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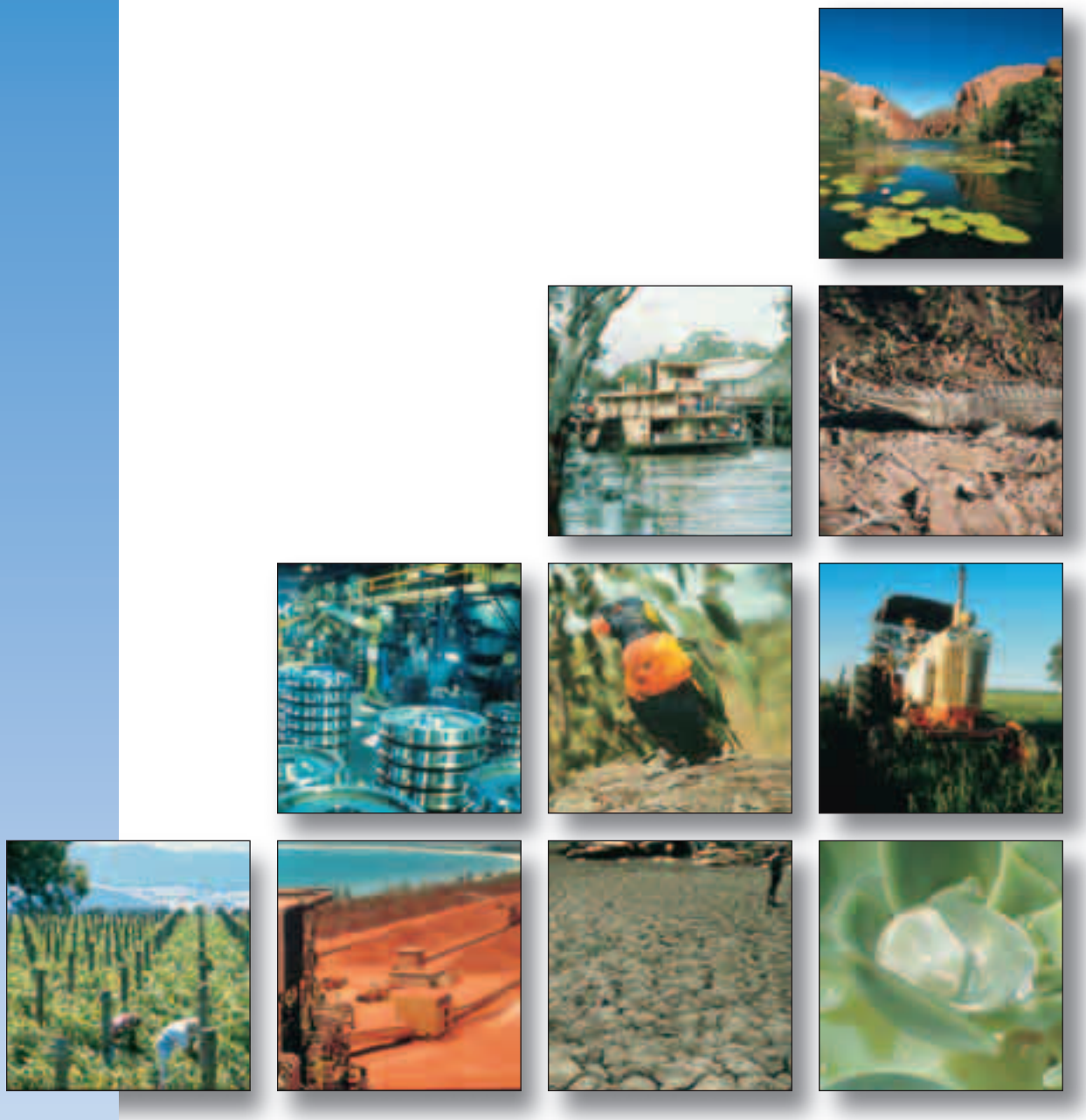
Australian Bureau of Statistics

Water Account Australia

2000–01



Water Account

Australia

2000–01

Dennis Trewin
Australian Statistician

AUSTRALIAN BUREAU OF STATISTICS

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Water droplet on plant photo courtesy of Stuart Peevor.

Freshwater crocodile photo courtesy of Michael Vardon.

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CONTENTS

LIST OF GRAPHICS AND TABLES

page

page

CHAPTER 3 MAINS WATER SUPPLY *continued*

GRAPHICS *continued*

TABLES

CHAPTER 4 WATER REUSE

GRAPHICS

TABLES

page

CHAPTER 5 WATER USE—AGRICULTURE *continued*

page

CHAPTER 7 WATER USE—ELECTRICITY AND GAS SUPPLY *continued*

GRAPHICS *continued*

TABLES

CHAPTER 8 WATER USE—REMAINING INDUSTRIES

GRAPHICS

TABLES

CHAPTER 9 WATER USE—HOUSEHOLDS

GRAPHICS

TABLES

CHAPTER 10 WATER STOCKS

GRAPHICS

page

CHAPTER 10 WATER STOCKS *continued*

CHAPTER 11 CURRENT AND EMERGING ISSUES

PREFACE

ABOUT THE PUBLICATION

This publication is one of the Australian Bureau of Statistics (ABS) environmental accounts, compiled using the System of Integrated Environmental and Economic Accounting (SEEA) framework. It presents estimates on the physical flow of water from the environment through the Australian economy in 2000–01. It consists of water supply and use tables (collectively referred to as flow tables) as well as information on water stocks and other related issues. It is one of the few water accounts that exists in the world.

ACKNOWLEDGEMENT

Many individuals and organisations provided data for inclusion in this publication. The ABS wishes to acknowledge the contribution from federal, state and local government departments, water authorities and a range of private sector organisations that provided data for this project. Without their contribution this publication would not have been possible.

The ABS is also indebted to many people who willingly provided their time to referee the draft manuscript. In Australia, environmental accounting is still a relatively new endeavour. Suggestions and comments on this ABS publication, or environmental accounting in general, would be greatly appreciated and should be sent to the Director, Environment and Energy Statistics Section, Australian Bureau of Statistics, Locked Bag 10, Belconnen, ACT 2616.

Dennis Trewin
Australian Statistician

CHAPTER 1 INTRODUCTION AND MAIN FINDINGS

INTRODUCTION

This publication presents information on the supply and use of water in the Australian economy in 2000–01, compiled in accordance with the System of Integrated Environmental and Economic Accounting (SEEA). Figure 1.2 shows the scope of the water account. Integrated environmental and economic accounting is an evolving field of statistics and since the publication of the first edition of the water account (ABS 2000), there have been a number of advances. Importantly, the SEEA manual has been updated (UN 2003). This has strengthened the conceptual foundations of the water accounts. There have also been a number of changes in the data sources used to compile the water accounts. In particular, more data have been sourced from surveys in this edition of the water account.

Together these changes have led to substantial improvements in the quality of data. However, it has also meant that comparisons with information in the first water account must be made with caution.

Environmental accounting

The water account describes the physical flow of water from the environment through the Australian economy. It consists of water supply and use tables (collectively referred to as flow tables) as well as information on water stocks and other related issues. The water account integrates data from different sources into a consolidated information set making it possible to link physical data on water to economic data, such as those in Australia's national accounts (see table 1.3). It is one of the few water accounts that exists in the world.

