management rules and that these may serve to address the breach in the long-term Cap.
• The Gwydir cumulative deficit is now 226 GL and exceeds the trigger of 69 GL for a Special Audit to be undertaken.
• Following the Special Audit, on the basis of available information, the IAG determines that the Gwydir Valley is in breach of the long-term diversion Cap.
• As a result of improvements to the Cap model, the cumulative debit for the Namoi Valley no longer exceeds the Schedule F trigger. The IAG therefore determines that diversions in the Namoi valley no longer exceed the Cap.
• While the trigger has not been exceeded for the combined Barwon-Darling and Lower Darling, the IAG notes that NSW has foreshadowed reduced allocations for the Barwon-Darling, albeit at a rate which the IAG considers may initially be inadequate to reduce diversions to Cap levels.
• The IAG has been unable to assess the Cap compliance for the NSW Border Rivers because the Cap has not been defined in that valley.

• Upon completion of the Integrated 1993/94 and current conditions Model for the Border Rivers, NSW should submit the proposed Cap for that system for assessment by the IAG of the appropriate allowance for the enlarged Pindari Dam.
• The IAG recommends that NSW and Queensland agree to a common approach to the preparation of the models to apply to this system.
• NSW should submit a monitoring report on the Intersecting Streams as required under Schedule F.
• NSW has accepted that the IAG will use a suite of information to reach conclusions regarding Cap compliance as part of a Special Audit.
• NSW continues to maintain that it will use the long-term current conditions modelling to assess the effectiveness of either its current rules or any proposed change in meeting the long-term Cap.
• The IAG would expect any long-term current conditions model to be used as part of a Special Audit to be subject to independent assessment.

Queensland

• Diversions of an estimated 339 GL are the equal second lowest since 1993/94. This follows below average flows for the Border Rivers and a very poor flow year, less than 5% of the long-term average, for the Condamine-Balonne.
• Growth in off-stream storages has been minimal following the moratorium on construction with an estimated total capacity of 1878 GL.
• Draft Water Resource Plans were released for the Border Rivers, Moonie and Paroo/Warrego/Nebine. Public comments closed on 31 October 2002.
• The IAG reviewed the plans and considers that the proposals for the Paroo/Warrego/Nebine meet the audit criteria.
• The proposals for the Moonie and Border Rivers do not meet the Precautionary Principle and would result in further growth in diversions and possible adverse downstream impacts.
• In the case of the Border Rivers the IAG recommends that the long-term flow targets be set to the greater of the flows at November 1999 conditions or 60% of pre-development flow. This differs from the current proposal in the draft Plan which proposes the lower of the two flow levels.

Australian Capital Territory
• No Cap presently exists for the ACT.
• Net diversions of 36.4 GL in 2001/02 exceed the average usage between 1989 and 2001 of 31 GL and a possible climate-adjusted Cap of 34.9 GL. However the ACT would have a cumulative credit of 27.1 GL if the proposed Cap of 38 GL had applied since July 1997.

• The IAG recommends that greater priority be given by the Council, to the resolution of the trading rules across the Basin.
• Once the trading rules are agreed for the Basin to the satisfaction of the ACT the IAG recommends that consideration be given to an average long-term Cap for the ACT of 38 GL/year which should be fully transferable.
• Consideration will also need to be given to the acquisition of Cap for water provided to areas lying outside the traditional ACT/Queanbeyan area that may be supplied from the ACT in the future.
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 in finalising Schedule F agreed that the IAG should have an ongoing role in auditing the implementation of the Cap.

The Council has also asked the IAG to review the Queensland Water Resource Planning 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 in-stream use and the Council has supported the auditing of both the process and outcomes.

Thus the Review of Cap Implementation 2001/02 by the IAG has been prepared in response to the 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 Cap targets for the ACT, Queensland and Border Rivers within New South Wales 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 findings however are entirely those of the IAG.
2. Background

The Council 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 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 with 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 Water Allocation and Management Planning (WAMP) process being undertaken by that State, the outcome of which will be subject to consideration by the Council.

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

- it must accommodate in-stream 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.

In Queensland for unregulated rivers with high seasonal variability, the Council agreed that the Cap may be described in terms of end-of-valley
flows and supporting flow management rules including diversion entitlements until December 2002. After this the Cap in Queensland, as in all other States and the ACT, will be specified as diversion limits on a valley by valley basis.

The 2000/01 Review of Cap Implementation identified that:

- Caps were still to be finalised for the ACT, Queensland and Border Rivers of New South Wales;
- Diversions for South Australia were within the Cap, as were diversions from the Goulburn/Broken/Loddon, Campaspe and Wimmera-Mallee systems in Victoria;
- Diversions from the Murray/Kiewa/Ovens in Victoria were above the climate-adjusted Cap target;
- Diversions from the Lachlan, Namoi and Barwon-Darling/Lower Darling in New South Wales exceeded the Cap;
- Accreditation of models had commenced;
- Quality management systems needed to be introduced for licensing and collection, storage and retrieval of diversion data;
- A water trading framework was required and this should be allocated as a project to the Water Trading Project Management Board;
- Draft Water Resource Plans for Queensland rivers were expected to be released for public comment in 2002.
3. Audit Process

For the purposes of this 2001/02 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 2001/02 as a means of quantifying overall diversions and commenting on 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 Water Resource Plans and finalisation of Cap figures for the ACT and Queensland.

The IAG met with representatives of each of the States and the ACT during the period 21 to 24 October 2002. The format of each meeting was to compare water usage in 2001/02 with Cap targets, to discuss progress with the establishment of models and management frameworks to achieve targets and to discuss issues of possible concern. The IAG also conducted a Supplementary Audit of the New South Wales Border Rivers, Namoi and Gwydir valleys by teleconference on 18 February 2003.

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.

The Audit identified two major process issues that need to be addressed as a matter of urgency to ensure integrity of Schedule F. Schedule F Clause 9 requires that models must be developed for determining annual diversion targets and that the analytical models must be approved by the Commission. A number of analytical models have been developed but only 4 (1 by South Australia, 2 by Victoria and 1 by New South Wales) have been submitted to the Independent Technical Auditor appointed by the Commission to review the Cap models. Only one has been approved by the Commission.

The IAG considers that models need to be finalised for each valley and that the models be formally assessed and accredited to ensure a valid Cap target is established which is auditable. In the interim the IAG is auditing against interim Cap targets. Independent scrutiny of the models will give the Basin community confidence in the Cap management process.

A related issue is that of data quality. The IAG has previously observed a number of cases where diversion data for a given year and valley changed between years and varied from information provided in the Water Audit Monitoring (WAM) Report required under Clause 11 of Schedule F.

The IAG has previously suggested that each State and the ACT implement a Quality Management System for the collection and management of diversion data. A Draft Data Management System Protocol has been developed. The IAG notes however that there is no requirement for periodic audits within each jurisdiction to check the process.

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 MDBC staff, the findings and conclusions presented in this report are entirely those of the IAG.
4. Audit of 2000/01 Cap Implementation

South Australia

• The Cap

As a result of decisions by the Ministerial Council in December 1996 and March 2001 and the finalisation of Schedule F, the components of the South Australian Cap are:

• a five year rolling non-tradeable allocation of 650 GL for metropolitan Adelaide;
• a tradeable allocation of 50 GL per year for country towns;
• an allocation of 103.5 GL per year for the lower Murray Swamps with the following components:
  • 9.3 GL per year for highlands with unrestricted trade;
  • 72 GL per year for swamp use with unrestricted trade; and
  • 22.2 GL per year non-tradeable environmental entitlement
• an average of 440.6 GL per year for other uses in South Australia which is tradeable.

• 2001/02 Usage

South Australia in 2001/02 maintained its record of utilising less than the Cap in both the urban and irrigation sectors (Table 1).

• 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 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.

The issue of Quality Assurance is being addressed. Licensing and diversion data has been audited, a Water Licensing Manual documents processes and a new software package is under development (WILMA – Water Information and Licensing Management Application). This will incorporate trades from March 2003. South Australia also supports the Data Management System Protocol including periodic internal audit.

A model for comparing seasonal diversions in high level irrigation areas and Cap targets has been developed and submitted to the Murray-Darling Basin Commission for assessment.

Interstate trading was down in 2001/02 compared to 2000/01 with 1.4 GL of net permanent trades in and a preliminary estimate of 6.2 GL of net temporary trades out of South Australia. This compares with a net 4.5 GL of permanent trade moving into the State and 3.5 GL of temporary trade moving out in 2000/01.

For permanent interstate trade only, the South Australian Cap increases or decreases by 0.9 GL for every 1 GL traded into or out of the State.

Table 1: South Australian Diversions for 2001/02 (GL)

<table>
<thead>
<tr>
<th></th>
<th>Long-term Cap adjusted for permanent trade</th>
<th>Adjustment Cap as a result of temporary trade</th>
<th>Diversion</th>
<th>Cap Credits (Cap target less diversion)</th>
<th>20% Schedule F Trigger</th>
</tr>
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<tbody>
<tr>
<td></td>
<td>2001/02</td>
<td>Cumulative since 1 July 1997</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Adelaide</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>- current year</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>- rolling 5 years</td>
<td>650</td>
<td>630.4</td>
<td>+29.6*</td>
<td></td>
<td>-</td>
</tr>
<tr>
<td>Country towns</td>
<td>50</td>
<td>35.5*</td>
<td>14.5*</td>
<td>68.4</td>
<td>–10</td>
</tr>
<tr>
<td>Reclaimed Swamps</td>
<td>99.7</td>
<td>99.7</td>
<td>-</td>
<td>-</td>
<td>–20.7</td>
</tr>
<tr>
<td>Other</td>
<td>457.4</td>
<td>–6.2</td>
<td>387.8</td>
<td>+63.4</td>
<td>+285.6</td>
</tr>
</tbody>
</table>

* SA has proposed a 12 GL temporary trade from country towns to Metro-Adelaide. The IAG does not support the inclusion of this 12 GL in the 5 year rolling Cap for Adelaide and has not included it in Table 1.
South Australia, through SA Water, transports water from the Murray to other Basins, i.e., Barossa Valley, Clare Valley. The IAG supports the accounting of diversions and trades as specified in Schedule F and notes that South Australia debits this against the originating allocation.

In 2001/02 a temporary trade of 12 GL was made from country towns to Adelaide. This did not affect performance against the Cap but raises a number of issues addressed later.

- **Monitoring and Reporting**
  The IAG was advised that a modified computer based system for licensing and monitoring of water use (WILMA) will provide the basis for reporting of water use in the future.
  Urban consumption and consumption in rehabilitated irrigation areas are 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.
  It is also proposed to meter all diversions from the Lower Murray Swamps as part of a proposed rehabilitation program.

- **Proposals to Refine Implementation in 2001/02**
  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.

- **IAG Assessment**
  Consumption in South Australia in 2001/02 was within the Cap in both country, urban and irrigation areas. Adelaide’s diversion was less than the nominal annual average of 130 GL/year (actual diversions 82.5 GL). Total diversions over 5 years at 630 GL were within the rolling 5 year Schedule F Cap of 650 GL.
  A temporary trade of 12 GL was made in 2001/02 from country towns to Adelaide to accommodate transfer of water via SA Water infrastructure for rural purposes.

- **Conclusions/Recommendations**
  • Diversion in 2001/02 was within the Cap.
  • South Australia has a reliable system of measurement for urban and irrigation use.
  • South Australia is developing a Quality Management System including a new Water Information and Licensing Management Application.
  • A model has been developed to compare seasonal water use for highland irrigation and the climate-adjusted Cap which has been submitted for verification and accreditation and should be used to assess Cap compliance in 2002/03.
  • If the Metropolitan Adelaide Cap is at risk of breach the IAG recommends that SA Water acquire, by way of permanent trade, water with the same level of security.
Victoria

• The Cap

Victoria is using computer models, calibrated to 1993/94 level of development, to calculate annual Cap targets. The model used to calculate Cap targets for the Goulburn/Broken/Loddon and Campaspe valleys has recently undergone minor re-calibration and has been reviewed by the model auditor. Final calibration results and a revised model report are currently being prepared. The revised model produces a slightly lower long-term Cap for both the Goulburn/Broken/Loddon and Campaspe valleys. This model has been used to calculate the 2001/02 Cap targets and the cumulative credits since 1997.

The model used to calculate the Murray component of the Murray/Kiewa/Ovens valley Cap target has been re-calibrated by the MDBC but is yet to be audited. The 2001/02 Cap target and the cumulative credit since 1997 have been calculated by the updated model.

A methodology that uses regression relationships with rainfall and temperature is being developed to calculate Cap targets for the Ovens component of the Murray/Kiewa/Ovens valley. It is proposed to use this method to calculate the annual Cap targets in the future as the cost of updating the Ovens model annually is very high compared with the small amount of diversion from that catchment.

A model of the Wimmera-Mallee system has been developed and the Bulk Entitlement Project Group has accepted the model calibration. Refinements to the specification of environmental entitlements need to be agreed and built into the model before it can be used for Cap purposes. The target completion date is July 2003.

Victoria remains committed to the ongoing development and improvement of Cap models. The current estimates of the long-term Cap in each system is shown in Table 2.

• 2001/02 Diversions

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

As a result of the continuing drought, the Goulburn and Wimmera-Mallee systems were severely resource constrained during 2001/02. The Murray system benefited from carryover water in Dartmouth and Menindee Lakes.

Diversions from the Goulburn and Campaspe were above their Cap targets for 2001/02. Those for the Murray were 74 GL below target. The Murray and Campaspe remain in credit since Cap accounting commenced in 1997 as shown in Table 2.

Table 2: 2001/02 Diversions (preliminary values) compared with Schedule F Targets (GL/year)

<table>
<thead>
<tr>
<th>Valley</th>
<th>Long-term Cap</th>
<th>2001/02 Cap target</th>
<th>Net adjustment to Cap because of trade*</th>
<th>Diversion</th>
<th>Cap Credits (Cap target less diversion) 2001/02</th>
<th>20% Schedule F Trigger 2001/02 Cumulative since 1 July 1997</th>
</tr>
</thead>
<tbody>
<tr>
<td>Goulburn/Loddon/Broken</td>
<td>2058</td>
<td>1613</td>
<td>–7</td>
<td>1789</td>
<td>–182</td>
<td>–35</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>412</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Murray/Kiewa/Ovens</td>
<td>1665</td>
<td>1966</td>
<td>–1</td>
<td>1892</td>
<td>74</td>
<td>+211</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>–333</td>
<td></td>
</tr>
<tr>
<td>Campaspe</td>
<td>122</td>
<td>105</td>
<td>–</td>
<td>127</td>
<td>–22</td>
<td>+17</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>–24</td>
<td></td>
</tr>
<tr>
<td>Wimmera-Mallee</td>
<td>162</td>
<td>N/A</td>
<td>–</td>
<td>94</td>
<td>N/A</td>
<td>–33</td>
</tr>
<tr>
<td>Interim Mokoan allowance</td>
<td>22</td>
<td>22</td>
<td>–</td>
<td>22</td>
<td>110</td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>4055</td>
<td>3902</td>
<td>–</td>
<td>–</td>
<td>–</td>
<td></td>
</tr>
</tbody>
</table>

* Preliminary estimates only
Goulburn/Broken/Loddon

Resource availability
Inflows to Lake Eildon, the main water resource for the Goulburn system, were only 29% of average during 2001/02. The storage reached a maximum of 44% of capacity in mid-December 2001 but by early June 2002, it had been drawn down to 19%, the second lowest level on record. Run-off from the Goulburn River catchment between Lake Eildon and Goulburn Weir was 27% of average.

The initial seasonal allocation in mid-August 2001 for the Goulburn system was 55% of Water Right or Licensed Volume and no sales. The allocation gradually increased to 100% of Water Right or Licensed Volume by mid-October 2001. No sales allocation was available during the 2001/02 irrigation season as any additional inflows were reserved to supply high security rights in the following season. No off-allocation water was available during the year. This was the fourth irrigation season in a row where the final seasonal allocation was the equal lowest on record.

In the Broken system, Lake Nillahcootie reached 96% full in November 2001 and by early June 2002 it had been drawn down to 46% of capacity. Lake Mokoan reached 64% of capacity in early November 2001 and was drawn down to 41% in early June 2002. Broken system inflows were well below average.

By mid-October 2001, the seasonal allocation for the Broken System had reached 100% of Licensed Volume plus the maximum allowable allocation of 70% sales. During the summer, an 8.9 GL supplement was made available from Lake Mokoan to assist in overcoming channel capacity constraints in the Barmah Choke reach of the River Murray. A further 15.7 GL was released from Lake Mokoan for the lower Goulburn River to reduce the draw on Lake Eildon.

Cairn Curran and Tullaroop reservoirs on the Loddon system peaked at 53% and 56% of capacity respectively. Inflows to these storages for the year were extremely low, with the calculated natural flow at Laanecoorie Reservoir about 13% of average. Cairn Curran and Tullaroop reservoirs were drawn down to 22% and 27% of capacity respectively and remained at low levels during the 2002 winter.

Cap compliance
Diversion from the Goulburn/Broken/Loddon valley was 1789 GL, which is 182 GL (11%) above the Cap target of 1607 GL (preliminary adjustment for trade). Diversions were 13% below the recently revised long-term Cap of 2058 GL/year.

This valley has a cumulative Cap debit of 35 GL since accounting commenced in July 1997 which is only 8% of the 412 GL trigger for Cap exceedance.

The above calculations do not include the 22 GL/year interim allowance for the full utilisation of the Lake Mokoan.

Murray/Kiewa/Ovens

Resource availability
Inflows to both Lake Dartmouth and Lake Hume were below average for the year (73% and 78% of average respectively). Lake Dartmouth reached 89% of capacity in late October 2001 and Lake Hume reached 80% of capacity in mid-November 2001. By the end of the irrigation season, Lake Hume had been drawn down to 8%. At the end of June 2002, Lake Dartmouth was 84% and Lake Hume had recovered to 19% of capacity.