Environmental accounts can facilitate a range of issues that include:

- a broader assessment of the consequences of economic growth;
- the contribution of sectors to particular environmental problems; and
- sectoral implications of environmental policy measures (for example, regulation, charges and incentives).

Hydrological conditions vary considerably across Australia, and ideally data presented in the water account should be presented at a regional level. However, comprehensive water supply and use data were unavailable at this level for this report. The ABS is investigating ways of providing regional data in the future.

Water quality

The water account does not present detailed information on water quality, with the exception of some groundwater resources covered in Chapter 10. Ideally, the supply and use tables would include the quality of water used as well as the quality of the water returned to the environment.

Reporting

Generally, the level and quality of reporting of water supply and use data have improved since the first edition of the water account either as a result of the implementation of the Council of Australian Governments (COAG) water reform and changed government legislation, or advances in technologies and water management practices of the water providers. This has led to a better understanding of water supply and use in Australia than in 1996–97. In particular, more detailed information on water use was available from water providers in 2000–01.

Data Sources

In compiling the water account, the ABS has accessed readily available data on water resources from various government and non-government organisations. Data were also collected directly through surveys conducted by the ABS. The project did not duplicate existing data collection activities, but tied together industry, regional and state data into a single system showing the supply and use of water within the Australian economy.

Climate

Water supply and use in the Australian economy needs to be viewed in the context of Australia's climate. Mean annual rainfall in Australia varies substantially across the continent. Large areas in Australia have a mean annual rainfall of 600–1500 mm, an amount comparable with most of Europe and North America. A key feature of Australia's climate is not the amount of rainfall but the variability in rainfall from year-to-year and season-to-season. Annual rainfall variability is greater for Australia than any other continental region (Smith 1998). Any assessment of water supply and use over time must take this into account.

DEFINITIONS AND TERMINOLOGY

Water supply and use in the flow tables is separated into self-extracted, mains water, and reuse water. Understanding what is meant by these terms and others used in this publication is important for data interpretation. Figure 1.2 shows the relationship between the water flows in the economy and the environment, and is useful for understanding the terms used.

Self-extracted water

Self-extracted water is defined for the purposes of the water account as water extracted directly from the environment for use, and includes water from rivers, lakes, farm dams, groundwater and other water bodies. Some of this water is then distributed via a water provider to other water users.

The volume of water used from rainfall is not in scope of the water account, unless it was stored and/or delivered before use. For example, rainfall directly onto a crop is not in scope for the water account. However, if rainfall is collected in a farm dam and then applied onto the crop, it is in scope and is included in the self-extracted water use figures.

Mains water

Mains water is water supplied to a user often through a non-natural network (piped or open channel), and where an economic transaction has occurred for the exchange of this water. Where a water provider reported volumes of water supplied to a user, this was included in mains water, regardless of the method of delivery. As such, water supplied by irrigation water providers via natural waterways and bores is included under mains water. More detail on mains water supply is presented in Chapter 3.

Reuse water

There are multiple interpretations of the term 'reuse water'. In the water account, reuse water refers to wastewater that may have been treated to some extent, and then used again without first being discharged to the environment. It excludes water reused on-site, for example on-farm water reuse, or water constantly being recycled within a manufacturing plant. Only reuse water supplied to a customer by a water provider appears in the publication. Although it is likely that on-site and on-farm reuse involves significant volumes of water, data are limited, and as a result neither have been included in this edition of the water account.

Data on reuse water in the water account were supplied almost entirely by the WATER SUPPLY, SEWERAGE AND DRAINAGE SERVICES industry, and includes reuse water supplied by irrigation/rural water providers through regional reuse schemes. Some businesses from the MINING and MANUFACTURING industries also supply reuse water.

Regulated discharge

Regulated discharge refers to water discharged after use where that discharge does not match the natural flow regime of the receiving water body. For example, wastewater discharged into a river, ocean or land outfall by a sewerage service provider is considered a regulated discharge. Water discharged from a household is not considered to be a regulated discharge because it is usually discharged into a sewerage system.

There are limited data on regulated discharge. In this edition of the water account regulated discharge figures have been included for MINING; ELECTRICITY AND GAS SUPPLY; and WATER SUPPLY, SEWERAGE AND DRAINAGE SERVICES industries only. Many irrigation water providers were unable to quantify the volume of drainage water discharged and it is likely that this volume is larger than indicated in the flow tables. Unregulated discharges are currently not included in the water account.

In-stream use

The use of freshwater *in situ*, such as water use for hydro-electricity generation and aquaculture purposes is classified as in-stream use, and is included in the accounts as self-extracted water use. In-stream volumes are considered to be a type of non-consumptive use, for although these volumes are also considered to be a form of regulated discharge, an economic benefit is gained from the use of the water prior to discharge.

Water use and consumption

Calculating water use by industries is not straightforward. Water use can include self-extracted water, mains water, or reuse water. Sometimes a combination of all three sources are used. Calculating water use estimates for an industry or business is made more complicated when water is supplied to other users, or when water is used in-stream.

In the water account, volumes of water used and supplied by each industry have been balanced to derive a figure called 'water consumption'. This figure takes into account the different characteristics of water supply and use of industries and is a way of standardising water use, allowing for comparisons between industries. The method for calculating water use and water consumption is outlined in figure 1.1.

Water use and consumption continued

For most industries, water use and water consumption are the same as most industries do not have any in-stream use or supply water to other users. However water consumption will be considerably different for some industries, specifically the WATER SUPPLY, SEWERAGE AND DRAINAGE SERVICES industry, ELECTRICITY AND GAS SUPPLY industry, and the AQUACULTURE industry (included in the FORESTRY AND FISHING industry), where in-stream water use and water supply volumes are significant.

1.1 WATER USE AND WATER CONSUMPTION CALCULATION METHODS

Water Use
Mains water use + Self-extracted water use + Reuse water use

Water Consumption
Water use (mains + self-extracted + reuse) – Water supplied to other users – In-stream water use

COMPARISONS WITH THE FIRST WATER ACCOUNT

This section compares the scope and methods of calculation between the previous edition and this edition of the water account. These differences must be taken into account when making comparisons between the reference years.

Together these changes have led to substantial improvements in the quality of data. However, it has also meant that comparisons with the first water account are not strictly possible for all data. Where possible, comparisons between years have been presented in this publication (in particular in Chapters 3, 4 and 9). All other differences between years may reflect changes due to differing concepts, data sources and methodologies in addition to any actual changes in water supply and use by the different sectors of the economy.