The initial seasonal allocation was 100% of Water Right or Licensed Volume and 74% sales (44% sales for private diverters not on the Mitta Mitta). By mid-November 2001 the seasonal allocation had increased to the maximum possible for the Murray System (100% of Water Right plus 100% sales in the case of gravity supplied areas).

Water from the Menindee Lakes was used for most of the irrigation season to augment flows in the Lower River Murray. In the autumn the available supplement from the Menindee Lakes had been exhausted. Channel capacity constraints were experienced in the mid-Murray during the summer/autumn period and some rationing of supplies was necessary.

Filling of Lake Buffalo was restricted to one metre below design full supply level for the second year in a row because of dam safety considerations. The storage was drawn down to 30% in early June 2002. Lake William Howell filled to capacity in late July 2001, and spilled continuously until early December 2001. By early June 2002, the storage had been drawn down to 26% of capacity. A small supplement
was provided from the Ovens system to the River Murray in early March 2002.

Kiewa River flows at Bandiana were 89% of average.

**Cap compliance**

Diversion from the Murray/Kiewa/Ovens valley was 1892 GL, which is 74 GL (4%) below the Cap target of 1966 GL (no adjustment for trade). The diversion was 14% above the long-term Cap of 1665 GL/year.

This valley has a cumulative Cap credit of 211 GL since accounting commenced in July 1997. The trigger for Cap exceedance is a debit of 333 GL.

**Campaspe**

*Resource availability*

In mid-November 2001, Lake Eppalock reached 65% of capacity and by early June 2002 the Lake had fallen to 28%, which is the third lowest end of season storage volume on record. Inflows to Lake Eppalock for the year were only 7% of average.

Irrigators in the Campaspe system received an initial seasonal allocation of 100% of Water Right or Licensed Volume plus 80% sales. The allocation remained unchanged for the rest of the season. No off-quota allocation was made available.

The high seasonal allocation permitted the maximum possible supplement of Lake Eppalock water (24.7 GL) to the Goulburn System. Trade from the Campaspe System to the Goulburn System further increased this supplement to about 30 GL.

The Coliban storages reached 95% of capacity in early November 2001 and by late June 2002 the total volume in storage was 52%. There were no restrictions imposed in the Coliban system during the year.

**Cap compliance**

Diversion from the Campaspe valley was 127 GL, which is 22 GL (21%) above the Cap target of 105 GL (no adjustment for trade is necessary). This difference is due to the full use of the 24.7 GL Campaspe supplement to the Goulburn system which, although allocated by the model, was not used in the model. The only trigger for use of the supplement in the model is a capacity constraint in the Waranga Western Channel whereas it was called on in 2001/02 because of the very low resource situation in the Goulburn system. Diversions were 4% above the long-term Cap of 122 GL/year.

This valley has a cumulative Cap credit of 17 GL since accounting commenced in July 1997. The trigger for Cap exceedance is a debit of 24 GL.

**Wimmera-Mallee**

*Resource availability*

Continuing record-low stream-flows led to a worsening of conditions going into the 2001/02 season with storages holding only 12% of capacity at the start of the season in May 2001. Restrictions were imposed on domestic and stock customers in the 2001 winter season, with these customers being able to fill only 33% of the dams on their properties. For the third year in a row, no supply went to recreation lakes.

The winter was again relatively dry and spring inflows to Wimmera-Mallee Water storages were below average. Storages peaked at 26% of capacity in November 2001, compared with 19% at the same time the previous year.

Irrigators were limited to 50% of water right with no sales allocation and the summer domestic and stock run was restricted to filling 50% of dams. The environmental allocation was set at 50% of allocation, which enabled 9030 ML to be allocated to the Wimmera catchment and 6020 ML to the Glenelg catchment.

Continuing dry conditions saw the 2002 winter domestic and stock season start with an allocation sufficient for 50% of farm dams being filled. At the end of the financial year Wimmera-Mallee Water storages held 15% of capacity.

**Cap compliance**

Diversion from the Wimmera-Mallee valley was 94 GL in 2001/02. An annual Cap target has not been calculated for this valley as, although a model has been built, it has not been calibrated to 1993/94 level of development. The model was provisionally developed at 1990/91 level of development and the best estimate of the long-term Cap is 162 GL/year.

Diversions for 2001/02 were 42% below the long-term Cap. Usage has remained within Cap as there have been considerable savings since 1993 through construction of the Northern Mallee Pipeline. The pipelining has resulted in reduced diversions and enabled increased allocations for environmental flows.

Completion of Stage 7 of the Northern Mallee Pipeline enabled additional entitlement to be...
created for environmental flows in the Wimmera and Glenelg rivers. The environment’s entitlement from savings increased by 4.6 GL to 34.7 GL/year at the end of the 2001/02 financial year.

**Administration of the Cap**

Between 1995 and 1997 Victoria introduced and refined the following changes to water management in response to the Murray-Darling Basin Ministerial Council decision to cap water use:

- restrictions on temporary and permanent water trading;
- reductions on allocations for a given resource; and
- limits on the issuing of new entitlements.

Monitoring of the effectiveness of the water management policies is undertaken on an ongoing basis. No new policies were introduced for the 2001/02 year and none are proposed for the 2002/03 year, as these measures have continued to be effective and there is no evidence of any growth in diversions in any of the Victorian valleys.

Victoria remains committed to the Cap through the continued establishment and implementation of Bulk Entitlements and Stream-flow Management Plans.

**Bulk Entitlements**

Victoria continued to implement the Cap on regulated systems by establishing Bulk Entitlements in accordance with the Water Act 1989.

The current status of Bulk Entitlements in the Victorian portion of the Murray-Darling Basin is:

- **Goulburn Basin** –Bulk Entitlements were granted in 1995.
- **Murray (Victorian system)** – Bulk Entitlements were granted in July 1999.
- **Campaspe Basin** – Bulk Entitlements were granted in May 2000.
- **Kiewa River** – Bulk Entitlements were granted in the Upper Kiewa in May 2000.
- **Broken Basin** – nearing completion.
- **Ovens River** – nearing completion.
- **Wimmera-Mallee** – progressing.
- **Loddon Basin** – progressing.

**Stream-flow Management Plans**

Interim capping arrangements were put in place in 1995 to constrain diversions on unregulated streams until stream-flow management plans could be developed. The two key rules were:

- no new diversion licences, except through transfer of existing ones (this had largely been in place for some years, but it was now extended to winter-fill licences);
- trade must be downstream and there is a 20% reduction in volume, unless the resulting licence is a winter-fill one.

The stream-flow management planning process is very similar to the one used for the Bulk Entitlements, but the outcome is a plan for managing a number of user entitlements to meet agreed environmental flows. The plans are implemented as policies, which affect the issuing of, and condition set in licences, rostering rules in dry periods, metering and monitoring, and the transfer of licences.

Metering of diversions on all unregulated streams will be necessary to adequately monitor use and detect changes in diversions over time. Programs are being developed that, subject to funding, will see most of the diversions from unregulated streams metered within two years.

Stream-flow management plans will ensure diversions do not increase. They consider what extra development should be allowed into their valleys given local conditions, but any extra development has to be via acquisition of existing rights so that flows in the Murray are not ultimately affected.

Stream-flow management plans are at various stages of completion on the following twelve high priority streams:

- Ovens River above Myrtleford
- Yea River
- King Parrot Creek
- Kiewa River
- Sevens Creeks
- Delatite River
- Nariel Creek
- Avoca River
- Loddon River above Cairn Curran
- Avon/Richardson
- Upper Wimmera River
- Upper Mt William Creek
Public consultation has been completed for two plans and they are currently with the Minister. Two more plans are expected to be finalised by the end of 2002, a fifth is well advanced and the seven others are progressing. Plans for more high priority streams will be developed by Catchment Management Authorities under the Victorian River Health Strategy, which will also promote improved management in all unregulated systems.

**Irrigation Farm Dams**

When water is stored off waterways in catchment dams for irrigation and commercial purposes, farmers and the environment downstream can be affected. The water available downstream can be reduced, the security of downstream farmers can be lessened and environmental flows can be reduced. In addition, compliance with the MDBC Cap would be an issue if the construction of new farm dams were not controlled.

The Government has addressed this issue by passing the *Water (Irrigation Farm Dams) Act* in April 2002.

The main outcomes of this legislation are:

- licensing of all irrigation and commercial use of water, whether the dam is located on a waterway or not (existing irrigation dams will be either licensed or registered and diversion of water authorised under existing water rights or licenses will need to be purchased before new dams are built);
- establishment of Permissible Annual Volumes for catchments across the State to ensure that water use is sustainable;
- establishment of exchange rates to ensure Cap is preserved when licences are traded;
- legislative backing for locally developed Stream-flow Management Plans.

**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 Schedule F reporting. However further improvement may be required to streamline the processing of water trading information.

An estimated 95% of diversions are metered and plans are in place to progressively introduce meters for the unregulated stream diversions.

Victoria supports the Data Management Systems Protocol including periodic audits.

**Proposals to Refine Implementation in 2002/03**

- Model for Goulburn/Broken/Loddon and Campaspe valleys expected to gain Commission approval by March 2003;
- Re-calibration and auditing of the Murray/Kiewa/Ovens model expected to be completed by end of 2003;
- Final calibration of the Wimmera model expected to be completed by July 2003;
- Bulk Entitlement process for Broken expected to be completed March 2003;
- Bulk Entitlement process for Wimmera-Mallee expected to be completed July 2003;
- Bulk Entitlement process for Loddon expected to be completed December 2003;
- Stream-flow Management Plans expected to be approved for four streams by July 2003; and
- Licensing provisions of the Farm Dam legislation expected to be fully implemented by July 2003.

**IAG Assessment**

Diversions for the Murray/Kiewa/Ovens Valley were below the Cap target while those from the Goulburn/Broken/Loddon and Campaspe valleys were above their Cap targets for 2001/02.

The Campaspe and Murray/Kiewa/Ovens have accumulated credits while the Goulburn/Kiewa/Ovens valley had a 35 GL cumulative debit. This compares with a trigger debit of 412 GL.

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 by the MDBC;
• finalisation of bulk entitlements for the Ovens River, Broken and Loddon Basins and the Wimmera-Mallee system;
• 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/Kiewa/Ovens valley were below the climate-adjusted annual Cap targets for 2001/02.
• Diversions from the Goulburn/Broken/Loddon and Campaspe valleys were above the annual Cap targets for 2001/02.
• Cumulative diversions for the Murray/Kiewa/Ovens and the Campaspe valleys are in credit while the Goulburn/Broken/Loddon valley has a 35 GL cumulative deficit which is substantially less than the Schedule F trigger of 412 GL.
• Substantial progress has been made in developing climate-adjusted models and implementing management frameworks to achieve Cap compliance.
• Bulk water entitlements need to be finalised for the Ovens River, Broken, Wimmera-Mallee and Loddon Basins.
• Models for the Goulburn/Broken/Loddon and Campaspe valleys are expected to gain accreditation by March 2003.
New South Wales

**The Cap**

Performance relative to the 2001/02 Cap is assessed for the 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. Diversion outcomes for the northern valleys were not available at the time of the IAG’s initial visit to the States. A Supplementary Audit was therefore carried out on these valleys on 18 February 2003.

The Department of Land and Water Conservation (DLWC) has developed a suite of Integrated Quantity/Quality Models (IQQMs) for each of its major regulated valleys and the Barwon-Darling. The IQQM for the Lachlan has now been approved for use under Schedule F. Interim and final IQQMs are also available for Cap auditing in the Murrumbidgee, Namoi, Gwydir, Border Rivers, Macquarie and Barwon-Darling Valleys. (See Table 3).

For the Murray and Lower Darling, the MDBC’s Monthly Simulation Model is used for Cap auditing. For the 2001/02 year, pending completion of the IQQM model for the Peel valley, an informal assessment of the level of annual water extraction has been made using a climate-diversion relationship.

**2001/02 Usage**

The IQQM models in interim form have primarily been used to determine whether individual valley diversions have exceeded the Cap. The difference between the annual diversion target or climate-adjusted Cap and the actual recorded diversion for each valley is recorded as either a credit or a debit for the year. This is then added to the previous year’s debit or credit, which is then compared to the Schedule F exceedance trigger. This exceedance trigger is 20% of the long-term average diversion generated from the analytical model.

Preliminary information on some of the diversion estimates, particularly for the northern valleys, was initially provided to the IAG. More up to date information was made available by NSW in late February 2003 and this has been included in the IAG’s report for the year.

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 annual Cap values and whether or not those in debit have exceeded the Schedule F trigger.

**Border Rivers**

Allowing 16 GL for unregulated stream diversion, diversions in the NSW Border Rivers in 2001/02 were 199 GL.

The water year commenced in the NSW Border Rivers valley with high allocation levels, as has been the case in recent water years.

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**Table 3: NSW Audit Tools 2001/02**

<table>
<thead>
<tr>
<th>Valley</th>
<th>Auditing Tool</th>
<th>Comment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Murray/Lower Darling</td>
<td>Murray Monthly Simulation Model (Interim)</td>
<td>Awaiting recalibration</td>
</tr>
<tr>
<td>Murrumbidgee</td>
<td>IQQM (Interim)</td>
<td>Preliminary results available</td>
</tr>
<tr>
<td>Lachlan</td>
<td>IQQM (Final)</td>
<td>Approved for use under Schedule F</td>
</tr>
<tr>
<td>Macquarie</td>
<td>IQQM (Final)</td>
<td>To be presented to the Commission for approval</td>
</tr>
<tr>
<td>Namoi</td>
<td>IQQM (Interim)</td>
<td>Preliminary results available</td>
</tr>
<tr>
<td>Peel</td>
<td>Climate-diversion relationship</td>
<td>IQQM under development</td>
</tr>
<tr>
<td>Gwydir</td>
<td>IQQM (Interim)</td>
<td>Preliminary results available</td>
</tr>
<tr>
<td>Border Rivers</td>
<td>IQQM (Interim)</td>
<td>Definition of the Cap not complete</td>
</tr>
<tr>
<td>Barwon-Darling</td>
<td>IQQM (Final)</td>
<td>To be presented to the Commission for approval</td>
</tr>
</tbody>
</table>
In 2001/02 DLWC surveys estimate that 40,000 ha of crops were irrigated with approximately 36,500 ha (92% of the total area) of cotton.

An assessment of on-farm storage capacity in the NSW Border Rivers in 2001/02 indicates a total of 153 GL.

The Ministerial Council has accepted that an allowance be made for the enlarged Pindari Dam and for it to be included in the NSW Border Rivers Cap. The levels of irrigation development commensurate with the Pindari Dam enlargement have yet to be established.

Consequently, it remains unclear whether or not the current development is simply a take up of the allowance for Pindari enlargement as foreshadowed by the Ministerial Council, or growth beyond that allowance. This will be determined when the Cap model is audited for endorsement as per Schedule F.

The Border Rivers IQQM model has been developed, and a 1993/94 and ‘current’ scenario have been produced. Currently there is a consultative process underway with regional irrigation representatives regarding the IQQM modelling, and setting of Cap levels following the enlargement of the Pindari Dam. There is currently no agreed Cap level, and consequently no estimates of Cap are available.

An Annual Allocation Plan was produced for each valley for the 2001/02 water year, outlining the management rules that would apply. Continuous accounting, similar to that currently used in the Gwydir and Namoi valleys, was introduced in the NSW Border Rivers during 2001/02, with a maximum account limit of 100%.

Environmental flow rules have not yet been determined for the Border Rivers. As the Border Rivers are managed under an interstate agreement, as per the New South Wales – Queensland Border Rivers Act 1947 (NSW) and the New South Wales – Queensland Border Rivers Act 1946 (Qld), neither State is able to make unilateral changes to flows without agreement by both of the participating States.

### Table 4: NSW Valley Diversions 2001/02 (GL)

<table>
<thead>
<tr>
<th>Designated river valley</th>
<th>Long-term diversion Cap</th>
<th>2001/02 Cap target</th>
<th>Net trade in to valley</th>
<th>2001/02 diversion</th>
<th>Cap Credits (Cap Target less Diversion)</th>
<th>20% Schedule Trigger</th>
<th>Trigger exceeded</th>
</tr>
</thead>
<tbody>
<tr>
<td>Barwon-Darling</td>
<td>173</td>
<td>83</td>
<td>0</td>
<td>93</td>
<td>-9</td>
<td>-208</td>
<td>-35</td>
</tr>
<tr>
<td>Lower Darling</td>
<td>137</td>
<td>96</td>
<td>+8</td>
<td>126</td>
<td>-22</td>
<td>173</td>
<td>-27</td>
</tr>
<tr>
<td>Combined</td>
<td>Barwon-Darling</td>
<td>310</td>
<td>179</td>
<td>219</td>
<td>-32</td>
<td>-35</td>
<td>-62</td>
</tr>
<tr>
<td></td>
<td>&amp; Lower Darling</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Border Rivers</td>
<td>N/A</td>
<td>N/A</td>
<td>-9</td>
<td>199</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
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<tr>
<td>Gwydir</td>
<td>345</td>
<td>435</td>
<td>0</td>
<td>461</td>
<td>-26</td>
<td>-226</td>
<td>-69</td>
</tr>
<tr>
<td>Namoi/Peel</td>
<td>284</td>
<td>298</td>
<td>0</td>
<td>325</td>
<td>-27</td>
<td>-43</td>
<td>-57</td>
</tr>
<tr>
<td>Macquarie/ Castlereagh/ Bogan</td>
<td>464</td>
<td>561</td>
<td>0</td>
<td>577</td>
<td>-16</td>
<td>111</td>
<td>-93</td>
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<tr>
<td>Lachlan</td>
<td>330</td>
<td>441</td>
<td>0</td>
<td>453</td>
<td>-11</td>
<td>-79</td>
<td>-66</td>
</tr>
<tr>
<td>Murrumbidgee</td>
<td>2322</td>
<td>2619</td>
<td>+31</td>
<td>2312</td>
<td>339</td>
<td>386</td>
<td>-464</td>
</tr>
<tr>
<td>NSW Murray</td>
<td>1904</td>
<td>2127</td>
<td>-33</td>
<td>2092</td>
<td>2</td>
<td>809</td>
<td>-381</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td><strong>6163</strong></td>
<td><strong>6660</strong></td>
<td><strong>6</strong></td>
<td><strong>6637</strong></td>
<td><strong>228</strong></td>
<td><strong>922</strong></td>
<td><strong>-1233</strong></td>
</tr>
</tbody>
</table>

Note: a) All volumes are shown in Gigalitres (GL); n/a indicates estimate is not available.

b) A positive difference indicates a Cap credit, and a negative difference indicates a Cap debit.

c) Long-term Diversion Caps do not include floodplain harvesting components to maintain consistency with observed diversions.

d) Table 4 includes estimates of unregulated diversions for the valleys concerned.
Environmental flow rules for the Border Rivers are planned to be implemented via the development of a Flow Management Plan by NSW and Queensland. Negotiations have recommenced with Queensland, aimed at producing an inter-governmental agreement on common principles for flow management. This would then form the basis for setting of environmental flows.