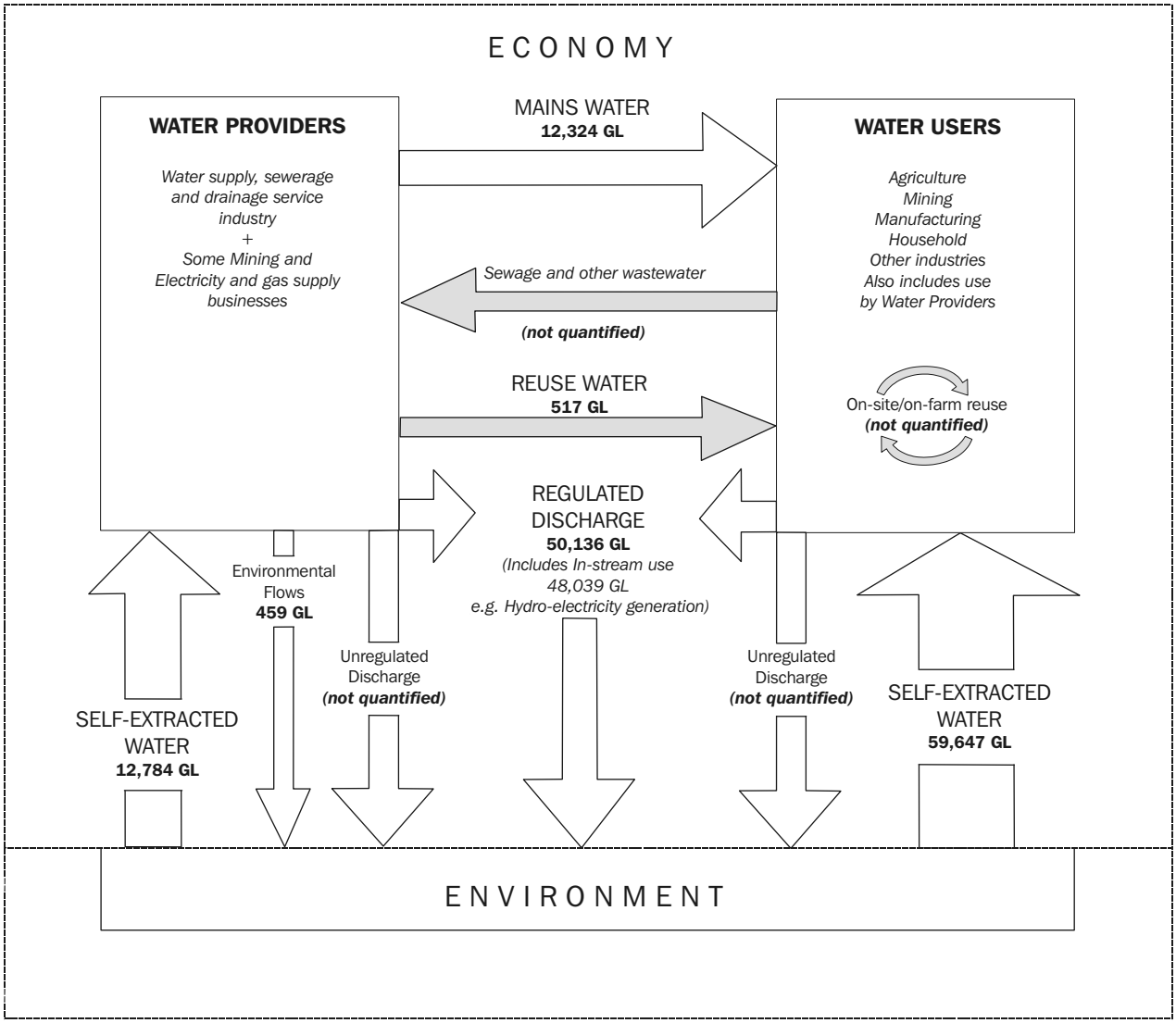
Reuse water

Reuse water was referred to as 'effluent reuse' in the first water account. The definition is the same in both editions: 'the use of wastewater that may have been treated to some extent, and then used again without first being discharged to the environment'.

The first water account included all reuse water supplied to a customer by a water provider. On-farm reuse was not included, although certain on-site reuse volumes (mainly from mineral processing and paper manufacturing businesses) were collected and presented in the reuse estimates.

In this edition, on-site and on-farm reuse volumes have not have been included due to a widespread absence of data. Only reuse water supplied to a customer by a water supplier appears in the publication. This includes water supplied by irrigation/rural water providers through regional reuse schemes. Data on on-site reuse by mineral processing and paper manufacturing businesses were not available and are not included in this account.

1.2 WATER SUPPLY AND USE IN THE AUSTRALIAN ECONOMY—2000–01



Water consumption by industry

Water consumption was calculated differently in the first water account, with reuse water not included in the calculations. In this edition reuse water has been included in water consumption, and although the volumes are small, comparisons with previous water consumption figures should be made with caution.

WATER SUPPLY AND USE

During 2000–01, 72,431 GL of water was extracted from the environment and used within the Australian economy (figure 1.2). Of this amount, 12,784 GL was extracted by water providers, mostly by the WATER SUPPLY, SEWERAGE AND DRAINAGE SERVICES industry (12,765 GL), while water users directly extracted 59,647 GL.

Of the volume extracted by water providers (12,784 GL), 12,324 GL was supplied as mains water to water users and 459 GL was returned to the environment as environmental flows (additional water is also allocated to the environment via a variety of measures and this is addressed in Chapter 11).

WATER SUPPLY AND USE *continued*

Of the total volume extracted from the environment (72,431 GL), 50,136 GL was returned to environment as regulated discharge, with 48,039 GL of this discharge being in-stream use, almost entirely by the ELECTRICITY AND GAS SUPPLY industry (47,544 GL) for hydro-electricity power generation. Water consumption by industries was 24,909 GL.

CHAPTER CONTENTS

In this edition of the water account, the ABS has expanded discussion on the water supply and use data. Each chapter begins with an introduction and contains information to assist with interpretation of tables which are located at the end of all chapters. In some cases information and explanations are repeated so that chapters can stand alone as a source of data. Chapter 2 presents the supply and use (flow) tables. Volumes of water supplied, used and discharged are presented by industry in these tables. Water use is split by self-extracted, mains water, and reuse water. Chapter 3 takes a detailed look at mains water supply, while Chapter 4 presents information on reuse water in Australia in 2000–01. As the characteristics of water supply and use vary between industries, Chapters 5–9 describe water use separately for the main industry groups.

Chapter 10 presents information on water stocks. Water stocks refer to the long term availability of water resources, and data are presented for surface water and groundwater resources. Additional information is presented in this chapter covering the storage capacity of dams. Chapter 11 briefly covers some of the current and emerging issues that will impact on the future development of the water accounts.

MAIN FINDINGS

- In 2000–01 a total of 24,909 GL was consumed in the Australian economy.
- AGRICULTURE consumed the largest volume of water with 16,660 GL, representing 67% of water consumption in Australia in 2000–01. The largest consumers of water within the AGRICULTURE industry were LIVESTOCK, PASTURE, GRAINS AND OTHER AGRICULTURE (5,568 GL), COTTON (2,908 GL), DAIRY FARMING (2,834 GL) and RICE (1,951 GL) industries.
- Excluding in-stream use, water consumption by the ELECTRICITY AND GAS SUPPLY industry in 2000–01 was 1,688 GL or 7% of water consumption in Australia.
- Water consumption by the HOUSEHOLD sector was 2,181 GL in 2000–01 accounting for 9% of water consumption in Australia. This compares with 1,829 GL in 1996–97 where water accounted for 8% of water consumption.
- In 2000–01, the MANUFACTURING industry consumed 866 GL or 4% of total water consumption in Australia.
- The MINING industry consumed 401 GL or 2% of water consumption in Australia in 2000–01.
- Water consumption for the Remaining industries was 859 GL in 2000–01 representing 3% of water consumption in Australia. The CULTURAL, RECREATIONAL AND PERSONAL SERVICES industry accounted for 46% (or 832 GL) of water consumption by the REMAINING industries.
- The use of reuse water has increased dramatically from 134,424 ML in 1996–97 to 516,563 ML in 2000–01.
- Increases in reuse water use occurred in most industries between 1996–97 and 2000–01. The greatest increase in reuse water use was in the AGRICULTURE industry, where reuse water use increased from 38,118 ML in 1996–97 to 423,264 ML in 2000–01.