NSW is committed to establishing environmental flows for the Border Rivers. However, NSW is proposing that any changes in flow arrangements must be within the limit of 10% impact on long-term diversions under 1993/94 levels of development (the Cap) to maintain an approach consistent with other NSW river valleys.

Previous assessments of Cap performance have been made by the IAG and they have expressed some concern about the level of diversions on the NSW Border Rivers in terms of the Cap. A conditional assessment at this time would be that diversions have been above Cap for this valley. Once information is available for the 2001/02 year, the IAG will offer a view as to the likely performance of the Border River area against the Cap. However, until such time, a Cap is agreed (including appropriate allowance for Pindari Dam), this can only be an informal opinion as a guide to the parties involved.

Gwydir Valley

Allowing 11 GL for unregulated stream diversions, diversions in the Gwydir valley in 2001/02 were 461 GL.

The Cap for the regulated sections of the Gwydir Valley is currently assessed using the Gwydir IQQM. The Gwydir IQQM simulation of Cap is currently preliminary, and is being recalibrated to assess the impact of remote sensing data provided by Agrecon Limited on behalf of the Gwydir Valley Irrigators Association. The IAG was asked to arbitrate in a disagreement between irrigators and the DLWC during the year as to the appropriate level of the Cap. It is anticipated that subject to the recalibration referenced above, a final decision can be made on the Cap.

The IAG was asked to adjudicate on the development levels associated with the Cap in this valley. In accordance with the recommendation of the IAG, the DLWC has agreed to reconfigure the Gwydir Valley IQQM based on the data provided by Agrecon. The DLWC has also agreed to base the maximum irrigated area for the Cap scenario at 80000 ha.

In 2001/02 the DLWC surveys estimated that 98900 ha of crops were irrigated, with approximately 77700 ha (79% of the total area) of cotton. This represents a significant increase in the total area irrigated from previous years, most of which seems to be for crops other than cotton.

An assessment of on-farm storage capacity in the Gwydir Valley in 2001/02 indicates a total of 430 GL. This represents an increase of 80 GL (23%) from the previously reported total in 1999/00.

An Annual Allocation Plan (AAP) was produced for this valley for the 2001/02 season, outlining the management rules that would apply. No significant changes were made to management rules for the 2001/02 water year.

The Gwydir IQQM has been used to simulated the 1993/94 Cap, current conditions scenario (based on 1999/00 development), and a Water Sharing Plan scenario. Each simulation uses 108 years of data. The simulated diversions from the river are compared to test the effectiveness of the water access rules in holding Cap.

Long-term simulations indicate that, were development and water access rules to remain as they currently are, the average annual diversions for the future will be 5% below the average annual Cap diversion. Notwithstanding these long-term calculations, the preliminary Schedule F accounting for the period 1997/98 to 2001/02 indicates that the Gwydir River is cumulatively 226 GL above Cap, and therefore in breach of the trigger for special auditing.

Namoi/Peel Valley

Allowing 42 GL for unregulated stream diversion, diversions in the Namoi/Peel valley in 2001/02 were 325 GL.

There are two regulated systems within the Namoi Valley: the Peel River system, which is supplied by Chaffey Dam, and the Manilla/Namoi system, which is supplied by Split Rock and Kepift dams. The Peel water year runs from 1 July to 30 June, whilst the Namoi/Manilla system runs from 1 October to 30 September. Whilst the two systems fall into...
one river valley under definitions given in Schedule F, supporting information is reported separately, as they have different management rules and irrigation behaviour.

The Cap for the regulated sections of the Namoi Valley is currently assessed using the Namoi IQQM. The Namoi IQQM simulation of Cap is currently preliminary, and is awaiting independent audit and approval for use under Schedule F. The Peel IQQM is not yet available for Cap auditing, and a climate-diversion relationship has been used as an indicator.

**Namoi/Manilla System**

The DLWC surveys indicate that around 52,600 ha were irrigated from the regulated Namoi/Manilla system during 2001/02, with cotton areas estimated at 40,000 ha. As has been the case for over ten years, cotton was the dominant crop grown in the Namoi/Manilla portion of the Namoi Valley in 2001/02. Cotton is not grown in the Manilla section of the Valley.

The DLWC estimates of irrigated areas are for regulated surface water only. It should be noted that historically between 25% and 75% of the reported irrigated cotton area in the Namoi Valley is partly or wholly irrigated using groundwater.

A survey of on-farm storage capacity in the Namoi Valley by the DLWC metering staff in 2001/02 indicated that the valley storage total was approximately 198 GL. This represents a 7% increase from the on-farm storage capacity found in the corresponding survey for 2000/01. On-farm storage capacity has grown each year since 1986/87 and from 1993/94 has doubled. This would indicate that, were the season wet, additional water could be taken by these larger dams and pose a risk to Cap. However, since it was a drier than normal year, with the opportunities to divert off-allocation limited, it could be expected that the additional storage would not contribute to growth in the 2001/02 year.

An Annual Allocation Plan (AAP) was produced for the Namoi valley for the 2001/02 water year, outlining the management rules that would apply. There were no significant changes to the management rules from the 2000/01 water year.

The Namoi IQQM has recently been upgraded to better represent early season diversions. The results of this upgrade are reflected in both simulated Cap targets and the long-term simulated diversions under Cap conditions. The cumulative Schedule F account for the Namoi/Peel for the period to 2002 is 43 GL debit which is less than the Schedule F trigger of 57 GL.

The Namoi/Manilla IQQM has simulated both the 1993/94 and current conditions scenarios. Both runs use 106 years of data. The simulated diversions from the river are compared to test for Cap compliance in the long-term. These long-term simulations for the Namoi Valley indicate that were development and water access rules to remain as at currently specified, the average annual diversions for the future will be 3% below the average annual Cap diversions.

**Peel System**

The estimated area irrigated in the Peel system in 2001/02 was around 2,500 ha. This represents an increase of around 800 ha on the previous year but since the area irrigated falls significantly short of the 1993/94 area (of around 3,250 ha), the diversions for 2001/02 could be expected to be below the annual Cap for that year.

There is no significant on-farm storage in the Peel valley.

An Annual Allocation Plan (AAP) was produced for the Peel valley for the 2001/02 water year. This plan outlined the management rules that would apply for the year. There were no significant changes to the management rules that were in place in the 2000/01 water year.

An IQQM for the Peel valley is currently being developed. An estimate of ‘current’ conditions, including current management and environmental flow rules is not yet available.

Based upon the current information available to the IAG for 2001/02, it would appear that the Namoi Valley has not breached the trigger for a special audit and any final decision on the Peel system will need to be made once a climate-adjusted Cap is estimated.

**Macquarie Valley**

The performance of the Macquarie Valley relative to the Cap is being monitored using the DLWC Integrated Quantity and Quality Model. The Macquarie IQQM simulation of Cap is currently preliminary, and is awaiting independent audit and approval for use under Schedule F.

The 2001/02 water year saw high levels of water availability and use. Allowing for an estimated unregulated stream use of 31 GL total diversions for the year amounted to 577 GL against an IQQM modelled Cap of 561 GL. Although diversions were 16 GL above the Cap target for
the year, the Macquarie Valley has a cumulative Cap credit since 1997/98 of 111 GL.

The DLWC has not at present collated survey estimates of irrigated areas or on-farm storages for 2001/02. However, there has been a steady increase in area irrigated back towards the levels achieved in the early 1990s. Cotton has been the main crop and has reached historically high levels of planting in this Valley. On-farm storage is thought not to have increased over the last year and is around 100 GL.

There were no significant changes to the management rules from those applicable in the 2000/01 season in the Macquarie Valley and the environmental flow rules also remained unchanged from the previous season.

The Macquarie IQQM has been configured to produce a 1993/94 and a current (1999/00) conditions scenario for comparison of long-term impacts. Both of these scenarios are used with 110 years of climatic data, and the resultant diversions from the river are compared to ensure Cap compliance in the long-term. The long-term modelling indicates that diversions under current (1999/00) conditions would be below Cap by 18%.

**Barwon-Darling/Lower Darling**

During 1999/00, it was determined that the Barwon-Darling valley had exceeded Cap in 1998/99, and the valley was formally declared in breach of the Cap. At the August 2000 Ministerial Council meeting, agreement was obtained to report the Barwon-Darling and Lower Darling valleys as one, although the two would be managed separately by NSW.

The Barwon-Darling valley receives only unregulated flows from other valleys, and extraction for irrigation is not closely related to local climatic conditions, but rather the access to flows. Licensed pumpers receive no official allocation, and all supply is essentially opportunistic. The Cap for the Barwon-Darling Valley is currently assessed using the Barwon-Darling IQQM. The Barwon-Darling IQQM simulation of Cap is currently preliminary, and is awaiting independent audit and approval for use under Schedule F.

The Barwon-Darling has adopted a 1 July to 30 June water year for the whole valley.

The Lower Darling is a regulated system supplied from Menindee Lakes. The system extends from the upstream limit of the Menindee Storages to the upstream limit of the Wentworth Weir pool influence. At present, auditing is carried out using the Murray-Darling Basin Commission’s Murray Simulation Model (MSM). The MSM estimates are considered preliminary, as a recalibration of the MSM is in progress by the Murray-Darling Basin Commission to better define 1993/94 irrigation development, management roles and behaviour.

The Lower Darling valley water year runs from 1 July to 30 June.

Diversions from the Barwon-Darling for the 2001/02 year are 94 GL which is 9 GL above the Cap. In cumulative terms the Barwon-Darling is 208 GL above the Cap which substantially exceeds the 20% trigger point of 34 GL. The Lower Darling had diversions of 126 GL which is 22 GL above the Cap. The Lower Darling has, on a cumulative basis, a large Cap credit. When the Barwon-Darling and Lower Darling are combined, the cumulative diversions are still above the Cap by 35 GL, but fall below the 62 GL trigger for a special audit.

The DLWC has not collated survey estimates of irrigated areas for 2001/02. Historical irrigated areas from the joint NSW Agriculture/DLWC study, the ‘Barwon-Darling History of Development Project’ indicate growth in irrigated areas for the Barwon-Darling up until 2000/01. Similar growth is also evident in on-farm storage.

As yet, no cropped area estimates for the Lower Darling are available for 2001/02. Historical irrigated areas from the joint NSW Agriculture/DLWC study, the ‘Barwon-Darling History of Development Project’ indicate growth in irrigated areas for the Barwon-Darling up until 2000/01. Similar growth is also evident in on-farm storage.

Nearly all of the on-farm storage capacity in the Lower Darling valley is located on the Tandou property, totalling approximately 160 GL in natural lakes. Although no comprehensive information is available, very little on-farm storage capacity exists elsewhere in the valley.

In 2001/02, there was no significant change to the management rules from the 2000/01 water year for the Barwon-Darling.

Following the breach of Cap in the Barwon-Darling, the Murray Darling Basin Ministerial Council agreed to consider the Barwon-Darling and Lower Darling as one valley for reporting purposes, but that NSW would ensure Cap compliance in each system. NSW has committed to commencing a course of action by July 2002 to return diversions within Cap. The first step in this process was announced in July 2002, being a 5% reduction in volumetric quotas, which will apply for the 2002/03 water year. Further reductions in quotas of 15% for 2003/04 and 10% in 2004/05, subject to further socio-economic reviews, have also been announced.

An embargo on development at 2000 levels...
continues to be in place for the Barwon-Darling system. The management rules have not changed significantly for the Lower Darling for a number of seasons. As water from Menindee Lakes is also a Murray River resource, the availability of water to Lower Darling users is prescribed as part of the Murray-Darling Agreement. Generally the majority of resources in Menindee Lakes are for the Murray River, and the (approximately) 50 GL of entitlements for the Lower Darling have had full allocations every year.

As the Lower Darling River is managed under an interstate agreement (the Murray-Darling Basin Agreement) no individual State is able to make unilateral changes to flows without agreement by either of the participating States. A process to establish environmental flow provisions for the Lower Darling, as part of the Environmental Flows and Water Quality Objectives for the River Murray project, has commenced. A number of options have been approved by the Ministerial Council for more detailed assessment.

Extensive infrastructure development and increases in estimated irrigated areas since 1993/94 indicates that users in the Barwon-Darling River system are continuing to exceed the Cap in the long-term.

The current favourable performance with regard to Cap in the Lower Darling, although preliminary until MSM is recalibrated, is linked to changed access to off-allocation (particularly for Tandou). This has occurred in two parts; an increase in the threshold storage level at Menindee from 1680 GL to 2000 GL before off-allocation is made available, and a more equitable sharing of high flows (to the Darling Anabranch). The raised storage threshold was initially introduced to mitigate the effects of the Hume storage drawdown for remedial works, which occurred during 1996, but has been retained as a long-term operating policy. At present there is no calibrated model which represents current levels of irrigation diversions with which to compare the long-term Cap simulations.

The IAG notes that the DLWC has taken action to try to alleviate the Cap excedence on the Barwon-Darling and to bring diversions back to Cap levels. This action is being taken despite the combined Barwon-Darling/Lower Darling debit is now thought to be less than the 20% trigger.

**Lachlan Valley**

The 2001/02 water year saw high levels of water availability and use. The Lachlan Valley water year runs from 1 July to 30 June. Allowing for estimated unregulated stream diversions of 11 GL, total diversions of 453 GL were above the annual Cap target of 441 GL by 11 GL contributing to a cumulative Cap debit since 1997/98 of 79 GL. This exceeds the 20% trigger of 66 GL and as such will require special auditing by the IAG.

The Cap for the regulated sections of the Lachlan Valley is currently audited on an annual basis using the results of the Lachlan Valley IQQM. The Lachlan Valley IQQM has recently been approved by the Murray-Darling Basin Commission under Schedule F. This is the first valley Cap model in the Basin to achieve this milestone. NSW is to be commended for its preparation and audit under this process.

The irrigated area in the Lachlan valley for 2001/02 has been estimated by the DLWC at 80500 ha.

There is no significant on-farm storage development in the Lachlan Valley. An Annual Allocation Plan was produced for this valley for the 2001/02 season, outlining the management rules that would apply. There were no significant changes to the management rules from the 2000/01 season. The environmental flow rules (EFRs) remained unchanged from the previous season.

The maximum carry-over from the 2000/01 season remained at 50% of licensed entitlement. As noted above, diversions in the Lachlan Valley are in breach of the trigger requiring a special audit by the IAG. NSW has developed management rules that target long-term outcomes in addition to annual outcomes. The Water Reforms process has consequently been based on long-term modelling of management rules. For the Lachlan Valley, the upgraded IQQM has been configured to represent 1993/94 conditions. An estimate of ‘current’ conditions, including irrigation infrastructure and behaviour at 1999/00 and current management and environmental flow rules is also available. Both of these scenarios are used with 102 years of climatic data, and the resultant diversions from the river are compared to ensure Cap compliance in the long-term.

The long-term modelling indicates that diversions under current (1999/00) conditions will be below Cap by 4%.
Further analysis undertaken by the DLWC suggests that there may be some cyclic climate change process that occurred in the late 1940s and that could have an impact upon aspects of the long-term modelling. It is expected that the DLWC will explore these issues further as part of its participation in a special audit for this Valley. The DLWC notes that a Water Sharing Plan is also under consideration for this Valley. This may affect the performance of this valley against the Cap.

**Murrumbidgee Valley**

The 2001/02 water year saw high levels of water availability and use. Allowing for an estimated 6 GL of unregulated stream use, total diversions for the Murrumbidgee Valley were 2312 GL including 128 GL for the Lowbidgee. These diversions are below the 2001/02 annual diversion Cap target of 2619 GL including 161 GL for the Lowbidgee.

The Cap for the regulated sections of the Murrumbidgee Valley is currently assessed using the Murrumbidgee IQQM. This hydrologic model estimates diversion Cap for the regulated system below Burrinjuck and Blowering storages, and for the Lowbidgee Flood Control and Irrigation District. The Murrumbidgee Valley water year runs from 1 July to 30 June.

An aerial photography of rice areas across this Valley indicates 90021 ha of rice were irrigated in the Murrumbidgee Valley in the 2001/02 season. This represents a 13% increase from the area planted in 1999/00 and, is the highest rice area total for the Murrumbidgee Valley on record.

At present, irrigated areas of other crops are not fully available, but are still thought to contribute to around 30% of the valley water use. No estimates of areas of specific crops are routinely collected for Lowbidgee. The main crops appear to be winter cereals and sunflower.

There is no significant on-farm storage development within the Murrumbidgee Valley.

An Annual Allocation Plan was produced for this valley for the 2001/02 season, outlining the management rules that would apply. The only significant changes to the management rules from the 2000/01 season were a number of small changes to trading arrangements for high security licences. These changes were:

- The annual temporary trade Cap of 60 GL for the valley was removed.
- The deadline for applications of intent to make a temporary trade was brought forward from 18 October to 1 August.

Cap accounting has been performed using the provisional Murrumbidgee IQQM. The preliminary Schedule F accounting for the 1997/98 – 2001/02 seasons indicates that the Murrumbidgee Valley is cumulatively 386 GL below the Cap.

The long-term modelling indicates that diversions under current (1999/00) conditions will be below the Cap by 3%.