MAIN FINDINGS

continued

- Reuse water made up 4% of total water supplied by water providers in 2000–01. This compares to 1% in 1996–97.
- In 2000–01 there were 479 water providers in Australia, collectively supplying 12,784 GL of mains water. This volume was 11% higher than in 1996–97.
- Surface water is by far the greatest source of water for the WATER SUPPLY, SEWERAGE AND DRAINAGE SERVICES industry, with 12,042 GL or 94% of total mains water being derived from this source in 2000–01.

1.3 WATER CONSUMPTION, EMPLOYMENT AND IGVA, by selected industries —2000–01

	Water consumption	*Employment*	*IGVA*
	ML	no.	$m
Agriculture(a)	16 660 381	369 379	20 072
Forestry and fishing(b)	26 924	62 288	1 546
Mining	400 622	78 891	33 975
Manufacturing	866 061	1 101 669	73 354
Electricity and gas supply	1 687 778	48 159	11 129
Water supply(c)	1 793 953	19 067	4 222
Other	832 100	7 386 258	405 776

(a) Water consumption for irrigated agriculture only. Industry Gross Value Added (IGVA) and employment represent all irrigated and non-irrigated agriculture.

(b) Includes Services to agriculture; hunting and trapping.

(c) Includes sewerage and drainage services.

Source: ABS 2001a, ABS 2002a, ABS 2002d.

CHAPTER 2 WATER SUPPLY AND USE

INTRODUCTION

This chapter presents information on the volume of water supplied and used within the Australian economy in 2000–01, by industry. Water consumption between states and territories is presented, as well as water consumption by main industry groups. The industries discussed in the water account have been adapted from the Australian and New Zealand Standard Industrial Classification 1993 (ANZSIC) (ABS and New Zealand Department of Statistics 1993) and have been grouped according to user demand (refer to Appendix 4).

Important differences between this edition of the water account and the previous edition are highlighted in this chapter.

WATER CONSUMPTION BY INDUSTRY

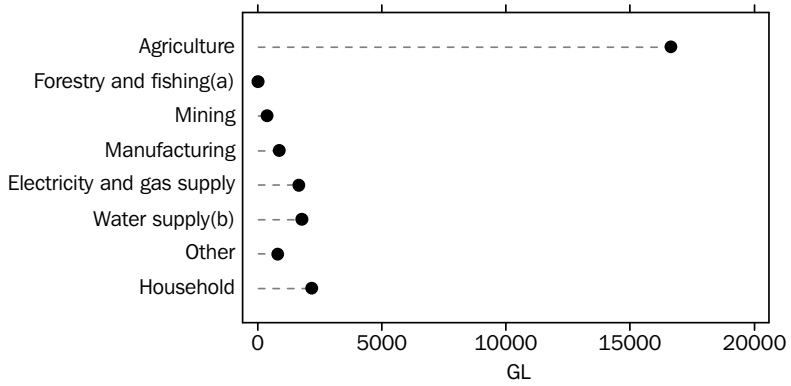
Calculating water use and water consumption by industries is not straightforward (see Chapter 1 and figures 1.1 and 1.2). For most industries, water use and water consumption are the same as they will not have any in-stream use or supply water to other users. However water use and water consumption will be considerably different for some industries where in-stream water use and water supply volumes are significant; specifically the WATER SUPPLY, SEWERAGE AND DRAINAGE SERVICES industry, the ELECTRICITY AND GAS SUPPLY industry, and the AQUACULTURE industry (included in the FORESTRY AND FISHING industry).

Graph 2.1 shows water consumption by industry for Australia during 2000–01. Water consumption is presented instead of total water use as it takes into account the different characteristics of water supply and use of industries, allowing more meaningful comparisons between them. More detail on the water use within these industries can be found in Chapters 5–9 and information used for the calculation of water consumption for different industries can be found in tables 2.9 to 2.16.

The AGRICULTURE industry had the highest water consumption in 2000–01, accounting for 16,660 GL (or 67%). Households were the next highest consumer of water, accounting for 2,181 GL (or 8.8%) of water consumption. The WATER SUPPLY, SEWERAGE AND DRAINAGE SERVICES industry was also a significant consumer of water, accounting for 1,794 GL (or 7.2%) of water consumption, followed by the ELECTRICITY AND GAS SUPPLY industry which consumed 1,688 GL (or 6.8%).

WATER CONSUMPTION BY INDUSTRY *continued*

2.1 WATER CONSUMPTION, Australia—2000–01



(a) Includes Services to agriculture; hunting and trapping.
(b) Includes Sewerage and drainage services.

WATER CONSUMPTION BY STATE AND TERRITORY

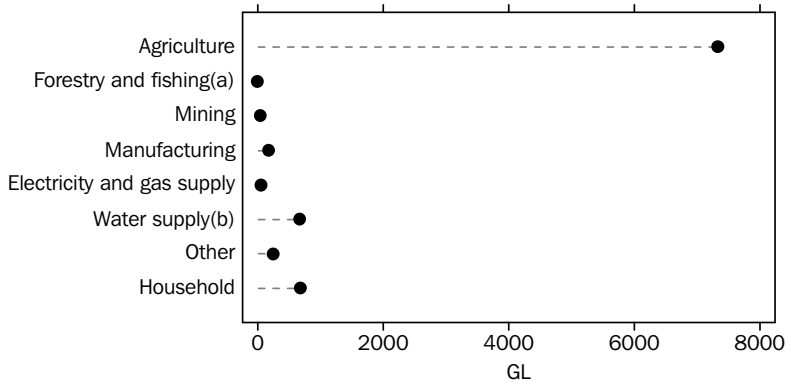
As with the first water account, data from New South Wales and the Australian Capital Territory have been amalgamated in this publication to protect the confidentiality of water providers and users in the Australian Capital Territory. Where possible, data for New South Wales and the Australian Capital Territory are presented separately, such as in the Households chapter (Chapter 9).

Graphs 2.2 to 2.8 show water consumption by industry for each state and territory. These graphs illustrate the different patterns of water consumption by the main industry groups in the states and territories.

New South Wales and the Australian Capital Territory

In New South Wales and the Australian Capital Territory combined, water consumption was 9,425 GL during 2000–01. The highest consumer was the AGRICULTURE industry with 7,322 GL or 78% of water consumption. This was followed by households which consumed 679 GL or 7% of water.

2.2 WATER CONSUMPTION, New South Wales and Australian Capital Territory—2000–01

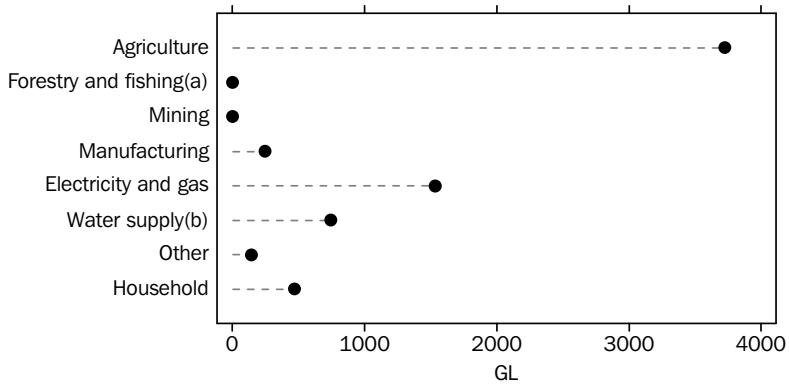


(a) Includes Services to agriculture; hunting and trapping.
(b) Includes Sewerage and drainage services.

Victoria

In Victoria 7,140 GL of water were consumed in 2000–01. The AGRICULTURE industry was the highest consumer of water in Victoria (graph 2.3), responsible for the consumption of 3,725 GL (or 52%) of the state's water consumption. The ELECTRICITY AND GAS SUPPLY industry was the next highest consumer of water, accounting for 1,536 GL (or 22%). The WATER SUPPLY, SEWERAGE AND DRAINAGE SERVICES industry was also a significant consumer with 745 GL or 10% of the state's water consumption.

2.3 WATER CONSUMPTION, Victoria—2000–01

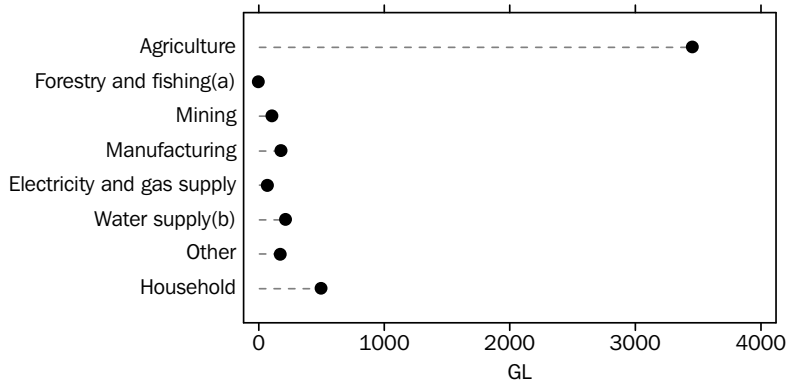


(a) Includes Services to agriculture; hunting and trapping.
(b) Includes Sewerage and drainage services.

Queensland

In Queensland 4,711 GL of water were consumed in 2000–01. The AGRICULTURE industry consumed the most water with 3,454 GL or 73% of the state's water consumption. SUGAR and COTTON were the main consumers within the AGRICULTURE industry, with 1,186 GL and 985 GL consumed respectively. The next largest consumers were households, with 501 GL or 11% of the state's water consumption (graph 2.4).

2.4 WATER CONSUMPTION, Queensland—2000–01



(a) Includes Services to agriculture; hunting and trapping.
(b) Includes Sewerage and drainage services.

South Australia

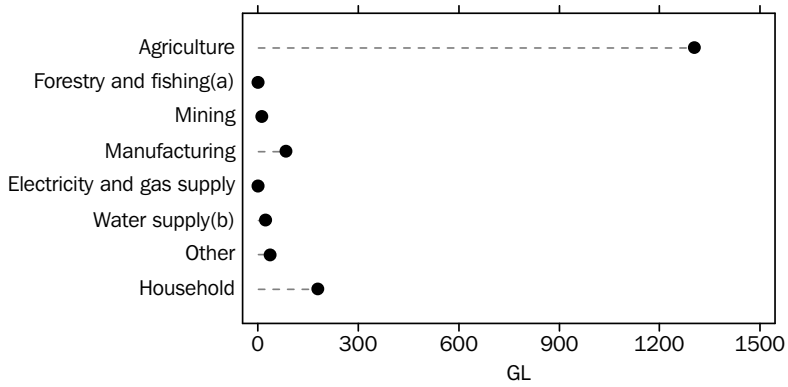
Water consumption in South Australia was 1,647 GL in 2000–01. The AGRICULTURE industry was the largest consumer of water accounting for 1,302 GL or 79% of the state's water consumption. This proportion of water consumption by AGRICULTURE was the largest of all the states and territories. Of the water consumed by AGRICULTURE, 474 GL (or 36%) was by

South Australia continued

LIVESTOCK, PASTURE, GRAINS AND OTHER AGRICULTURE, and 320 GL (or 25%) was by DAIRY FARMING. Water consumption for GRAPES was also significant (284 GL or 22% of water consumption by AGRICULTURE).

Households were also large consumers of water with 181 GL or 11% consumed (graph 2.5).

2.5 WATER CONSUMPTION, South Australia—2000–01

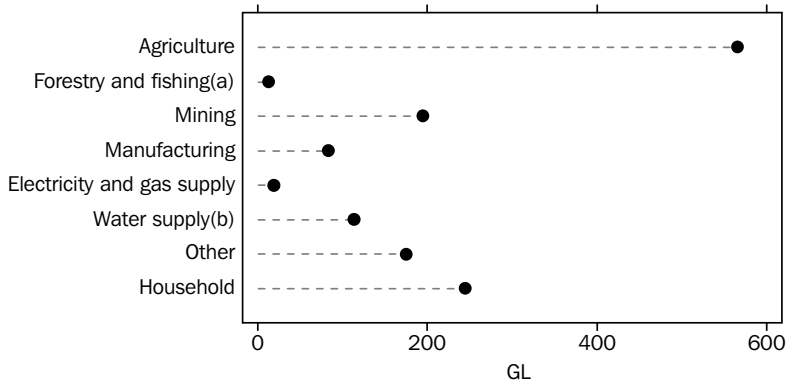


(a) Includes Services to agriculture; hunting and trapping.
(b) Includes Sewerage and drainage services.

Western Australia

Graph 2.6 shows that of the 1,409 GL of water consumed in Western Australia in 2000–01, the AGRICULTURE industry consumed the largest volume (565 GL or 40%) followed by households (245 GL or 17%). Consumption by the MINING industry was also substantial (195 GL or 14%), due to a significant level of MINING activity in Western Australia compared to other states and territories.

2.6 WATER CONSUMPTION, Western Australia—2000–01



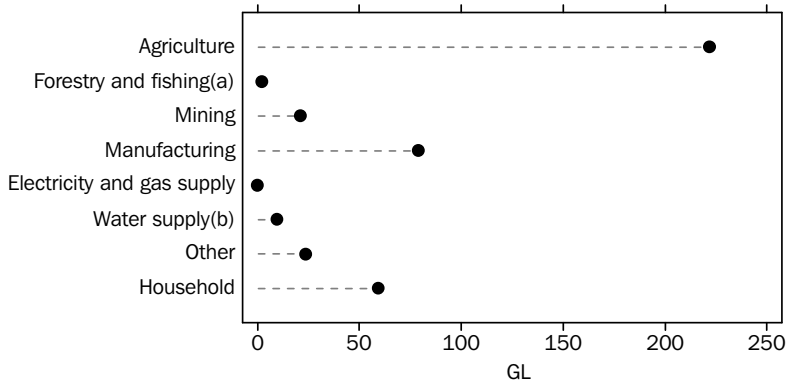
(a) Includes Services to agriculture; hunting and trapping.
(b) Includes Sewerage and drainage services.

Tasmania

Water consumption was 417 GL in Tasmania in 2000–01. The AGRICULTURE industry was the largest consumer accounting for 222 GL or 53% of water consumption in the state (graph 2.7). MANUFACTURING was also major user of water in the state, consuming 79 GL or 19%. Most of the water consumed by MANUFACTURING in Tasmania, was by the WOOD AND PAPER PRODUCTS industry (87% of Manufacturing water consumption).