At present, there has been no decision to reduce the Lowbidgee district’s access below Cap, and the access rules for the Lowbidgee remain unchanged from 1993/94. However, the introduction of environmental flow rules for the Murrumbidgee Valley will affect the level of access available to Lowbidgee, which may require changes to its access rules.

**Murray Valley**

The Cap for the regulated sections of the Murray Valley is currently audited on an annual basis using the Murray Simulation Model. The Murray Valley water year runs from 1 July to 30 June.

Allowing for an estimated 6 GL of unregulated stream diversions, total diversions in the 2001/02 year were 2092 GL compared with an annual Cap diversion target of 2127 GL. Allowing for trade, diversions this year were 2 GL below the Cap increasing the cumulative credit to 809 GL.

Satellite imagery measurements of rice areas indicate 64000 ha of rice were irrigated in the Murray Valley in the 2001/02 season. This area is less than the 87400 hectares of irrigated rice reported by the Rice Growers Association survey for 2000/01.

The 2001/02 Annual Allocation Plan for the Murray and Lower Darling valleys outlines the management rules that would apply during the water year. There were two significant changes to the allocation management rules from the 2000/01 water year: the maximum carryover was increased from 35% to 50%, and some minor changes to trading arrangements also occurred.

An additional 25 GL has been set aside (by both NSW and Victoria), subject to allocation constraints for environmental flows to the Barmah-Millewa forest. There have also been a number of changes to the carryover and borrow provisions for this environmental water which allow accumulation of larger volumes of water and augmentation of allocations during periods of low allocations.
The DLWC is unable to assess long-term outcomes from its current management rules until such time as the MSM is able to produce a ‘current’ scenario (with an independently calibrated irrigation demand) with which to compare against the 1993/94 scenarios results. However, on a preliminary basis using the MSM the NSW Murray Valley was 2 GL in credit in 2001/02 and has accumulated 809 GL of Schedule F credits since July 1997.

**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, in conjunction with the EFRs, are designed to ensure that diversions from the various valleys comply with the Cap in the longer-term.

NSW has introduced a number of management rules in recent years although in 2001/02 there have been a few changes to these rules. One possible change that NSW is considering is the limiting of maximum allocations that can be made in any one season. Table 5 highlights the difference between the Cap as currently defined and the water entitlement in certain valleys.

NSW recognises that the difference between the allocation entitlements and the Cap creates an ongoing problem in certain valleys which will need to be addressed by an appropriate use of all available management tools.

As part of the administration of the Cap for the Border Rivers, NSW has developed a model of the Border Rivers for 1993/94 and current conditions scenarios. NSW is proposing to adopt 1993/94 conditions of development with an adjustment for the Pindari Dam. However, this will not necessarily resolve the management of this system which is shared with Queensland. The Queensland approach is to model using conditions in November 1999 based on the timing of the Ministerial agreement between the two States relating to the Cap arrangements for the Border Rivers.

The 1993/94 conditions updated for the Pindari dam may broadly reflect November 1999 conditions of development. However, this may not necessarily be so. Furthermore, the IAG has a responsibility to test the assumptions relating to the Pindari Dam under the terms of reference provided by the Council.

In considering the ways in which to model the Border Rivers system, the IAG would favour the use of diversion Caps rather than end-of-valley flow Caps for each side of the border. Diversion Caps will ultimately provide an end-of-valley outcome including environmental flows for the total system.

**Monitoring and Reporting**

The issue of monitoring and reporting on the Cap has been the subject of some difficulty. There is the practical difficulty created by the later water year (October to September) that applies to the northern rivers. This means that at the time the IAG commences its audit of performance for the most recent water year, NSW is unable to provide data for the year in question for the northern rivers.

This is a practical difficulty which the IAG believes can be resolved through a process of updating the audit report as soon as the diversion data becomes available, normally at the beginning of the following calendar year.

NSW has also placed considerable reliance upon the use of its long-term current conditions model in assessing whether or not the Cap has been exceeded and whether corrective action needs to be taken. In the recent round of meetings with the States, NSW has taken the opportunity to highlight, for a number of valleys for which 2001/02 diversion data is available, the probability that the diversions have in practice exceeded the Cap from a long-term modelling perspective.

However, NSW has now acknowledged that its long-term current conditions modelling is but one piece of information that should be considered as part of a Special Audit, which is triggered by the annual Schedule F reporting and review procedure. Other items of information that can be considered include inter alia crop areas, on-farm storage capacity, rainfall, trends in diversions, and climatic conditions. Ultimately a judgment will need to be made in the context of all these indicators, and in providing advice to the Council the IAG will look to as many indicators as possible so as to assist informed debate and decision taking.

To date the IAG has not received a report from NSW on diversions for the Intersecting Streams. Schedule F lists the NSW Intersecting Streams as a designated river valley. Diversion on these streams is believed to be small although it is
understood that entitlements exceed current usage. Uptake of these entitlements could become an issue within the Council as Queensland moves to cap the streams (including the Narran River) upstream.

There has also been little progress made on the issue of monitoring diversions under the volumetric licences on unregulated streams. There is some concern that here again granted licensed volumes may exceed historic use. Monitoring and reporting on these streams needs to occur over the next three years.

Reporting on floodplain diversions is also not clear. It is understood that these diversions have notionally been included but not reported in the IQQM modelling undertaken in some valleys. However, data on floodplain diversions is not available. The draft Water Sharing Plans for many valleys endorse a policy for metering floodplain diversions and this policy is supported by the IAG.

**IAG Assessment**

NSW has again provided an informative report to the IAG together with data in line with the Schedule F format. There are still data problems mainly due to the timing of the delivery of reports associated with the end of the water year. Progress has been made on the development of the IQQM models and the Lachlan is the first model to be approved by the Commission.

The IAG’s assessment based upon information provided is that the Lachlan and Gwydir valleys are in breach of the trigger for a Special Audit. Although a final IQQM model is not available for the Border Rivers, indications are that it also has exceeded the Cap. The Barwon-Darling is over the Cap, although when combined with the Lower Darling it does not exceed the trigger for a Special Cap Audit. The IAG therefore recommends that Special Audit is required for the Lachlan and Gwydir valleys.

NSW has commenced action to address the exceedance of the Cap on some of these systems. For the Lachlan, the NSW is considering, via its Water Sharing Plans, actions necessary to ensure Cap compliance. For the Barwon-Darling, a reduction in allocations is proposed to reduce diversions, although the proposed allocation reduction program for the Barwon-Darling is considered by the IAG to be too limited.

The IAG has been pleased to note that there now has been acceptance by NSW that the IAG will use a suite of information to reach conclusions regarding Cap compliance as part of a Special Audit. NSW continues to maintain that it will use the long-term current conditions modelling to assess the effectiveness of either its current rules or any proposed changes in meeting the long-term Cap. The IAG recommended in its previous report that the assumptions adopted in the current conditions model used in any Special Audit should be reviewed by an independent expert. It is the IAG’s intention to seek the assistance of an independent expert to review the assumptions in such models when they form part of the evidence considered as part of a Special Audit.

The IAG notes that NSW has now completed three IQQM models and two are currently awaiting verification by an independent expert. NSW has raised some concerns about aspects of the MSM model used for the NSW Murray Valley. The IAG intends to seek independent consideration of this model, particularly as it appears to continually produce Cap credits despite apparent growth in diversions.

The IAG is concerned with certain aspects of finalising a Cap for the Border Rivers despite recent meetings held between NSW and Queensland to start to address aspects of the modelling for this system. There still appears to be some inconsistencies between the approaches proposed by NSW and Queensland. From an overall Cap management and reporting perspective aside from the equity issues for irrigators on both sides of the border, it would be more appropriate if a common approach was taken.

Table 5: Water use in 2001/02 for selected NSW valleys

<table>
<thead>
<tr>
<th>River valley</th>
<th>Water entitlement (GL)</th>
<th>Total allocated water (GL)</th>
<th>Diversions 2001/02 (GL)</th>
<th>Annual Cap Credit for 2001/02 (GL)</th>
<th>Long-term Average Cap (GL)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Border Rivers</td>
<td>266</td>
<td>256</td>
<td>199</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>Namoi/Peel</td>
<td>313</td>
<td>313</td>
<td>325</td>
<td>-27</td>
<td>284</td>
</tr>
<tr>
<td>Lachlan</td>
<td>667</td>
<td>631</td>
<td>453</td>
<td>-11</td>
<td>330</td>
</tr>
<tr>
<td>Barwon-Darling</td>
<td>518</td>
<td>518</td>
<td>93</td>
<td>-9</td>
<td>173</td>
</tr>
</tbody>
</table>
adopted. The IAG would prefer to see the model based on individual diversions rather than end-of-valley flows for the two parts of the Border Rivers system.

The question of unused entitlements for Intersecting Streams and Unregulated Streams needs more urgent attention. The IAG has yet to receive a report on Intersecting Streams despite their inclusion as a designated river valley in Schedule F.

• Conclusions/Recommendations
  • Diversions in 2001/02 were 6637 GL compared to 7157 GL in 2000/01.
  • IQQM Cap models have now been prepared for all river valleys, with the exception of the Murray and the Peel Rivers, and these models now await calibration and/or approval under Schedule F by the Commission.
  • The Lachlan IQQM model has been approved by the Murray-Darling Basin Commission under the Schedule F procedures, the first model across the Basin to achieve this milestone.
  • The Lachlan cumulative deficit is 79 GL and exceeds the trigger of 66 GL for a Special Audit to be undertaken. NSW is considering, via its Water Sharing Plans, actions necessary to ensure Cap compliance in the Lachlan Valley.
  • The Gwydir cumulative deficit is now 226 GL and exceeds the trigger of 69 GL for a Special Audit to be undertaken.
  • As a result of improvements to the Cap model, the cumulative debit for the Namoi Valley no longer exceeds the Schedule F trigger. The IAG therefore determines that diversions in the Namoi valley no longer exceed the Cap.
  • While the trigger has not been exceeded for the combined Barwon-Darling and Lower Darling, the IAG notes that NSW has foreshadowed reduced allocations for the Barwon-Darling, albeit at a rate which the IAG considers may initially be inadequate to reduce diversions to Cap levels.
  • The IAG has been unable to assess the Cap compliance of the NSW Border Rivers because the Cap has not been defined in that valley.
  • Upon completion of the Integrated 1993/94 and current conditions Model for the Border Rivers, NSW should submit the proposed Cap for that system for assessment by the IAG of the appropriate allowance for the enlarged Pindari Dam.
  • The IAG recommends that NSW and Queensland agree to a common approach to the preparation of the models to apply to this system.
  • NSW should submit a monitoring report on the Intersecting Streams as required under Schedule F.
  • NSW has accepted that the IAG will use a suite of information to reach conclusions regarding Cap compliance as part of a Special Audit.
  • NSW continues to maintain that it will use the long-term current conditions modelling to assess the effectiveness of either its current rules or any proposed change in meeting the long-term Cap.
  • The IAG would expect any long-term current conditions model to be used as part of a Special Audit to be subject to independent assessment.
Queensland

• The Cap

In line with the Council’s earlier decisions, the Queensland Cap is to be established in accordance with the provisions of Schedule F following the completion of the Water Resource Planning processes.

Three draft Water Resource Plans were released in July 2002 for public review and comment in accordance with the Water Act 2000. These plans are expected to be finalised at the beginning of 2003. The Condamine-Balonne valley is awaiting the outcome of an independent review by a panel of eminent scientists to determine the next planning stage.

Valley Caps for Queensland valleys are expected to be established in late 2003 following implementation of the final plans through Resource Operations Plans.

Moratoria are in place in all Queensland Murray-Darling valleys which prevent further storages, pumps etc., including works authorised under licence, from being constructed until the Water Resource Plans have been implemented.

In July 2002, the IAG audited the draft Plans in line with the principles endorsed by the Ministerial Council, and concluded that:

• Any adverse impact of proposed increased water use in the Warrego/Paroo/Bulloo/Nebine is likely to be minimal;

• The proposals for the Moonie River draft Plan do not meet the Precautionary Principle and may have significant impact downstream of the border. Diversions in the Moonie should be pegged at current levels until it can be demonstrated that the additional allocations are justified in terms of minimal impacts downstream; and

• In the Border Rivers, it would appear prudent for Queensland to apply the Precautionary Principle and set the long-term flow requirements at November 1999 conditions or 60% of the pre-development level, whichever is the greater not the lesser as proposed.

In August 2000, the Ministerial Council agreed to retain references to end-of-valley flows as an optional interim measure for Queensland compliance with the Cap until December 2002. It agreed that from December 2002, compliance would be on the basis of diversions on the same principles as other States.

• 2001/02 Diversions

The diversion profile over the last 9 years for the total Queensland section of the Basin is summarised in Table 6 below:

<table>
<thead>
<tr>
<th>Year</th>
<th>Diversions</th>
</tr>
</thead>
<tbody>
<tr>
<td>1993/94</td>
<td>336</td>
</tr>
<tr>
<td>1994/95</td>
<td>176</td>
</tr>
<tr>
<td>1995/96</td>
<td>528</td>
</tr>
<tr>
<td>1996/97</td>
<td>467</td>
</tr>
<tr>
<td>1997/98</td>
<td>741</td>
</tr>
<tr>
<td>1998/99</td>
<td>609</td>
</tr>
<tr>
<td>1999/00</td>
<td>541</td>
</tr>
<tr>
<td>2000/01</td>
<td>688</td>
</tr>
<tr>
<td>2001/02</td>
<td>339</td>
</tr>
</tbody>
</table>

The categories of 2001/02 diversions are summarised in Table 7:

<table>
<thead>
<tr>
<th>Diversion category</th>
<th>Diversions (GL)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Irrigation Area Channels</td>
<td>54</td>
</tr>
<tr>
<td>Private Diversions</td>
<td>105</td>
</tr>
<tr>
<td>Water Harvesting</td>
<td>138</td>
</tr>
<tr>
<td>Unregulated Stream Licences</td>
<td>29</td>
</tr>
<tr>
<td>Urban and Industrial</td>
<td>13</td>
</tr>
<tr>
<td><strong>Total (GL)</strong></td>
<td><strong>339</strong></td>
</tr>
</tbody>
</table>

Rainfall throughout the year has been well below average in the northern, eastern and southern parts of the Basin in Queensland (approximately 50% of the average) improving to approximately 80 to 90% of average in the western sections. Most of the major storages in the Queensland section of the Basin came into the water year at 30 to 50% of capacity following a winter with very little stream-flow and pre-watering activity in September 2001. Ring tank storages in the Condamine-Balonne started the season at only 30 to 40% of capacity following the limited water-harvesting opportunity in the 2000/01 water year, whilst ring tank storage in the Border Rivers was around 60 to 70% of capacity after some water-harvesting late in the 2000/01 season.
This year has been one of the low to extremely low stream-flows years in all areas of the Queensland part of the Basin.

- Flows in the Border Rivers were well down on last year with total flow passing Goondiwindi approximately 40% of the long-term annual average of 1030 GL.
- The Warrego River flow was almost two thirds the long-term average (290 GL for the year compared with an annual average of 386 GL). The flow in the previous year was twice the average.
- The Condamine-Balonne catchment experienced very low flows throughout the catchment, delivering only 5% of average in the Balonne and less in the upper reaches.
- The Moonee catchment also had only 5% of average flows.
- The Paroo catchment delivered less than 50% of average flows.

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

**Condamine-Balonne**

**Upper Condamine (Darling Downs)**
Flow has been very limited at Chinchilla peaking at around 4000 ML/day in a single flow event in December 2001. Bank full flows at this site are in the order of 70000 ML/day. Flows that did occur originated in the upstream end of the catchment and so the flow at Chinchilla has been impacted by upstream water-harvesting diversions. Diversion above Chinchilla is estimated at 20 GL for the 2001/02 year, with a net measured annual volume of flow at Chinchilla of 10 GL. Long-term average annual flow is 597 GL.

**Balonne**
From December 2001 to April 2002, Beardonmore Dam received several small inflows. These were captured by the dam and released as compensation flows to supply stock and domestic users at 730 ML/day. Limited releases of water allocation were made over the same period. In mid to late April, irrigators entered into an agreement to release additional stored water because of the critical level of downstream stock and domestic supplies. Beardonmore Dam did not spill during the year.

Total water-harvesting diversion is estimated at 10 GL for the year between Chinchilla Weir and Beardonmore Dam. Below Beardonmore Dam, flows failed to reach start thresholds and consequently there was no water harvesting in the Lower Balonne this year.

**Border Rivers**
There was only one significant flood flow event in the Macintyre River through the year. This was in November 2001 peaking at over 53000 ML/day. This was followed by a much smaller event in April of 15000 ML/day. Water-harvesting diversion in the valley is estimated at 95 GL for the year, 51 GL (55%) of which was metered and related to diversions in the regulated section of the Dumaresq-Macintyre system. The balance was primarily associated with diversions from the Weir River system. Total flow through Goondiwindi for the year was 413 GL with a further 18 GL being contributed from the Weir River downstream of Goondiwindi. Average annual flow past Goondiwindi is 1040 GL.

**Moonie**
There were only three flow events of any note in the Moonie during the past 15 months with the January flow being the largest but peaking at only 1150 ML/day. It is estimated that the limited water-harvesting development in the Moonie catchment diverted approximately 5 GL from the upper parts of the system. Flows failed to reach start thresholds in the lower reaches. A net total of 7.5 GL flowed past the Fenton gauge for the year. Recorded average annual flow is 156 GL.

**Warrego**
The total volume of flow for the Warrego was greatly reduced from the previous year to 290 GL. This was almost totally contained in a single flow event in January 2002. Water-harvesting diversion is estimated at 8 GL for the year into an estimated 13 GL of associated storage. There is only 10 years of record for this gauge so the recorded average annual flow of 386 GL needs to be treated with some caution. An upstream gauge with a 34 year period of record indicates a system annual average of 530 GL.

**Paroo**
The Paroo River performed only slightly better than the previous year with total volume of flow
for the year at 242 GL. Average annual flow is 555 GL. There is no water-harvesting development on the Paroo and negligible irrigation development.

**Water-harvesting**

Volumes water-harvested from the more developed catchments in the October 2001 to September 2002 period are summarised in Table 8.

The limited stream-flow and related access opportunity in the Condamine-Balonne catchment resulted in diversion from the system comparable with that of the 1994/95 drought year despite a marked increase in infrastructure. The relatively low level of diversion in the Border catchment (approximately 30% of ring tank capacity) reflects limited opportunity early in the season when a reasonable volume was stored in ring tanks from the previous year.

Auditing of irrigation infrastructure is continuing in the Queensland valleys. This auditing process, combined with the overland flow notification process outlined in the draft Water Resource Plans, will continue to provide more accurate estimates of storage capacity. Estimated ring tank capacity for the Queensland section of the Murray Darling Basin is approximately 6 GL higher than that reported in September 2001. The increase is due to additional storage being identified in the Basin and minor additional storage being sanctioned under the moratorium. The increase has been slightly offset by works that were previously sanctioned under the moratorium not being completed by due dates. This previously sanctioned storage no longer satisfies ‘started’ criteria under the moratorium and is unable to be completed whilst the moratorium remains in place (see Table 9).

**Irrigation**

With major storages average around 35% of capacity, available water for the water supply schemes was down on last year and generally in the order of 50% of nominal allocation. The exception was Beardmore Dam at St George starting the year at only 35% of capacity and 15% announced allocation. Most announced allocations were revised upwards to 100% during the year as some inflow occurred. The increase in announced allocations did however occur late in the water year.

Glenlyon Dam in the Dumaresq River Irrigation Project on the border moved to a continuous accounting system this year. Under this system irrigators in the Dumaresq had 54% of allocation available to them at the start of the 2001/02 water year.

Approximately 150 GL of a total nominal allocation of 212 GL was delivered through the

---

Table 8: Water-harvesting

<table>
<thead>
<tr>
<th>Gauging station</th>
<th>Average annual recorded flow (GL)</th>
<th>2001/02 recorded flow (GL)</th>
<th>Approx. volume harvested (GL)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Condamine R @ Chinchilla</td>
<td>597</td>
<td>10</td>
<td>20</td>
</tr>
<tr>
<td>Balonne R @ St George</td>
<td>1210</td>
<td>64</td>
<td>10</td>
</tr>
<tr>
<td>Macintyre R @ Goondiwindi</td>
<td>1040</td>
<td>431*</td>
<td>95</td>
</tr>
<tr>
<td>Total</td>
<td>-</td>
<td>-</td>
<td>125</td>
</tr>
</tbody>
</table>

* including Weir River inflows

---

Table 9: Growth in Stream-Based Ring Tank Capacity (GL)

<table>
<thead>
<tr>
<th>Catchment</th>
<th>September 1999</th>
<th>September 2000</th>
<th>September 2001</th>
<th>September 2002</th>
</tr>
</thead>
<tbody>
<tr>
<td>Condamine-Balonne</td>
<td>822</td>
<td>1273</td>
<td>1330</td>
<td>1333</td>
</tr>
<tr>
<td>Border</td>
<td>188</td>
<td>267</td>
<td>329</td>
<td>332</td>
</tr>
<tr>
<td>Moonee</td>
<td>10</td>
<td>18</td>
<td>21</td>
<td>21</td>
</tr>
<tr>
<td>Warrego/Paroo</td>
<td>6</td>
<td>8</td>
<td>12</td>
<td>12</td>
</tr>
<tr>
<td>Overland Flow</td>
<td>120</td>
<td>160</td>
<td>180</td>
<td>180</td>
</tr>
<tr>
<td>Total</td>
<td>1246</td>
<td>1726</td>
<td>1872</td>
<td>1878</td>
</tr>
</tbody>
</table>
major irrigation schemes for the year and a further 9 GL was transferred from NSW for use on the Queensland side of the Border Rivers.

**Unregulated Irrigation and Urban, Industrial and Stock**

This usage is small in comparison with water diverted by water-harvesting or captured in scheme storages. Unregulated irrigation largely depends on the availability of water from naturally flowing streams and naturally occurring waterholes and the irrigation need for the particular year. The estimated usage for the 2001/02 year is slightly lower than last year at 29 GL. This is due to the prevailing very dry conditions, particularly in the Condamine-Balonne, which limited available supply particularly in the headwater tributary streams where the majority of this form of take usually occurs.

Urban, industrial, and stock usage remains fairly static in the catchment as it is generally allocated as high security water and is normally able to be reliably supplied. Total usage for the 2001/02 year is estimated at 13 GL.

**Progress with the Planning Process**

Draft Water Resource Plans for the Warrego/Paroo/Bulloo/Nebine, the Moonie and the Border Rivers catchments were released on 8 July 2002 for public review and comment in accordance with the Water Act 2000. The draft Plans are a package of strategic-level proposals such as the sharing of water between consumptive use, the environment and downstream use, the conversion of entitlements to volumetric water allocations and managing the take of overland flow water. The draft Plans provide a consistent approach to management across the catchments, while taking the specific issues of each catchment into account.

The Department of Natural Resources and Mines has held briefings and workshops throughout the catchments over the last few months to enable the public to make informed submissions on the draft plan proposals. Submissions on the draft Plans closed on 31 October 2002.

The Minister is expected to finalise the three draft Plans at the beginning of 2003. The final Plans will be implemented through Resource Operations Plans that provide implementation details such as flow management rules and trading rules. Draft Resource Operations Plans will be released for public review and submissions in mid-2003, in accordance with the Water Act 2000, and are expected to be finalised by the end of 2003.

The Condamine-Balonne valley is waiting on the outcome of an independent review by a panel of eminent scientists by the end of 2002. A decision on the next planning stage will be made at that time.

A moratorium on works has existed in all Queensland Murray-Darling valleys since 20 September 2000, and since 30 November 2001 the date has closed for completion of started works. This moratorium prevents further storages, pumps etc., including works authorised under licence, from being constructed until the Water Resource Plans have been implemented. The moratoria will have effect until the Water Resource Plans have been finalised and implemented.

**Current Status of Water Resource Plans**

The status for each Water Resource Plan is provided below.

**Condamine-Balonne**

Development of private water related infrastructure in the Condamine-Balonne catchment, and particularly in the Lower Balonne region, has exceeded all expectations in recent years. Hydrologic modelling shows that under current development levels, end-of-system flows are now only 46% of the pre-development flow pattern.

A draft Plan released in June 2000 provided a range of scenarios that reduced diversions to increase the end-of-system flows. Reductions in diversions to levels consistent with 1993/94 development were considered to cause major social and economic impacts within the plan area and particularly the Lower Balonne region.

After release of the draft Plan, the community reaction and an indirectly related court challenge highlighted some areas of concern in the development of the Plan.

Substantial progress has been made on improving the hydrologic model (following a comprehensive independent audit) and gaining a better understanding of the relationship between river health and flows.

Given the continuing questioning of the integrity of the science, the Government is undertaking an external and independent review of the science knowledge base being used for the Condamine-Balonne water planning. The
Scientific Review Panel, comprising three eminent scientists, will present its independent report to the State Government in December 2002.

Border Rivers

The Draft Water Resource Plan for the Queensland part of the Border Rivers catchment was released on 8 July 2002 for public review and submissions.

In November 1999, the Queensland Minister for Natural Resources and the NSW Ministers for Land and Water Conservation and Environment announced:

- That increases in water use in the Border Rivers catchment that would cause further deterioration in the end-of-system flow regime would not be supported; and
- That further growth in diversions in the regulated sections of the Border Rivers catchment would not be allowed.

The draft Plan is based on preserving long-term average river flows in accordance with the November 1999 decisions and proposes that the long-term end-of-system flow across the NSW–Queensland border at Mungindi must not be less than the lesser of:

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

Following the new Water Act 2000 in September 2000, Queensland placed a moratorium on all water use development on streams and from overland flow. Development has now ceased. There has been around 10% growth in the overall capacity to take and store water in the catchment since November 1999. The draft Plan proposes to allow current levels of average total water extractions to continue for up to five years after the finalisation of the Plan. This allows a reasonable period of time to evaluate whether current levels of river flows are consistent with the Plan’s end-of-system flow objective and to develop any measures that might be necessary to ensure that the objective is met.

The draft Plan proposes that a strategic reserve of 5000 ML/annum be made available in the Granite Belt, comprising 1500 ML/annum for Stanthorpe’s urban water needs and 3500 ML/annum to support the expansion of agricultural industries over the next 10 years.

The draft Plan also proposes:

- Environmental flow performance indicators relating to the low, medium and high flow regimes;
- An increased emphasis on measuring water extractions;
- Monitoring and modelling of river flows to assess whether the end-of-system flow objective is being met;
- An increased focus on the continual improvement in water use efficiency; and
- New development that would increase the amount of overland flow extractions will not be allowed unless specifically provided for in the Plan (only stock and domestic dams are exempt).

A framework for guiding joint planning decisions in the Border Rivers was established under the Border Catchments Intergovernmental Memorandum of Understanding, which established the Ministerial Forum and Standing Committee. Officers-level meetings and workshops and Standing Committee meetings have been held in 2002 to progress joint planning. Jointly agreed rules will be given effect under each State’s legislative plans, i.e. the Resource Operations Plan in Queensland and the Water Sharing Plan in NSW.

The IAG reviewed the draft plan in July 2002 and concluded that:

In view of the advice provided by the Technical Advisory Panel that the existing river condition in 1999, although generally in good condition with respect to flow regime sensitive parameters, would not at that time have reflected the impact of significant increases in water development that had occurred in recent years, it would appear prudent for Queensland to apply the Precautionary Principle and set the long-term flow requirements at November 1999 conditions or 60% of pre-development flow, whichever is the greater not the lesser as proposed.

Moonie

The Moonie Draft Water Resource Plan was released on 8 July 2002 for public review and submissions.

The draft Plan proposes a target of not less than 70 per cent of modelled pre-development flow for the long-term end-of-system flow at the Queensland–New South Wales border. Currently, the long-term end-of-system flow at the Queensland–New South border is calculated at 77 per cent of the modelled pre-development flow.
The draft Plan proposes allowance for increased utilisation of existing entitlements including sleeper licences, plus a strategic reserve of 100 ML/annum for town water supplies and 1100 ML/annum for any purpose.

The Resource Operations Planning process will offer the community the opportunity to determine how the strategic reserves of water should be made available. The draft Plan also proposes:

- Environmental flow performance indicators relating to the low, medium and high flow regimes;
- An increased emphasis on measuring water extractions;
- Monitoring and modelling of river flows to assess whether the end-of-system flow objective is being met;
- An increased focus on the continual improvement in water use efficiency; and
- New development that would increase the amount of overland flow extractions will not be allowed unless specifically provided for in the Plan (only stock and domestic dams are exempt).

The IAG reviewed the plan in July 2002 and concluded that:

'...the proposals for the Moonie River...do not meet the Precautionary Principle and may have significant impact downstream of the border. It suggests diversions be pegged at current levels until it can be demonstrated that the additional allocations are justified in terms of minimal impacts downstream.'

Warrego/Paroo/Bulloo/Nebine

The Warrego/Paroo/Bulloo/Nebine Draft Water Resource Plan was released on 8 July 2002 for public review and submissions.

The draft Plan sets targets of not less than the following percentages of modelled pre-development flow for the long-term end-of-system flows:

- for the Warrego catchment – 89 per cent
- for the Paroo catchment – 99 per cent
- for the Bulloo catchment – 99 per cent
- for the Nebine catchment – 87 per cent

Currently, the long-term end-of-system flows expressed as percentages of the modelled pre-development flows are:

- for the Warrego catchment – 96 per cent
- for the Paroo catchment – 100 per cent
- for the Bulloo catchment – 99 per cent
- for the Nebine catchment – 92 per cent

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

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

In addition, strategic reserves of 8000 megalitres per annum in the Warrego and 1000 megalitres per annum in the Nebine are proposed for any purpose, inclusive of provision for future overland flow development.

The IAG audited the draft plan in July 2002 and concluded that:

'...given the absolute size of these diversions and the end-of-valley flow targets, the IAG is of the view that any adverse impact is likely to be minimal.'

- IAG Assessment

Diversions at 339 GL were equal second lowest recorded since 1993/94 and resulted from below average flows in the Border Rivers and less than 5% of average flow in the Condamine-Balonne. Although there has been substantial growth in stream-based ring tank capacity since 1993/94, a survey has confirmed that there has been minimal net increase since 2001 following the moratorium on construction. Estimated capacity is 1878 GL comprising 1698 GL of stream-based and 180 GL of overland flow capacity.

Draft Water Resource Plans for the Border Rivers, Moonie and Warrego/Paroo/Nebine have now been released for public comment which closed on 31 October 2002.

The IAG considers that proposals for the Warrego/Paroo/Nebine meet the criteria established by the Ministerial Council. Proposals for the Border Rivers and Moonie, in the view of the IAG, do not adequately apply the Precautionary Principle and in the case of both systems would cause further increases in diversions.

Further work on the Condamine-Balonne is expected to follow once the report of the
independent expert scientific panel is available. The IAG has previously reported in its 2000/01 report on the original draft Water Resource Plan for the Condamine-Balonne.

The IAG understands that Queensland and New South Wales officers will be developing Cap proposals for their respective jurisdictions over the Border Rivers.

It is unlikely that Cap proposals and implementation protocols will be available before the end of 2003.

**Conclusions/Recommendations**

- Diversions of an estimated 339 GL are the equal second lowest since 1993/94. This follows below average flows for the Border Rivers and a very poor flow year, less than 5% of the long-term average, for the Condamine-Balonne.
- Growth in off-stream storages has been minimal following the moratorium on construction with an estimated total capacity of 1878 GL.
- Draft Water Resource Plans were released for the Border Rivers, Moonie and Paroo/Warrego/Nebine. Public comments close on 31 October 2002.
- The IAG reviewed the plans and considers that the proposals for the Paroo/Warrego/Nebine meet the audit criteria.
- The proposals for the Moonie and Border Rivers do not meet the Precautionary Principle and would result in further growth in diversions and possible adverse downstream impacts.
- In the case of the Border Rivers the IAG recommends that the long-term flow targets be set to the greater of the flows at November 1999 conditions or 60% of pre-development flow. This differs from the current proposal in the draft Plan which proposes the lower of the two flow levels.
Australian Capital Territory

• **The Cap**

At the time of becoming a participant in the Murray-Darling Basin Commission in March 1998, 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 the 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. Net diversions since the mid-1980s for urban water supply have been around 31 GL per year with an additional 5 GL per year estimated for all other consumptive diversions (see Table 10).

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 (WQCC) and Queanbeyan Sewage Treatment Works (STW). As a consequence, 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 contains provision for the licensing and measurement of extractive water use from both groundwater and surface water. The ACT Government has implemented this licensing procedure and completed a metering program such that both groundwater and surface water is now metered. It is anticipated that in the next 12 months after the completion of some testing of metered usage results, the ACT Government will be able to report directly on groundwater extractions. This will allow confirmation of the ‘other diversion’ usage reported in Table 10 above. Currently an estimate has been used. 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 465 GL per year these guidelines allocate an average of over 272 GL to the environment leaving around 193 GL (gross) notionally available for consumptive use.

<table>
<thead>
<tr>
<th>Year</th>
<th>Gross diversion</th>
<th>Lower Molonglo WQCC</th>
<th>Queanbeyan STW</th>
<th>Other diversions</th>
<th>Net diversion</th>
</tr>
</thead>
<tbody>
<tr>
<td>1989/90</td>
<td>65.4</td>
<td>29.9</td>
<td>3.4</td>
<td>5.0</td>
<td>37.2</td>
</tr>
<tr>
<td>1990/91</td>
<td>77.3</td>
<td>33.1</td>
<td>3.4</td>
<td>5.0</td>
<td>45.8</td>
</tr>
<tr>
<td>1991/92</td>
<td>60.0</td>
<td>33.3</td>
<td>3.4</td>
<td>5.0</td>
<td>28.4</td>
</tr>
<tr>
<td>1992/93</td>
<td>50.2</td>
<td>34.8</td>
<td>3.4</td>
<td>5.0</td>
<td>17.0</td>
</tr>
<tr>
<td>1993/94</td>
<td>59.4</td>
<td>32.7</td>
<td>3.4</td>
<td>5.0</td>
<td>28.3</td>
</tr>
<tr>
<td>1994/95</td>
<td>60.6</td>
<td>30.1</td>
<td>3.4</td>
<td>5.0</td>
<td>32.1</td>
</tr>
<tr>
<td>1995/96</td>
<td>53.3</td>
<td>32.2</td>
<td>3.5</td>
<td>5.0</td>
<td>22.5</td>
</tr>
<tr>
<td>1996/97</td>
<td>61.8</td>
<td>33.7</td>
<td>3.4</td>
<td>5.0</td>
<td>29.7</td>
</tr>
<tr>
<td>1997/98</td>
<td>73.1</td>
<td>30.7</td>
<td>3.2</td>
<td>5.0</td>
<td>44.2</td>
</tr>
<tr>
<td>1998/99</td>
<td>54.4</td>
<td>32.7</td>
<td>3.4</td>
<td>5.0</td>
<td>23.2</td>
</tr>
<tr>
<td>1999/00</td>
<td>58.0</td>
<td>32.6</td>
<td>3.9</td>
<td>5.0</td>
<td>26.5</td>
</tr>
<tr>
<td>2000/01</td>
<td>63.0</td>
<td>30.3</td>
<td>3.9</td>
<td>5.0</td>
<td>33.8</td>
</tr>
<tr>
<td>2001/02</td>
<td>70.9</td>
<td>30.6</td>
<td>3.8</td>
<td>5.0</td>
<td>36.4</td>
</tr>
</tbody>
</table>
**Issues with Adoption of the Cap**

The ACT Government has reconfirmed its commitment to the concept of the Cap and its willingness to be included in the Cap review process. However, the ACT Government has yet to agree to a Cap to be applied to the ACT. In its response to the 1999/00 report of the IAG, which had outlined arguments in favour of a 38 GL Cap for the ACT, fully tradeable, the ACT Government argued the special circumstances of the ACT and the need for definition of the trading conditions that would apply to the Cap.