Tasmania continued

2.7 WATER CONSUMPTION, Tasmania—2000–01

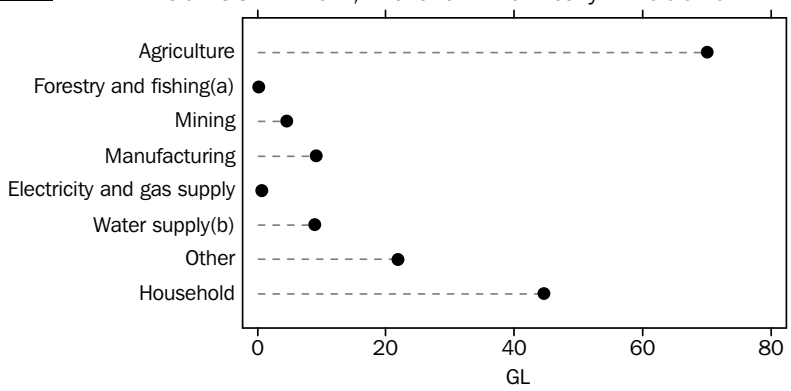


(a) Includes Services to agriculture; hunting and trapping.
(b) Includes Sewerage and drainage services.

Northern Territory

In the Northern Territory 160 GL were consumed in 2000–01. The AGRICULTURE industry accounted for 70 GL or 44% (graph 2.8). The next highest consumer of water was households, using 45 GL (or 28%). This relatively high proportion can be attributed to the Northern Territory having the highest household water use per capita in Australia during 2000–01.

2.8 WATER CONSUMPTION, Northern Territory—2000–01



(a) Includes Services to agriculture; hunting and trapping.
(b) Includes Sewerage and drainage services.

COMPARISONS WITH PREVIOUS EDITION

Agriculture

For AGRICULTURE (ANZSIC subdivision 01), water consumption is equal to water use, as this industry has no in-stream water use, nor does it supply water to other users. In this edition of the water account, the DAIRY FARMING industry has been separated from the LIVESTOCK, PASTURE, GRAINS AND OTHER AGRICULTURE category used in the first water account. This category was a large user of water, and the separation of DAIRY FARMING is the first step towards further disaggregation of the category which will allow a better understanding of water use within the AGRICULTURE industry.

There is significant difference between the methodologies of the two water accounts in the calculation of livestock water usage. In the first water account, livestock water use was included in the estimates where information was available, however no attempt was made to derive total water use for livestock in Australia. This was because there was an

Agriculture continued

absence of information on livestock water usage (from either water providers or water users) and it was difficult to separate livestock water use from other water use. In this water account, water use by all livestock has been estimated from information provided by water providers and state and industry representatives. As such, the use of water by livestock, which is included in LIVESTOCK, PASTURES, GRAINS AND OTHER AGRICULTURE and also in the DAIRY FARMING industry, is more accurately reflected in this water account.

Due to the changes in the methods of calculating water use, including livestock water usage, the differences between the two reference years should be interpreted cautiously. For more detail on water use in the AGRICULTURE industry, refer to Chapter 5.

Services to agriculture; hunting and trapping, Forestry and fishing

Most of the water used in SERVICES TO AGRICULTURE; HUNTING AND TRAPPING and FORESTRY AND FISHING (ANZSIC subdivisions 02–04) is for AQUACULTURE. Water use for AQUACULTURE is considered to be an in-stream water use, and therefore water consumption by this industry is calculated differently to most other industries. More comprehensive data were available for this industry in 2000–01 than in the first water account, and differences between the reference years should therefore be treated with caution. For more detail refer to Chapter 8.

Mining

In the MINING industry (ANZSIC subdivisions 11–15), water is often obtained from mine dewatering. In both editions of the water account, mine dewatering was assumed to be a part of self-extracted use by the MINING industry. This is because much of this water (largely rainfall, run-off and infiltration) collected from mine dewatering was used for mining processes prior to discharge. In the first water account, mine dewatering was unable to be distinguished from other discharges. For this water account, questions on water use in the ABS Environmental Management Survey 2000–01 (EMS), targeting the MINING industry, were structured so that this information could be distinguished from other regulated discharges.

On-site reuse for the MINING industry was included in the first water account, but was not included in this edition. This is because while on-site reuse by this industry is significant, nationally consistent data are lacking. As such, differences between the amount of reuse water between the two editions should be treated with caution.

This edition of the water account used the EMS to survey more MINING businesses than the survey used in the previous water account, and some differences may be the result of better coverage of this industry. For more detail on the MINING industry, refer to Chapter 6.

Manufacturing

On-site reuse for the MANUFACTURING industry was included in the first water account, but was not included in this edition. This is because while on-site reuse by this industry is significant, nationally consistent data are lacking. As such, differences between the amount of reuse water between the two editions should be treated with caution.

This edition of the water account used the EMS to survey more MANUFACTURING businesses than the survey used in the previous water account, and some differences may be the result of better coverage of this industry. For more detail on the MANUFACTURING industry, refer to Chapter 6.

Electricity and gas supply

Similar to other industries, on-site reuse for the ELECTRICITY AND GAS SUPPLY industry (ANZSIC subdivision 36) was included in the first water account, but was not included in this edition. On-site reuse by this industry is significant, and the differences between reuse water data should therefore be treated with caution.

A large proportion of water used by this industry is in-stream use. In-stream use has been presented at a state and territory level rather than only at a national level as was the case for the previous water account. For more detail on the ELECTRICITY AND GAS SUPPLY industry, refer to Chapter 7.

Water supply, sewerage and drainage services

Almost all mains and reuse water is provided by the WATER SUPPLY, SEWERAGE AND DRAINAGE SERVICE industry (ANZSIC subdivision 37). This industry consists of units engaged in the storage, purification or distribution of water, as well as units engaged in the operation of sewerage or drainage systems. Irrigation water providers and irrigation drainage service providers are included in this industry also.

All businesses that provided a sewerage service or provided water for use in 2000–01 were classified into this category when presenting data in the flow tables. This is consistent with the first water account.

Other industries

The OTHER industries are a collection of industries not already mentioned in this publication, and represent water use by businesses belonging mainly to services and administration industries (ANZSIC subdivisions 41–96). Of the OTHER industries, the CULTURAL, RECREATIONAL AND PERSONAL SERVICES industry is a significant user of water. Water use in this industry includes water used on parks and gardens, golf courses and other sporting grounds. For more detail on the OTHER industries refer to Chapter 8.

Household

Household water use, also referred to as domestic water use, includes water used by households for human consumption (such as for drinking and cooking) and also includes water used by households for cleaning or outdoors (such as water for gardens and swimming pools). The methods used to calculate water use by households are the same as in the first water account. For more detail on household water use, refer to Chapter 9.