In the last 12 months the issue of the supply of water from the Googong Dam to new residential developments in NSW and growth of Queanbeyan has arisen. The ACT Government has indicated that it will not be supplying water from the Googong Dam to these developments until there has been an agreement between NSW and the ACT on an Integrated Water Supply Strategy covering the region. In addition, the ACT Government would see any supply to these new areas as being above the Cap as it applies to the ACT.

The need for fully transparent rules for water trading is acknowledged by the IAG and a resolution to this issue would clarify the ACT’s ability to trade in water from other parts of the Basin. Resolution of these trading terms is still outstanding.

**Monitoring and Reporting**

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

**2001/02 Diversions**

Net diversions by the ACT in 2001/02 were 36.4 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 a 38 GL climate-adjusted Cap which has been recommended by the IAG in its 1999/00 Report.

The 2001/02 diversion is 1.5 GL above the 34.9 GL climate-adjusted target. Table 11 summarises the ACT’s performance against the 38 GL Cap since July 1997. It reveals that had the ACT adopted a Cap based on 38 GL, it would have already built up a credit of 27.1 GL.

**Discussion of Issues**

The IAG has discussed the issue of the setting of a Cap for the ACT in previous reports. For the moment this is a matter that is unlikely to be resolved until the trading rules for the Basin can be agreed and agreement has been reached on an Integrated Water Supply Strategy. This has proved to be a lengthy process. In the context of the commitment by all relevant governments to the Cap, the lack of resolution on this matter represents a flaw in the Cap’s implementation.

**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

---

**Table 11: An example of a Cap applied to the ACT – GLs Diversions since July 1997 compared with the 38 GL target**

<table>
<thead>
<tr>
<th>Proposed long-term diversion</th>
<th>2001/02 climate-adjusted target</th>
<th>Diversions</th>
<th>Credits (proposed climate-adjusted Cap target less diversion)</th>
</tr>
</thead>
<tbody>
<tr>
<td>38</td>
<td>34.9</td>
<td>36.4</td>
<td>-1.5</td>
</tr>
</tbody>
</table>

---

**Credits (proposed climate-adjusted Cap target less diversion)**

- 2001/02
- Cumulative since 1 July 97
- 20% long-term Cap diversion trigger
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.

Currently the ACT is considering the possible provision of water to new residential areas proposed for land bordering the ACT, but inside NSW and lying to the south of Queanbeyan. Inclusion of Queanbeyan in the ACT’s Cap when agreed may not necessarily cover these new areas. However, appropriate mechanisms will need to be found to ensure access to water for these new areas, with one possibility being the provision of water against a water allocation outside of the ACT Cap.

• **IAG Assessment**

The IAG notes ACT’s commitment to the Cap and to the principles behind the Cap. The IAG also notes the desire by the ACT to reach a conclusion on trading issues and thus provide a way for resolution of the Cap for the ACT. Once the Cap is agreed, the ACT has the monitoring and reporting arrangements in place which will provide appropriate data for the completion of Schedule F. The determination of what constitutes the Cap for the ACT is a matter still requiring resolution, but is dependent on matters that in part lie outside the control of the ACT Government. The IAG recognises that the need to resolve the trading rules to apply on the Murrumbidgee and across the Basin in general creates difficulties for the ACT. Until these trading rules are agreed, the Cap for the ACT will remain undefined.

• **Conclusions/Recommendations**

• No Cap presently exists for the ACT.
• Net diversions of 36.4 GL in 2001/02 exceed the average usage between 1989 and 2001 of 31 GL and a possible climate-adjusted Cap of 34.9 GL. However the ACT would have a cumulative credit of 27.1 GL if the proposed Cap of 38 GL had applied since July 1997.
• The IAG recommends that greater priority be given by the Council, to the resolution of the trading rules across the Basin.
• Once the trading rules are agreed for the Basin to the satisfaction of the ACT the IAG recommends that consideration be given to an average long-term Cap for the ACT of 38 GL/year which should be fully transferable.
• Consideration will also need to be given to the acquisition of Cap for water provided to areas lying outside the traditional ACT/Queanbeyan area that may be supplied from the ACT in the future.
5. Diversions from the Murray-Darling Basin in 2001/02

Murray-Darling Basin diversions in 2001/02 totalled 11520 GL. Of the total water diverted, New South Wales diverted 57.6%, Victoria 33.9%, South Australia 5.3%, Queensland 2.9% and the Australian Capital Territory 0.3%. Diversions for the individual valleys are presented in Table 12.

Annual diversions since 1983 are plotted in Figures 1 and 2. Diversion in 2000/01 ranked 8th highest on record in the Basin, 7th highest in Queensland and 6th highest in New South Wales. Diversion last year was 89% of the record diversion of 12964 GL in 1996/97.

<table>
<thead>
<tr>
<th>System</th>
<th>Total diversion (GL)</th>
<th>Percentage of Basin diversion (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>New South Wales</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Border Rivers</td>
<td>199</td>
<td></td>
</tr>
<tr>
<td>Gwydir</td>
<td>461</td>
<td></td>
</tr>
<tr>
<td>Namoi/Peel</td>
<td>325</td>
<td></td>
</tr>
<tr>
<td>Macquarie</td>
<td>577</td>
<td></td>
</tr>
<tr>
<td>Barwon-Darling</td>
<td>93</td>
<td></td>
</tr>
<tr>
<td>Lower Darling</td>
<td>126</td>
<td></td>
</tr>
<tr>
<td>Lachlan</td>
<td>453</td>
<td></td>
</tr>
<tr>
<td>Murrumbidgee</td>
<td>2311</td>
<td></td>
</tr>
<tr>
<td>Murray</td>
<td>2092</td>
<td></td>
</tr>
<tr>
<td>Total New South Wales</td>
<td>6637</td>
<td>57.6%</td>
</tr>
<tr>
<td>Victoria</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Goulburn/Loddon/Broken</td>
<td>1789</td>
<td></td>
</tr>
<tr>
<td>Campaspe</td>
<td>127</td>
<td></td>
</tr>
<tr>
<td>Wimmera-Mallee</td>
<td>94</td>
<td></td>
</tr>
<tr>
<td>Murray/Kiewa/Ovens</td>
<td>1892</td>
<td></td>
</tr>
<tr>
<td>Total Victoria</td>
<td>3902</td>
<td>33.9%</td>
</tr>
<tr>
<td>South Australia</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Metro-Adelaide &amp; Associated Country Areas</td>
<td>82</td>
<td></td>
</tr>
<tr>
<td>Country Towns</td>
<td>36</td>
<td></td>
</tr>
<tr>
<td>Lower Murray Swamps</td>
<td>100</td>
<td></td>
</tr>
<tr>
<td>All Other Uses of Water from the River Murray</td>
<td>368</td>
<td></td>
</tr>
<tr>
<td>Total South Australia</td>
<td>605</td>
<td>5.3%</td>
</tr>
<tr>
<td>Queensland</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Condamine/Balonne</td>
<td>154</td>
<td></td>
</tr>
<tr>
<td>Border Rivers/Macintyre Brook</td>
<td>170</td>
<td></td>
</tr>
<tr>
<td>Moomie</td>
<td>6</td>
<td></td>
</tr>
<tr>
<td>Warrego/Paroo</td>
<td>10</td>
<td></td>
</tr>
<tr>
<td>Total Queensland</td>
<td>339</td>
<td>2.9%</td>
</tr>
<tr>
<td>Australian Capital Territory</td>
<td>36</td>
<td>0.3%</td>
</tr>
<tr>
<td>Total Basin</td>
<td>11520</td>
<td>100.0%</td>
</tr>
</tbody>
</table>
Figure 1: Murray-Darling Basin Diversions – 1983/84 to 2001/02

Figure 2: Murray-Darling Basin Diversions – 1983/84 to 2001/02
(Usage under 1000 GL/year)
The IAG confirmed that South Australian diversions for the 2001/02 water year were within Cap and that a reliable system is in place to monitor these diversions.

South Australia remains firmly committed to the implementation of the Cap and has continued to pursue development of management tools and initiatives to facilitate the best possible reporting of compliance under the Cap, to monitor long-term trends in diversions and to ensure that irrigation diversions remain within Cap into the future. One such tool is the draft Climate Adjustment model that has been submitted to the MDBC for review through the independent model assessment process. South Australia should be able to report on diversions for irrigated development for the 2002/03 water-year using this model.

The development of a Water Allocation Plan by the River Murray Catchment Water Management Board was also adopted last year and provides the framework for many management issues including long-term Cap compliance. A final Catchment Plan is also expected for endorsement early in 2003.

Other initiatives being pursued in South Australia include the careful monitoring of trends in diversions, improved metering, continued development of the new Water Information and Licensing Management Application with enhanced reporting capabilities, and progression of quality management guidelines for data handling. The development of these strategies will expand the capabilities of the South Australian Government to confidently meet its obligations into the future.

South Australia mostly agrees with the IAG conclusions relating to South Australia and agrees with the conclusions relating to Victoria, New South Wales, Queensland and the ACT.

South Australia will be seeking further discussion on the 12 GL temporary trade that occurred into the Metropolitan Adelaide Cap. South Australia is not satisfied that the issue has been fully considered at this stage. The issue will be raised at the coming Murray Darling Basin Commission meetings.

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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 March 2001. The Council agreed to publish these responses as an appendix to the Independent Audit Group’s Report.
Victoria continued implementing the Cap in 2001/02 through the establishment of Bulk Entitlements on regulated systems and Stream-flow Management Plans on unregulated streams. The Bulk Entitlement conversion process commenced in the Loddon, progressed in the Wimmera/Mallee and is nearing completion in the Ovens and Broken water supply systems. Work continued on developing Stream-flow Management Plans on twelve high priority streams. Implementation of the Cap was progressed further by the passing of the Water (Irrigation Farm Dams) Act in April 2002. This legislation will ensure that diversions from new farm dams will comply with the Cap principles by ensuring that total valley diversions do not increase.

Diversions since July 1997 from each of the four designated valleys continue to comply with the Cap. Diversions from the Murray/Kiewa/Ovens valley were below the Cap target for 2001/02. Diversions from the Goulburn/Broken/Loddon and Campaspe valleys were above their targets but cumulative diversions from each of these valleys are in credit.

The level of diversions from the Wimmera-Mallee system continued to reduce with the completion of stage seven of the Northern Mallee Pipeline. Water savings from this pipelining enabled environmental entitlements to increase by 4.6 GL to 34.7 GL/year.

The climate-adjusted model covering the Goulburn/Broken/Loddon and Campaspe valleys is in the final stages of the independent review and is expected to gain accreditation by March 2003. Work continued on improvements to the broken and Loddon components of this model and on the calibration of the Wimmera-Mallee model as Bulk Entitlements progressed in these systems. Victoria will continue to rely on the MDBC model of the Murray system to provide Cap targets for the Murray system and is working with the MDBC to develop a regression model to calculate the Cap for the Ovens and Kiewa components of this valley.

Victoria will continue to provide accurate and timely water audit information as required and supports the draft Data Management System Protocol. The progressive metering of previously unmetered diversions is continuing however it is recognised that it will take many years to meter all diversions.

Victoria agrees with the IAG conclusions relating to Victoria, South Australia, New South Wales, the ACT and Queensland. Thus, Victoria supports the IAG’s proposal that a ‘Special Cap Audit’ of the Lachlan valley should be undertaken by the Commission and that New South Wales provide the necessary diversion and Cap target information on the Border Rivers, Gwydir and Namoi/Peel systems to enable the 2001/02 water Audit to be completed in these valleys.
NSW would again like to take the opportunity to reaffirm its commitment to the Cap process. In particular, NSW is committed to ensuring that long-term diversions are maintained within the Murray-Darling Basin Ministerial Council’s Cap. The IAG, on the basis of available information, has declared the Lachlan and Gwydir valleys in breach of the long-term diversion Cap.

NSW accepts that, over the five years since monitoring under Schedule F began, the water diversions in these valleys have exceeded the accumulated annual Cap targets. However, NSW is confident that the implementation of the environmental flow rules and the water access rules as defined in these valleys’ Water Sharing Plans will result in diversions below the long-term Cap as defined in the schedule. These outcomes were verified in the long-term studies provided to the IAG in accordance with the requirements of the special audit.

Whilst acknowledging that NSW has reduced allocations in the Barwon-Darling, the IAG have indicated that the initial rate of reductions is too low. NSW recognises that the initial 5% reduction will not be sufficient to reduce diversions below Cap. However, this is only the first step in a five-year adjustment period.

The IAG has made three recommendations regarding strategic issues, all of which impact upon NSW.

The IAG recommends that the ACT and NSW representatives establish the necessary framework to enable trade between them and to enable the ACT to finalise its Cap.

NSW agrees with this recommendation.

The IAG recommends that each State and the ACT, where relevant, submit valley models for independent verification with a view to 50% of the models being accredited by 30 June 2003 and 100% compliance by June 2004.

Significant efforts have been made to achieve accreditation of NSW valley models under Schedule F for Cap auditing, with the Lachlan valley being the first model in the basin to achieve this. NSW expects to have additional valley Cap models presented for accreditation during 2002/03.

The IAG supports the draft Data Management System Protocol and recommends that it be enhanced by the inclusion of an internal audit provision.

NSW supports the draft Data Management System Protocol and reaffirms its commitment to continual improvement of data management systems.

The IAG has also made a number of recommendations that specifically concern NSW. The following comments are offered in regard to the major recommendations:

Upon completion of the integrated 1993/94 and current conditions model for the Border Rivers, NSW should submit the proposed Cap for that system for assessment by the IAG of the appropriate allowance for the enlarged Pindari Dam.

NSW agrees with this recommendation.

The IAG recommends that that NSW and Queensland agree to a common approach to the preparation of models to apply to this system.

NSW and Queensland are committed to a common approach to modelling within the Border Rivers system. The first step in this process is the merging of modelling work completed to date. This is expected to be finalised early in 2003. It is intended to use the common model for Cap reporting as well as Water Sharing Plan development.

NSW should submit a monitoring report on the Intersecting Streams as required under Schedule F.

NSW agrees with this recommendation, however, in view of the fact that NSW usage is minor on these streams, it would be a meaningless exercise were Queensland not to do the same. It would be far more effective for NSW to feed into the Queensland reporting process and by so doing contribute to a complete view of the stream status.

The IAG would expect any long-term current conditions model to be used as part of a Special Audit to be subject to independent assessment.

NSW agrees with this requirement, and is currently preparing documentation of its current conditions modelling for those valleys triggered for Special Audit in a similar manner to that prepared for the independent assessment of its Cap auditing.
In line with Council’s earlier decisions, the Queensland Cap is to be established in accordance with the provisions of Schedule F, following the completion of the water resource planning processes. Compliance will be on the basis of diversions on the same principles as other States.

Draft water resource plans for the Border Rivers, Moonie, and Warrego/Paroo/Bulloo/Nebine were released in July 2002 for public review and comment in accordance with the Water Act 2000. The IAG audited the draft Plans in July 2002 in line with the principles endorsed by the Ministerial Council. The Commission formally submitted the IAG’s report on the draft Plans and the Minister will consider it, along with all other properly made submissions, in finalising the plans.

A consultation report will be published early next year around the time the Plans are finalised. It will provide information on how issues, including the IAG’s issues, raised during the consultation process have been dealt with.

For the Condamine-Balonne valley, a panel of eminent scientists is undertaking an independent review of the science knowledge base being used for the Condamine-Balonne water planning. The next planning stage is awaiting the outcomes of the review.

Valley Caps for Queensland valleys are expected to be established in late 2003 following implementation of the final plans through Resource Operations Plans. In the meantime, moratoria are in place in all Queensland Murray-Darling valleys and prevent further works that would increase water extractions, from being constructed until the water resource plans have been implemented.
Water consumption in the ACT was slightly above average during 2001–02 as a result of extended hot weather increasing urban demand during summer months. The ACT Government continues to demonstrate sound environmental and resource management practices and remains committed to the implementation of the Cap in the ACT.

The IAG has made a number of recommendations in relation to the ACT this year. The general recommendation relating to the submission of Cap models is supported but cannot be acted on by the ACT until the form and size of an ACT Cap is set. The recommendation on data management systems was made last year. The ACT response then was that it did not consider any further benefit would be gained by the implementation of additional quality management practices. The ACT believes it has in place sound data management practices and reporting mechanisms that will allow it to meet Cap reporting requirements adequately. The ACT is a small jurisdiction with a very small and simple data management system. The imposition of additional management controls is not considered warranted.

Specific recommendations relating to the need for the establishment of an ACT Cap are supported; ‘that greater priority be given by the Council, to the resolution of trading rules across the Basin’ is strongly supported as it is a key element required for the full implementation of COAG water reforms and will be essential to the continued economic development of the ACT. However, further analysis is required on the size of an ACT Cap against the ACT’s long-term role as the national capital and the emerging critical issue of regional development.

The related recommendation ‘that the ACT and New South Wales representatives establish the necessary framework to enable trade between them and to enable the ACT to finalise its Cap’ is also agreed but this is a minor component of trading which must be in place before a Cap can be agreed. A Basin wide and clearly defined trading scheme will need to be put in place before the ACT can consider a Cap which limits its access to water. The matter is under active consideration within the ACT.

Also related, but of a wider and more complex nature, is the supply of water to residential developments in NSW in areas surrounding the ACT. The recommendation ‘Consideration will also need to be given to the acquisition of Cap for water provided to areas lying outside the traditional ACT/Queanbeyan area that may be supplied from the ACT in the future’ is agreed. The development of an Integrated Water Supply Strategy is a high priority for the ACT. The ACT acknowledges that surrounding development will look to the ACT for its water supply. As the developments will be in NSW, processes must be put in place that will meet both NSW and ACT requirements. They will need to include the provision of Cap to cover increased consumption and trading arrangements to meet growth in demand.