2.9 WATER SUPPLY AND USE, Australia—2000–01

	SUPPLY			
Industry	*Self-extracted*(a) ML	*Mains water*(b) ML	*Reuse water*(c) ML	*Regulated discharge*(d) ML
Agriculture				
Livestock, pasture, grains & other	—	—	—	—
Dairy farming	—	—	—	—
Vegetables	—	—	—	—
Sugar	—	—	—	—
Fruit	—	—	—	—
Grapes	—	—	—	—
Cotton	—	—	—	—
Rice	—	—	—	—
Total	—	—	—	—
Services to agriculture; hunting & trapping	—	—	—	—
Forestry & fishing	—	—	—	367 756
Mining				
Coal mining	—	2 247	—	56 053
Oil & gas extraction	—	—	—	26 422
Metal ore mining	—	3 973	—	91 282
Other mining	—	—	—	25 180
Total	—	*6 220*	—	*198 937*
Manufacturing				
Food, beverage & tobacco	—	—	—	—
Textile, clothing, footwear & leather	—	—	—	—
Wood & paper products	—	—	—	50 928
Printing, publishing & recorded media	—	—	—	—
Petroleum, coal, chemical & associated product	—	—	720	—
Non-metallic mineral products	—	—	—	—
Metal products	—	—	—	—
Machinery & equipment	—	—	—	—
Other manufacturing	—	—	—	—
Total	—	—	*720*	*50 928*
Electricity & gas(e)	—	12 682	4 506	47 681 239
Water supply, sewerage & drainage services(f)	—	12 764 958	511 337	1 837 170
Construction	—	—	—	—
Wholesale & retail trade	—	—	—	—
Accommodation, cafes & restaurants	—	—	—	—
Transport & storage	—	—	—	—
Finance, property & business services	—	—	—	—
Government administration	—	—	—	—
Education	—	—	—	—
Health & community services	—	—	—	—
Cultural, recreational & personal services	—	—	—	—
Household	—	—	—	—
Environment	72 431 152	—	—	—
Total	**72 431 152**	**12 783 858**	**516 563**	**50 136 030**

— nil or rounded to zero (including null cells)

(a) Includes water extracted directly from the environment for use.

(b) Includes water supplied to a user usually through a non-natural network (piped/open channel or other carrier) where an economic transaction has occurred for the exchange of water regardless of method of delivery. Mains water is a subset of the Self-extracted total.

(c) Refers to wastewater that may have been treated to some extent and supplied to another user. It excludes water reused on-site (see Explanatory Notes 12 and 21).

(d) Refers to water discharged after use where that discharge does not match the natural flow regime of the receiving water body.

(e) The majority of water used by this industry is 'in-stream' and is often used again downstream by other water users.

(f) Includes losses from seepages and evapotranspiration (where measured) as well as water used by the Water supply, sewerage and drainage services industry.

2.9 WATER SUPPLY AND USE, Australia—2000–01 *continued*

	USE				
Industry	*Self-extracted*(b) ML	*Mains water*(c) ML	*Reuse water*(d) ML	*In-stream*(e) ML	*Water consumption*(a) ML
Agriculture					
Livestock, pasture, grains & other	3 471 109	1 905 485	191 879	—	5 568 474
Dairy farming	1 210 701	1 571 863	51 855	—	2 834 418
Vegetables	422 008	117 033	16 670	—	555 711
Sugar	555 668	753 129	1 875	—	1 310 671
Fruit	491 250	296 557	14 825	—	802 632
Grapes	345 371	364 190	19 576	—	729 137
Cotton	2 502 002	404 090	2 085	—	2 908 178
Rice	133 986	1 692 674	124 501	—	1 951 160
Total	*9 132 095*	*7 105 022*	*423 264*	—	*16 660 381*
Services to agriculture; hunting & trapping	2 770	1 027	104	—	3 901
Forestry & fishing	378 389	5 245	7 145	367 756	23 022
Mining					
Coal mining	106 472	14 701	2 687	49 175	72 439
Oil & gas extraction	17 862	1 346	—	9 146	10 061
Metal ore mining	306 883	31 362	2 754	52 659	284 367
Other mining	48 419	1 788	—	16 450	33 756
Total	*479 635*	*49 196*	*5 441*	*127 430*	*400 622*
Manufacturing					
Food, beverage & tobacco	122 804	116 986	1 719	—	241 509
Textile, clothing, footwear & leather	497	52 582	776	—	53 855
Wood & paper products	92 409	76 890	5 553	—	174 851
Printing, publishing & recorded media	81	48 107	—	—	48 188
Petroleum, coal, chemical & associated product	8 979	64 372	8 022	—	81 373
Non-metallic mineral products	15 630	8 894	233	—	24 757
Metal products	51 698	65 142	—	—	116 840
Machinery & equipment	3 156	108 442	234	—	111 832
Other manufacturing	572	12 285	—	—	12 857
Total	*295 825*	*553 700*	*16 536*	—	*866 061*
Electricity & gas(f)	49 116 399	122 937	4 991	47 543 867	1 687 778
Water supply, sewerage & drainage services(g)	12 767 205	1 768 650	23 056	—	1 793 953
Construction	3 414	14 665	—	—	18 079
Wholesale & retail trade	833	81 248	265	—	82 346
Accommodation, cafes & restaurants	5 283	45 794	734	—	51 811
Transport & storage	3 846	50 660	250	—	54 756
Finance, property & business services	852	85 437	56	—	86 345
Government administration	4 200	50 895	1 279	—	56 374
Education	10 955	34 826	719	—	46 500
Health & community services	2 611	38 165	64	—	40 840
Cultural, recreational & personal services	131 327	231 230	32 492	—	395 049
Household	95 512	2 085 768	167	—	2 181 447
Environment	—	459 393	—	—	459 393
Total	**72 431 152**	**12 783 858**	**516 563**	**48 039 054**	**24 908 659**

— nil or rounded to zero (including null cells)

(a) Water consumption = Self-extracted use + Mains water use + Reuse water use - Mains water supply - In-stream use.

(b) Includes water extracted directly from the environment for use.

(c) Includes water supplied to a user usually through a non-natural network (piped/open channel or other carrier) where an economic transaction has occurred for the exchange of water regardless of method of delivery. Mains water is a subset of the Self-extracted total.

(d) Refers to wastewater that may have been treated to some extent and supplied to another user. It excludes water reused on-site (see Explanatory Notes 12 and 21).

(e) This is a subset of Self-extracted water use.

(f) The majority of water used by this industry is 'in-stream' and is often used again downstream by other water users.

(g) Includes losses from seepages and evapotranspiration (where measured) as well as water used by the Water supply, sewerage and drainage services industry.

2.10 WATER SUPPLY AND USE, New South Wales and Australian Capital Territory—2000–01

	SUPPLY			
Industry	*Self-extracted*(a) ML	*Mains water*(b) ML	*Reuse water*(c) ML	*Regulated discharge*(d) ML
Agriculture				
Livestock, pasture, grains & other	—	—	—	—
Dairy farming	—	—	—	—
Vegetables	—	—	—	—
Sugar	—	—	—	—
Fruit	—	—	—	—
Grapes	—	—	—	—
Cotton	—	—	—	—
Rice	—	—	—	—
Total	—	—	—	—
Services to agriculture; hunting & trapping	—	—	—	—
Forestry & fishing	—	—	—	575
Mining				
Coal mining	—	—	—	41 673
Oil & gas extraction	—	—	—	—
Metal ore mining	—	—	—	1 150
Other mining	—	—	—	1 330
Total	—	—	—	*44 153*
Manufacturing				
Food, beverage & tobacco	—	—	—	—
Textile, clothing, footwear & leather	—	—	—	—
Wood & paper products	—	—	—	7 022
Printing, publishing & recorded media	—	—	—	—
Petroleum, coal, chemical & associated product	—	—	—	—
Non-metallic mineral products	—	—	—	—
Metal products	—	—	—	—
Machinery & equipment	—	—	—	—
Other manufacturing	—	—	—	—
Total	—	—	—	*7 022*
Electricity & gas(e)	—	8 987	—	4 053 044
Water supply, sewerage & drainage services(f)	—	4 748 295	266 963	820 876
Construction	—	—	—	—
Wholesale & retail trade	—	—	—	—
Accommodation, cafes & restaurants	—	—	—	—
Transport & storage	—	—	—	—
Finance, property & business services	—	—	—	—
Government administration	—	—	—	—
Education	—	—	—	—
Health & community services	—	—	—	—
Cultural, recreational & personal services	—	—	—	—
Household	—	—	—	—
Environment	13 247 414	—	—	—
Total	**13 247 414**	**4 757 281**	**266 964**	**4 925 670**

— nil or rounded to zero (including null cells)

(a) Includes water extracted directly from the environment for use.