The report again compares consumption to the 38 GL Cap proposed by the IAG. It must be stressed the ACT does not accept the level of the Cap proposed by the IAG. Any assumption as to the level of a future ACT Cap and estimates of cumulative credits therefore could lead to false expectations. There are many complex issues that must be resolved to ensure the ACT has continuing access to water on equitable terms. Secure and fair trading arrangements and confidence in the ongoing availability of water are key elements that must be resolved before the ACT will be in a position to set a Cap.
## Glossary

<table>
<thead>
<tr>
<th>Term</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>ACTEW</td>
<td>ACT Electricity and Water Corporation.</td>
</tr>
<tr>
<td>announced allocation</td>
<td>The percentage of water entitlement declared available for diversion from a regulated stream in a season.</td>
</tr>
<tr>
<td>annual allocation</td>
<td>The annual volume of water available for diversion from a regulated stream by an entitlement holder.</td>
</tr>
<tr>
<td>authorised use</td>
<td>Total of the water allocated in the valley plus off-allocation and water-harvesting use plus unregulated stream use not in allocation.</td>
</tr>
<tr>
<td>Border Rivers</td>
<td>The rivers and tributaries forming, or intersecting the border between NSW and Queensland.</td>
</tr>
<tr>
<td>Bulk Entitlement</td>
<td>A perpetual entitlement to water granted to water authorities by the Crown of Victoria under the Water Act 1989.</td>
</tr>
<tr>
<td>carryover</td>
<td>An unused entitlement from one season that can be used in the next year.</td>
</tr>
<tr>
<td>channel capacity</td>
<td>The maximum rate at which water can be delivered through a river reach or an artificial channel.</td>
</tr>
<tr>
<td>COAG</td>
<td>Council of Australian Governments.</td>
</tr>
<tr>
<td>diversion licence</td>
<td>Specified licences issued for a specified annual volume and diversion rate.</td>
</tr>
<tr>
<td>diversion</td>
<td>The movement of water from a river system by means of pumping or gravity channels.</td>
</tr>
<tr>
<td>dozer allocation</td>
<td>An allocation that is not fully utilised.</td>
</tr>
<tr>
<td>DLWC</td>
<td>The Department of Land and Water Conservation (of NSW).</td>
</tr>
<tr>
<td>DNR</td>
<td>The Department of Natural Resources (of Queensland).</td>
</tr>
<tr>
<td>DNRE</td>
<td>The Department of Natural Resources and Environment (of Victoria).</td>
</tr>
<tr>
<td>end-of-valley flows</td>
<td>The flow regime at the end of a valley.</td>
</tr>
<tr>
<td>floodplain-harvesting</td>
<td>The diversion of water from a floodplain into storage(s).</td>
</tr>
<tr>
<td>FMIT</td>
<td>First Mildura Irrigation Trust.</td>
</tr>
<tr>
<td>gigalitre (GL)</td>
<td>One thousand million or 10^9 litres.</td>
</tr>
<tr>
<td>GL</td>
<td>Gigalitre: one thousand million or 10^9 litres.</td>
</tr>
<tr>
<td>G-MW</td>
<td>Goulburn-Murray Water (of Victoria).</td>
</tr>
<tr>
<td>gravity districts</td>
<td>Districts which use gravity to divert the flow of water from the river.</td>
</tr>
</tbody>
</table>
high security entitlement  An entitlement which does not vary from year to year and is expected to be available in all but the worst droughts.

IAG  Independent Audit Group.

LV  Licence Volume.

impoundment  The storage of water diverted from a watercourse.

irrigation  Supplying land or crops with water by means of streams, channels or pipes.

MDBC  Murray-Darling Basin Commission.

MDBMC  Murray-Darling Basin Ministerial Council.

megalitre (ML)  One million litres. One megalitre is approximately the volume of an Olympic swimming pool.

Ministerial Council, the  Murray-Darling Basin Ministerial Council.

ML  Megalitre: one million litres. One megalitre is approximately the volume of an Olympic swimming pool.

Murray-Darling Basin Agreement  The Agreement between the Governments of the four Basin States and the Commonwealth. The current Agreement is the 1992 Agreement.

off-allocation  When unregulated tributary inflows or spills are sufficient to supply irrigation needs and downstream obligations.

on-farm storage  Privately owned storages used to harvest surplus flows or to store unused allocations for use in the following season.

overallocation  Water diverted in one season against a prospective allocation in the subsequent year.

overland flow  Water that runs off the land following rainfall, before it enters a watercourse and floodwater that erupts from a watercourse or lake onto a floodplain.

permanent transfer  The transfer of water entitlements on a permanent basis. The right to permanent transfers allows irrigators to make long-term adjustments to their enterprise and enables new operators to enter the industry.

private diverters  Licensed to operate privately owned pumps or diversion channels; includes river pumpers and diverters as well as town water supplies.

property right  In this context, the right to ownership of allocated volumes of water.

RAMSAR wetland  A wetland listed on the Register of internationally significant wetlands established by the Convention at Ramsar.

regulated streams/waterways  Streams where users are supplied by releases from a storage. A water licence for a regulated stream specifies a base water entitlement defining the licence holder’s share of the resources from a stream.

riparian  Of, inhabiting or situated on the bank and floodplain of a river.

RIT  Renmark Irrigation Trust.

sales water  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.
<table>
<thead>
<tr>
<th>Term</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>salinity</td>
<td>The concentration of dissolved salts in groundwater or river water usually expressed in EC units.</td>
</tr>
<tr>
<td>sleeper allocation</td>
<td>An allocation that does not have a history of water usage.</td>
</tr>
<tr>
<td>temporary transfer</td>
<td>Water entitlements transferred on an annual basis.</td>
</tr>
<tr>
<td>unregulated streams</td>
<td>Streams that are not controlled or regulated by releases from major storages.</td>
</tr>
<tr>
<td>utilisation</td>
<td>The amount of water available for diversion that is actually diverted.</td>
</tr>
<tr>
<td>water entitlement</td>
<td>The legal right of a user to access a specified amount of water in a given period.</td>
</tr>
<tr>
<td>water-harvesting</td>
<td>The diversion of water from an unregulated stream in Queensland in which the access to water is defined only by a diversion rate and a starting flow in the stream.</td>
</tr>
<tr>
<td>WAMP</td>
<td>Water Allocation and Management Planning. It is a process formerly under way in Queensland to enable the acceptable level of allocatable water to be determined for a river system. These plans have been superseded by Water Resource Plans.</td>
</tr>
<tr>
<td>WMRWG</td>
<td>Water Market Reform Working Group.</td>
</tr>
<tr>
<td>WR</td>
<td>Water Right.</td>
</tr>
<tr>
<td>WSP</td>
<td>Water Sharing Plan. Plans developed under the New South Wales Water Management Act, 2000 for equitable sharing and management of NSW water resources.</td>
</tr>
<tr>
<td>WUE</td>
<td>Water Use Efficiency.</td>
</tr>
</tbody>
</table>
Special Cap Audit
NSW Lachlan and
Gwydir Valleys
Report of the Independent
Audit Group

Independent Audit Group Members

Dr Wally Cox (Chair)
Paul Baxter

M A R C H  2 0 0 3
INTRODUCTION

The 2001/02 Review of Cap Implementation by the Independent Audit Group identified that cumulative diversions for the NSW Lachlan and Gwydir Valleys since 1997/8 had exceeded the cumulative annual Cap targets by more than 20% of the long-term average diversion and as a consequence the requirement in Clause 14 of Schedule F for a Special Audit had been triggered.

This report is the report of the IAG on the Special Cap Audit of the NSW Lachlan and Gwydir Valleys.

AUDIT PROCESS

The IAG considered detailed reports submitted by the NSW Department of Land and Water Conservation (attached) and clarified aspects of the report by way of a conference call on 18 February 2003. A draft report was made available to the Department for comment prior to finalisation of the report.

AUDIT OUTCOMES

Lachlan Valley

The DLWC in its response to the Special Audit requirement has highlighted a number of factors impacting upon the level of diversions in the Lachlan Valley in the 2001/02 water year. This advice has referred to changes in climatic conditions and rainfall levels within the Valley, estimates of irrigated areas and changes in crop composition, and general water availability.

The DLWC has also advised of changes in environmental flow rules (EFRs) originally introduced in the 1998/99 water year. These rules were intended to produce both environmental benefits and reduced diversions. The EFRs were modified in 1999/00 to increase the carry over limit from 30% to 50%, while retaining a 30 GL limit to off-allocation diversions, provision for translucent releases from Wyangala Dam, and end-of-system targets.

Despite these measures, the Lachlan Valley has been in breach of the Cap trigger for the last two years.

A Water Sharing Plan (WSP) for the Lachlan Valley was gazetted by the NSW Government on 21 February 2003 and combines changes to the current environmental flow rules as well as other management rules. Significantly, the WSP places an annual use limit of 75% of the Valley entitlements for the first year of the ten year plan, the creation of continuous accounting and the removal of off-allocation access that was previously provided under the EFRs.

Long-term modelling undertaken by the DLWC suggests that the WSP will constrain diversions over the next 10 years and will in the long run ensure that diversions remain below the long-term Cap. The IAG notes that, importantly, these conclusions rely heavily upon the assumption that land development does not increase.

The IAG notes that there has been a breach of the Cap trigger for the last two years and that the NSW Government has now announced new measures designed to restrain diversions over the next 10 years. The success of these measures and the reliability of the long-term modelling upon which the DLWC depends will rest heavily upon whether there are any further increases in land development over this period. Thus, there should be close monitoring of the area under development in this Valley as any dramatic increase in such development or change in composition of crop types towards more water intensive crops could foreshadow a continuation of a breach of the Cap.

The DLWC has argued that the long-term modelling that they have used which shows long-term diversions some 4% below the long-term Cap should be taken as evidence that there is no need for the IAG to report to the Commission that the long-term diversion Cap has been exceeded. The IAG however, is not convinced that the long-term Cap has not been breached, and therefore proposes to report to the Commission accordingly.

CONCLUSION

On the basis of available information the IAG determines that the Lachlan Valley is in breach of the long-term diversion Cap. The IAG notes that NSW has recently announced new management rules and that these may serve to address the breach in the long-term Cap.

Gwydir Valley

Advice provided by the DLWC highlights the significant increase in the total area irrigated in this Valley over the 2001/02 year. There was also a large increase in on-farm storage capacity over the same period.

The DLWC in their advice to the IAG have noted that the modelling prepared for Schedule F
purposes has been influenced by two high flow events occurring during the 2000/01 irrigation year. The DLWC have noted that the amount of flood plain harvesting assumed to have occurred in the IQQM model may not have in fact occurred. This matter is still under investigation. Nevertheless, despite possible adjustment to the Cap performance in the year in question, the IAG notes and the DLWC agrees, that the trigger for a Special Audit has been exceeded.

The NSW Government’s WSP for the Gwydir which is expected to be gazetted by the end of February 2003 will define the level of consumptive water access for a ten year period. Under the WSP there will be a number of changes to the current environmental flow rules and other management rules that have applied during the period in which the breach of the Cap has occurred. These management rule changes are outlined in the report provided by the DLWC and attached.

The DLWC has undertaken long-term modelling of diversions from the Gwydir Valley using the revised WSP rules and objectives. This modelling has indicated that diversions will remain below the long-term Cap.

However, the IAG has some concern with the reliability of the outcomes from the modelling that has been undertaken, particularly in regard to the assumptions made concerning the extent of future land development. These concerns are supported by the evidence of a significant breach of the Cap over time. The IAG also notes that there were further large increase in both crop areas and on-farm storage in the most recent year. The IAG considers that the more recent announcements by NSW of new rules to apply under its WSP have yet to demonstrate that the breach in the Cap can be wound back in a reasonable period of time.

**CONCLUSION**

On the basis of available information the IAG determines that the Gwydir Valley is in breach of the long-term diversion Cap.
2001/02 MDBMC Cap Performance
Special Audit of the Lachlan & Gwydir Valleys
Natural Resource Products Group
Water Management Systems Branch
February 2003
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1. Executive Summary

The NSW submission to the Independent Audit Group (IAG) review of Cap implementation for 2001/02 indicated that the regulated Lachlan and Gwydir valley extractions had exceeded the trigger for special auditing. This report has been produced in response to a subsequent request by the Murray Darling Basin Commission (MDBC), under clause 14 of schedule F to the Murray-Darling Basin Agreement, for the IAG to undertake a ‘Special Audit’ of the regulated Lachlan and Gwydir valleys.

This report provides further information on diversions, irrigation infrastructure and results from modelling for 2001/02 to the initial submission to the IAG in October 2002.

1.1 Lachlan Valley

Lachlan Valley allocations have generally been quite high over the Schedule F accounting period, with allocations in most years reaching 100% of licensed entitlement by the time summer crops had been planted. Off-allocation events have been available to varying extents in most of the water years, but off-allocation diversions have been relatively small, with a maximum of only 22 GL in 2000/01.

When compared to rainfall totals since 1983/84, the annual July–April rainfall over the first three years of Schedule F accounting has generally been close to or above the average, with 1999/00 rainfall close to the highest on record for this period. The last two years of Schedule F accounting have seen below average rainfall.

The DLWC survey estimates of irrigated areas do not indicate any trend towards overall increased areas. However, cotton areas have increased dramatically during the Schedule F accounting period, rising from 335 GL in 1997/98 to 430 GL in 2001/02.

During the Schedule F accounting period, a suite of environmental flow rules (EFRs) were introduced (1998/99). These were intended to produce significant environmental benefits and, as a consequence, reduce diversions. The EFRs included translucent flows passing Wyangala Dam between July and October, a 30 GL environmental contingency allowance, a 30 GL limit to off-allocation diversions, and end-of-system flow targets.

The Lachlan IQQM Cap scenario has been approved for use under Schedule F of the Murray-Darling Basin Agreement, and has been used for all assessments of Cap in this report. The Schedule F accounting for the 1997/98 – 2001/02 period indicates that the Lachlan Valley is cumulatively 79 GL above the annual Cap, and 15 GL above the Schedule F trigger for further auditing by the IAG. Long-term simulations indicate that the introduction of the EFRs and water access rules as per the Lachlan Water Sharing Plan will result in long-term diversions some 4% below the long-term Cap diversions.

1.2 Gwydir Valley

Gwydir Valley allocations have generally been quite high over the Schedule F accounting period, water availability in most years reaching 100% of licensed entitlement. Off-allocation events have been available to varying extents in most of the water years, ranging from 156 GL in 1997/98 to 49 GL in 2001/02.

The DLWC surveys of irrigated areas do not indicate any trend towards higher irrigated areas. However, the DLWC surveys also indicate that on-farm storage capacity increased significantly during the Schedule F accounting period, rising from 315 GL in 1997/98 to 430 GL in 2001/02.

During the 1997/98 – 2001/02 period a suite of environmental flow rules were in place, which are expected to reduce diversions below Cap in the long-term. The only significant change to management rules during this period was the introduction of Continuous Accounting in 1998/99.

During 2002, The Gwydir Valley Irrigators Association presented new remote sensing information for irrigated areas and on-farm storage capacities. A recalibrated model has been prepared to estimate Cap targets for Schedule F accounting, but has not been used for long-term simulations as yet.

The preliminary Schedule F accounting for the 1997/98 – 2001/02 water years indicates that the Gwydir Valley is cumulatively 225 GL above Cap, and in breach of the trigger for Special auditing. Long-term simulations using the currently endorsed model indicate that average annual current conditions diversions are 5% below Cap diversions.
2. Introduction

Schedule F of the Murray-Darling Basin Agreement requires its member states to submit annual reports to the Commission outlining:

- the season’s water usage; and,
- the annual water usage expected under the 93/94 level of development – the annual cap figure.

This requirement was met by NSW in its report 2001/02 MDBMC Cap Performance for NSW Regulated Streams submitted in October 2002, covering the 2001/02 water year. An update of this report has been provided in February 2003, which includes final diversion totals and modelling results for 2001/02 for the northern NSW valleys.

Schedule F (clause 14 (b)) allows for a buffer in annual Cap calculations and diversion measurements. A valley may exceed the accumulated annual Cap by this amount (20% of average annual diversions) without prompting further action under the Agreement. Information supplied in the 2001/02 report indicated that the estimate of error had been exceeded for the regulated Lachlan and Gwydir valleys.

In accordance with the Clause 14 of the schedule, such an exceedance prompts the MDBMC to request the Independent Audit Group to undertake a special audit of the relevant valleys.

This report has been produced by NSW for input to the IAG special audit for the regulated Lachlan and Gwydir valleys, prepared under the requirement of clauses 14 and 15 of Schedule F of the Agreement. Summary information is presented regarding climatic conditions, water use in the period since the commencement of accounting under Schedule F, the areas planted and the crops irrigated. This is then compared with the latest model assessment of Cap performance.
3. Lachlan Valley

3.1 Background

The Cap for the regulated sections of the Lachlan Valley is currently audited on an annual basis using the results of the Lachlan Valley IQQM. This model and has been approved as a Cap model under Schedule F of the Murray-Darling Basin Agreement. Modelling of current development levels and management rules proposed under the Lachlan Water Sharing Plan has also been modelled using the Lachlan valley IQQM.

The Lachlan Valley water year runs from 1 July to 30 June.

3.2 Water Availability 1997/98–2001/02

Lachlan Valley allocations have generally been quite high during the Schedule F accounting period, with allocations in most years reaching 100% of licensed entitlement by the time summer crops have been planted (representing around 665 GL of water). The only exceptions to this were the 1997/98 water year (85%), and the 2001/02 water year (94%). The ability to carryover unused entitlements has been in place throughout this period, rising from an initial limit of 20% of licensed entitlement to 50% in the later water years.

Off-allocation events have been available to varying extents in most of the water years, but off-allocation diversions have been relatively small, with a maximum of only 22 GL in 2000/01. The maximum off-allocation Cap for the Lachlan Valley during this period was 30 GL.

3.3 Climatic conditions 1997/98–2001/02

Rainfall between July and April each year across the regulated section of the Lachlan has historically shown a strong correlation with annual water diversions in the valley, using a spatial composite of rainfall stations across the parts of the valley where irrigation is most prevalent. When compared to rainfall totals since 1983/84, the annual July–April rainfall over the first three years of Schedule F accounting has generally been close to or above the average. The 1998/99 rainfall was significantly higher than average, and the 1999/00 rainfall was close to the highest on record for this period. However, 2000/01 rainfall was slightly below average, and 2001/02 rainfall was significantly below average.

3.4 Irrigated Areas 1997/98–2001/02

The DLWC survey estimates indicate an irrigated area in 2001/02 of 80500 ha, comprising of numerous different types of crops, but mainly summer and winter cereals and pasture, lucerne and cotton. There are still a small number of licences for which areas of irrigated crops have not been finalised, but they are not expected to significantly affect the total indicated. There is no significant trend in the overall areas of irrigated agriculture during the Schedule F period that would indicate growth in water use.

The annual area of cotton has increased significantly during this period from generally less than 1000 ha of cotton irrigation up to

Figure 3.1: Irrigated areas in Lachlan Valley since 1983/84
1997/98, to 21000 ha in 2000/01. However, in 2001/02, cotton areas reduced to 13500 ha.

3.5 Management Rules
1997/98–2001/02

An Annual Allocation Plan (AAP) was produced for each valley for each water year, outlining the management rules that would apply. The significant changes to the management rules over this period have been:

- Introduction of the environmental flow rules (EFRs) for the 1998/99 water year. These were intended to produce significant environmental benefits and, as a consequence, reduce diversions. The EFRs included translucent releases from Wyangala between July and October, a 30 GL environmental contingency allowance, a 30 GL limit to off-allocation diversions, and end-of-system flow targets.
- Increase in carryover limit from 20% to 30% in 1998/99, and from 30% to 50% in 1999/00.

3.6 Cap Performance

The Lachlan IQQM Cap scenario has been approved for use under Schedule F of the Murray-Darling Basin Agreement, and has been used for all assessments of Cap in this report.

### 3.6.1 Annual Cap performance

The cumulative estimate of the difference between observed diversions and the diversions that would have occurred under 1993/94 development levels, commencing from 1997/98 are detailed in Table 3.1.

### 3.6.2 Long-term Cap performance

Schedule F refers variously to the compliance with Cap in the ‘long-term’. NSW has around 104 years of climatic data available for use to assess Cap performance and considers this period to be the most appropriate representation of ‘long-term’.

As stated previously, NSW has developed management rules that target both long-term outcomes as well as day-to-day and annual outcomes. For the Lachlan Valley, the IQQM has been configured to analyse three scenarios:

- the 1993/94 development, 1993/94 water access rules and all operation flow rules that existed at that time.
- The 1999/00 development and its associated water management and environmental flow rules.
- the 2001/02 development and the Water Sharing Plan rules to apply from July 2003.

Each of these scenarios are analysed using 104 years of climatic data. The resultant diversions from the river are compared to ensure Cap compliance in the long-term. In order to study

<table>
<thead>
<tr>
<th>Water year</th>
<th>Total diversions (GL)</th>
<th>Cap estimate from IQQM (GL)</th>
<th>Difference (GL)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1997/98</td>
<td>414</td>
<td>411</td>
<td>~2</td>
</tr>
<tr>
<td>1998/99</td>
<td>278</td>
<td>300</td>
<td>23</td>
</tr>
<tr>
<td>1999/00</td>
<td>285</td>
<td>228</td>
<td>~56</td>
</tr>
<tr>
<td>2000/01</td>
<td>408</td>
<td>376</td>
<td>~32</td>
</tr>
<tr>
<td>2001/02</td>
<td>442</td>
<td>429</td>
<td>~11</td>
</tr>
<tr>
<td>Cumulative total</td>
<td>1826</td>
<td>1744</td>
<td>~79</td>
</tr>
</tbody>
</table>

Long-term average Cap estimate: 319

20% of Long-term average Cap estimate: ~64

Cumulative Cap performance: Above Trigger

Note: A below Cap diversion for a year is a credit and is indicated as a positive difference.
how the annual diversions under the ‘current conditions’ would deviate from the computed annual Cap diversions, the accumulated differences between the two runs are compared. This is an estimate of how the Schedule F accounting would track over the long-term. It is shown for the full period of simulation in Figure 3.2.

A change in the prevailing climatic regime during the late 1940s is apparent in the Lachlan valley. It is not yet clear whether this is part of a cyclic climatic process or not. The long-term modelling indicates that diversions under current conditions will be below Cap by 4%. However, the sequencing of the impacts of the current environmental flow rules is clearly biased towards the first half of the climatic sequence which has significantly lower inflows. It was recognised that the current rules would provide for extended periods of high impact to irrigation, should a return to the climatic conditions experienced during 1898–1945 recur.

Additionally, there would be extended periods of diversions in excess of Cap.

It was considered important that a more robust set of rules were required to maintain diversions closer to Cap on an annual basis irrespective of climatic conditions.

The NSW Government has developed a Water Sharing Plan (WSP) for the Lachlan Valley, which will provide a legislative basis for the management rules and define a level of consumptive water access for the next 10 years. The WSP does not include the Belubula River system, which is also part of the Lachlan valley defined under Schedule F of the Murray-Darling Basin Agreement. The WSP includes changes to the current environmental flow rules as well as other management rules. The significant changes from the current management rules are:

- An annual use limit of 75% of the valley entitlements at year 1 of the Plan (2003/04). This may be altered during the life of the Plan (upwards or downwards) to ensure long-term diversions remain at the level indicated by the WSP. The use limit may not be increased beyond 100% during the life of the Plan.
- Continuous accounting will be introduced, with a maximum account limit of 136%.
- The removal of off-allocation access (currently a 30 GL limit applies)
- The period under which translucent releases are made from Wyangala storage has been extended from 1 June–31 October to 15 May–15 November each water year.
- A requirement that the total inflow to Wyangala must exceed 250 GL each calendar year prior to commencement of any translucent releases.
- A Water Quality Allowance of 20 GL to be set aside for salinity dilution and algal bloom mitigation.

The Lachlan WSP will be gazetted on 21 February 2003. A WSP scenario has been analysed to assess long-term diversions and environmental conditions.
improvements under the Plan over the 104 years of available climate data. The diversions from this scenario have been compared with those produced by the accredited Cap model to assess long-term performance under Schedule F. The results are shown in Figure 3.3.

As can be seen from this plot, the adopted rules for the Plan maintain a more consistent diversion regime with respect to the annual cap. There are but a few sequences (indicated by a downward slope in the line) where the annual diversions are expected to exceed the annual cap.

Table 3.2: Probability of Cap Exceedance Being Triggered Under Current Conditions

<table>
<thead>
<tr>
<th>Period of Schedule F accounting</th>
<th>Probability of being in breach of Cap</th>
</tr>
</thead>
<tbody>
<tr>
<td>No. Years</td>
<td>Current Conditions</td>
</tr>
<tr>
<td>2</td>
<td>5%</td>
</tr>
<tr>
<td>3</td>
<td>22%</td>
</tr>
<tr>
<td>4</td>
<td>25%</td>
</tr>
<tr>
<td>5</td>
<td>25%</td>
</tr>
<tr>
<td>8</td>
<td>31%</td>
</tr>
<tr>
<td>10</td>
<td>33%</td>
</tr>
<tr>
<td>20</td>
<td>43%</td>
</tr>
<tr>
<td>50</td>
<td>25%</td>
</tr>
</tbody>
</table>

3.7 Conclusion

NSW is of the opinion that the new rules of access and operational rules contained in the Lachlan Valley Regulated Water Sharing Plan will constrain diversions over the next ten years. The rules of the plan, subject to land development not increasing, will result in long-term diversions some 4% below the long-term cap. Furthermore, it is expected that the rules will also result in annual diversions that only rarely exceed annual cap targets.

The plan contains ‘growth management rules’ which, in the case of growth, will automatically reduce access to water to the extent that the long-term diversions reduce back to the plan ‘diversion limit’.

An analysis was performed to assess the likelihood that breaches of Cap would be triggered under the annual accounting provisions of Schedule F across a range of accounting periods over the full period of current conditions simulation, for both the simulated diversions under current conditions and WSP. The results are presented in Table 3.2 below.

Figure 3.3: Cumulative Lachlan Valley Cap Performance under WSP
4. Gwydir Valley

A Special Note:
A number of issues have become apparent in assessing Cap compliance in the Gwydir valley. The DLWC has cause for concern that reported on-farm storage capacity and irrigated areas over recent years have been highly variable, and at odds with industry estimates. In addition, the Gwydir Valley Irrigators Association has supplied remote survey data of on-farm storage capacity as well as developed and irrigated areas. This new information is significantly different from the DLWC survey data, and is currently being reviewed for accuracy.

Notwithstanding these data issues, preliminary re-calibration of the Gwydir IQQM to reflect some of the remotely sensed data has been undertaken. However, the nature of the Cap simulation over 1997/98–2001/02 suggests that the modelling may not represent floodplain harvesting and on-farm storage management appropriately. At present, these two processes are being further investigated, in conjunction with re-calibration of the Gwydir IQQM using the Agrecon datasets.

4.1 Irrigated areas
In 2001/02 the DLWC surveys estimate that 98900 ha of crops were irrigated, with approximately 77700 ha (92% of the total area) of cotton. This represents a significant increase in the total area irrigated, most of which seems to be for crops other than cotton. Historical irrigated areas of cotton are shown in Figure 4.1, and historical irrigated areas of all crops are shown in Table 4.1.

Figure 4.1: Comparison of DLWC and Industry Cotton Areas
4.2 On-farm storage status

An assessment of on-farm storage capacity in the Gwydir Valley in 2001/02 indicates a total of 410 GL. This represents a large increase of 80 GL (23%) from the previously reported total in 1999/00.

In 2002, the Gwydir Valley Irrigators Association presented results from a remote sensing analysis of irrigation infrastructure conducted on their behalf by consultants (Agrecon). The consultants produced estimates of areas irrigated, areas developed for irrigation, and on-farm storage capacity. The irrigated and developed area estimates were produced from remote sensing analysis, and the on-farm storage capacity was based on a survey conducted in 2001. Table 4.1 outlines historical crop area and infrastructure estimates made by DLWC Regional staff, and the estimates produced by Agrecon.

4.3 Management rules

An Annual Allocation Plan (AAP) was produced for each valley for the 2001/02 season, outlining the management rules that would apply. No significant changes were made to management rules for the 2000/01 water year.

<table>
<thead>
<tr>
<th>Year</th>
<th>DLWC estimates</th>
<th>Agrecon estimates</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Area irrigated (Ha)</td>
<td>On-farm storage capacity (ML)</td>
</tr>
<tr>
<td>1981/82</td>
<td>45004</td>
<td>21000</td>
</tr>
<tr>
<td>1982/83</td>
<td>26721</td>
<td>28000</td>
</tr>
<tr>
<td>1983/84</td>
<td>41035</td>
<td>37000</td>
</tr>
<tr>
<td>1984/85</td>
<td>52418</td>
<td>-</td>
</tr>
<tr>
<td>1985/86</td>
<td>65892</td>
<td>-</td>
</tr>
<tr>
<td>1986/87</td>
<td>67353</td>
<td>-</td>
</tr>
<tr>
<td>1987/88</td>
<td>47946</td>
<td>102000</td>
</tr>
<tr>
<td>1988/89</td>
<td>55744</td>
<td>-</td>
</tr>
<tr>
<td>1989/90</td>
<td>53886</td>
<td>-</td>
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<tr>
<td>1990/91</td>
<td>77043</td>
<td>-</td>
</tr>
<tr>
<td>1991/92</td>
<td>65212</td>
<td>-</td>
</tr>
<tr>
<td>1992/93</td>
<td>32398</td>
<td>-</td>
</tr>
<tr>
<td>1993/94</td>
<td>20580</td>
<td>314108</td>
</tr>
<tr>
<td>1994/95</td>
<td>8961</td>
<td>331080</td>
</tr>
<tr>
<td>1995/96</td>
<td>45687</td>
<td>331480</td>
</tr>
<tr>
<td>1996/97</td>
<td>78655</td>
<td>334924</td>
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<tr>
<td>1997/98</td>
<td>83455</td>
<td>335174</td>
</tr>
<tr>
<td>1998/99</td>
<td>64801</td>
<td>-</td>
</tr>
<tr>
<td>1999/00</td>
<td>65494</td>
<td>350328</td>
</tr>
<tr>
<td>2000/01</td>
<td>70092</td>
<td>-</td>
</tr>
<tr>
<td>2001/02</td>
<td>98920</td>
<td>430397</td>
</tr>
</tbody>
</table>

These figures have been previously been presented to the IAG. The IAG recommended that a maximum area of 80 000 ha be used for cap modelling.

Table 4.1: Gwydir Valley development estimates
4.4 Schedule F Cap performance

The IAG were asked to review the information made available by the Gwydir Valley Irrigators Association in February 2002 with regard to establishment of development levels associated with Cap. The DLWC has agreed to base the maximum irrigated area for the Cap scenario at 80000 ha, as recommended by the IAG. The DLWC has also agreed to recalibrate the Gwydir valley IQQM based on the data provided by Agrecon.

The DLWC has prepared some modelling for the Schedule F accounting period using a version of the Gwydir valley IQQM that has been recalibrated using the Agrecon on-farm storage data. The maximum irrigated area has not been adjusted to reflect the recent IAG determination as yet.

The cumulative estimate of the difference between observed diversions and the estimate of Cap provided by the Gwydir IQQM, commencing from 1997/98 are detailed in Table 4.2 (below).

As can be seen, the Special Audit trigger exceedance is due almost entirely to accounting for the 2000/01 water year. A closer examination has revealed that 2 high flow events occurred during the irrigation season during 2000/01, for which the model predicted significant amounts of floodplain harvesting. Consequently, the modelled pumped diversions used for Schedule F accounting are quite low.

<table>
<thead>
<tr>
<th>Water year</th>
<th>Total diversions (GL)</th>
<th>Cap estimate from IQQM (GL)</th>
<th>Difference (GL)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1997/98</td>
<td>521</td>
<td>549</td>
<td>28</td>
</tr>
<tr>
<td>1998/99</td>
<td>295</td>
<td>277</td>
<td>-17</td>
</tr>
<tr>
<td>1999/00</td>
<td>433</td>
<td>398</td>
<td>-35</td>
</tr>
<tr>
<td>2000/01</td>
<td>414</td>
<td>239</td>
<td>-175</td>
</tr>
<tr>
<td>2001/02</td>
<td>450</td>
<td>424</td>
<td>-26</td>
</tr>
<tr>
<td>Cumulative total</td>
<td>2112</td>
<td>1887</td>
<td>-225</td>
</tr>
</tbody>
</table>

The long-term modelling indicates that diversions under current conditions will be below Cap by 5%.

4.5 Long-term Cap performance

The Gwydir IQQM has been configured using the DLWC datasets to produce a 1993/94, a current conditions scenario (based on 1999/00 development) and a Water Sharing Plan scenario for comparison of long-term impacts. All of these scenarios simulate 108 years, and the resultant diversions from the river are compared to ensure Cap compliance in the long-term.

The current conditions scenario has not yet been recalibrated using the Agrecon data. Consequently, the long-term simulation results presented below are from the currently endorsed Gwydir IQQM.

The long-term modelling indicates that diversions under current conditions will be below Cap by 5%.

Note: A below Cap diversion for a year is a credit and is indicated as a positive difference.
The provisions of Schedule F have also been applied to the long-term modelling, where the simulated diversions from the 'current conditions' scenario have been used to take the place of the observed diversions. The total cumulative Cap account over the full period of simulation is shown in Figure 4.2.

The analysis of long-term Schedule F accounting behaviour indicated that there was only a small chance of inappropriate triggering of Cap exceedance by annual audits, with only one 3-year sequence and one 5-year sequence triggering Cap exceedance.

The NSW Government has now accepted a Water Sharing Plan (WSP) for the Gwydir Valley, which will provide a legislative basis for the management rules and define a level of consumptive water access below Cap for a

Figure 4.2: Gwydir Long-term simulated Cap behaviour under 'Current Conditions'

![Figure 4.2: Gwydir Long-term simulated Cap behaviour under 'Current Conditions'](image)

Figure 4.3: Cumulative Cap Performance under WSP

![Figure 4.3: Cumulative Cap Performance under WSP](image)
10 year period. The WSP includes changes to the current environmental flow rules as well as other management rules. The significant changes from the current management rules are:

- Increase in the Environmental Contingency Allowance (ECA) from 25 GL of high security with a 150% account limit, to 45 GL of general security entitlement with a 200% account limit.

The annual water use limit has been changed from 100% to 125%, subject to a 300% use limit in any 3 year period.

The Gwydir WSP will be gazetted prior to the end of February 2003.

A WSP scenario has been produced to assess long-term diversions and environmental improvements under the Plan over the 108 years of available climate data.

The long-term modelling indicates that diversions under the Water Sharing Plan will be below Cap by 7%.

The diversions from this scenario have been compared with those produced by the accredited Cap model to assess long-term performance under Schedule F. The results are shown in Figure 4.3.

An analysis was performed to assess the likelihood that breaches of Cap would be triggered under the annual accounting provisions of Schedule F across a range of accounting periods over the full period of current conditions simulation, for both the simulated diversions under current conditions and WSP. The results are presented in Table 4.3 below.

Table 4.3: Probability of Schedule F Triggering

<table>
<thead>
<tr>
<th>Period of Schedule F accounting</th>
<th>Probability of being in breach of Cap</th>
</tr>
</thead>
<tbody>
<tr>
<td>No. years</td>
<td>Current conditions</td>
</tr>
<tr>
<td>----------</td>
<td>-------------------</td>
</tr>
<tr>
<td>2</td>
<td>1%</td>
</tr>
<tr>
<td>3</td>
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<td>0%</td>
</tr>
<tr>
<td>50</td>
<td>0%</td>
</tr>
</tbody>
</table>

4.6 Conclusion

NSW is of the opinion that the new rules of access and operational rules contained in the Gwydir Valley Regulated Water Sharing Plan will constrain diversions over the next ten years. The rules of the plan, subject to land development not increasing, will result in long-term diversions some 7% below the long-term cap. Furthermore, it is expected that the rules will also result in annual diversions that only rarely exceed annual cap targets.

The plan contains ‘growth management rules’ which, in the case of growth, will automatically reduce access to water to the extent that the long-term diversions reduce back to the plan ‘diversion limit’.