(b) Includes water supplied to a user usually through a non-natural network (piped/open channel or other carrier) where an economic transaction has occurred for the exchange of water regardless of method of delivery. Mains water is a subset of the Self-extracted total.

(c) Refers to wastewater that may have been treated to some extent and supplied to another user. It excludes water reused on-site (see Explanatory Notes 12 and 21).

(d) Refers to water discharged after use where that discharge does not match the natural flow regime of the receiving water body.

(e) The majority of water used by this industry is 'in-stream' and is often used again downstream by other water users.

(f) Includes losses from seepages and evapotranspiration (where measured) as well as water used by the Water supply, sewerage and drainage services industry.

2.10 WATER SUPPLY AND USE, New South Wales and Australian Capital Territory—2000–01 *continued*

	USE				
Industry	*Self-extracted*(b) ML	*Mains water*(c) ML	*Reuse water*(d) ML	*In-stream*(e) ML	*Water consumption*(a) ML
Agriculture					
Livestock, pasture, grains & other	1 542 588	959 091	88 541	—	2 590 220
Dairy farming	364 581	36 002	636	—	401 219
Vegetables	71 095	20 627	3 972	—	95 694
Sugar	1 071	80	18	—	1 169
Fruit	156 684	46 852	10 525	—	214 061
Grapes	112 659	50 369	11 324	—	174 352
Cotton	1 836 183	83 992	876	—	1 921 050
Rice	107 310	1 692 674	124 501	—	1 924 484
Total	*4 192 170*	*2 889 687*	*240 391*	—	*7 322 249*
Services to agriculture; hunting & trapping	148	491	52	—	690
Forestry & fishing	576	487	2 517	575	3 005
Mining					
Coal mining	64 808	4 469	2 651	38 297	33 631
Oil & gas extraction	—	—	—	—	—
Metal ore mining	4 143	9 512	2 754	950	15 459
Other mining	2 220	407	—	—	2 627
Total	*71 171*	*14 388*	*5 406*	*39 247*	*51 718*
Manufacturing					
Food, beverage & tobacco	13 008	19 862	—	—	32 870
Textile, clothing, footwear & leather	447	20 763	—	—	21 210
Wood & paper products	12 111	18 053	10	—	30 174
Printing, publishing & recorded media	1	2 112	—	—	2 113
Petroleum, coal, chemical & associated product	39	16 307	—	—	16 346
Non-metallic mineral products	4 182	2 712	—	—	6 894
Metal products	—	28 872	—	—	28 872
Machinery & equipment	3	36 860	—	—	36 863
Other manufacturing	566	2 827	—	—	3 393
Total	*30 356*	*148 368*	*10*	—	*178 735*
Electricity & gas(f)	4 107 257	9 330	1 210	4 049 610	59 200
Water supply, sewerage & drainage services(g)	4 748 295	666 139	9 689	—	675 828
Construction	118	7 806	—	—	7 923
Wholesale & retail trade	45	25 007	—	—	25 052
Accommodation, cafes & restaurants	2 467	11 534	11	—	14 012
Transport & storage	113	15 144	—	—	15 257
Finance, property & business services	712	45 190	—	—	45 903
Government administration	2 445	5 993	—	—	8 438
Education	2 576	7 185	71	—	9 832
Health & community services	2 581	12 668	—	—	15 249
Cultural, recreational & personal services	56 761	47 901	7 440	—	112 102
Household	29 623	649 433	167	—	679 223
Environment	—	200 528	—	—	200 528
Total	**13 247 414**	**4 757 281**	**266 964**	**4 089 432**	**9 424 944**

— nil or rounded to zero (including null cells)

(a) Water consumption = Self-extracted use + Mains water use + Reuse water use - Mains water supply - In-stream use.

(b) Includes water extracted directly from the environment for use.

(c) Includes water supplied to a user usually through a non-natural network (piped/open channel or other carrier) where an economic transaction has occurred for the exchange of water regardless of method of delivery. Mains water is a subset of the Self-extracted total.

(d) Refers to wastewater that may have been treated to some extent and supplied to another user. It excludes water reused on-site (see Explanatory Notes 12 and 21).

(e) This is a subset of Self-extracted water use.

(f) The majority of water used by this industry is 'in-stream' and is often used again downstream by other water users.

(g) Includes losses from seepages and evapotranspiration (where measured) as well as water used by the Water supply, sewerage and drainage services industry.

2.11 WATER SUPPLY AND USE, Victoria—2000–01

	SUPPLY			
Industry	*Self-extracted*(a) ML	*Mains water*(b) ML	*Reuse water*(c) ML	*Regulated discharge*(d) ML
Agriculture				
Livestock, pasture, grains & other	—	—	—	—
Dairy farming	—	—	—	—
Vegetables	—	—	—	—
Sugar	—	—	—	—
Fruit	—	—	—	—
Grapes	—	—	—	—
Cotton	—	—	—	—
Rice	—	—	—	—
Total	—	—	—	—
Services to agriculture; hunting & trapping	—	—	—	—
Forestry & fishing	—	—	—	717
Mining				
Coal mining	—	—	—	—
Oil & gas extraction	—	—	—	3 402
Metal ore mining	—	—	—	1
Other mining	—	—	—	16 083
Total	—	—	—	*19 486*
Manufacturing				
Food, beverage & tobacco	—	—	—	—
Textile, clothing, footwear & leather	—	—	—	—
Wood & paper products	—	—	—	361
Printing, publishing & recorded media	—	—	—	—
Petroleum, coal, chemical & associated products	—	—	—	—
Non-metallic mineral products	—	—	—	—
Metal products	—	—	—	—
Machinery & equipment	—	—	—	—
Other manufacturing	—	—	—	—
Total	—	—	—	*361*
Electricity & gas supply(e)	—	136	2 745	3 064 547
Water supply, sewerage & drainage services(f)	—	4 410 180	193 608	428 624
Construction	—	—	—	—
Wholesale & retail trade	—	—	—	—
Accommodation, cafes & restaurants	—	—	—	—
Transport & storage	—	—	—	—
Finance, property & business services	—	—	—	—
Government administration	—	—	—	—
Education	—	—	—	—
Health & community services	—	—	—	—
Cultural, recreational & personal services	—	—	—	—
Household	—	—	—	—
Environment	9 903 296	—	—	—
Total	**9 903 296**	**4 410 316**	**196 353**	**3 513 735**

— nil or rounded to zero (including null cells)

(a) Includes water extracted directly from the environment for use.

(b) Includes water supplied to a user usually through a non-natural network (piped/open channel or other carrier) where an economic transaction has occurred for the exchange of water regardless of method of delivery. Mains water is a subset of the Self-extracted total.

(c) Refers to wastewater that may have been treated to some extent and supplied to another user. It excludes water reused on-site (see Explanatory Notes 12 and 21).

(d) Refers to water discharged after use where that discharge does not match the natural flow regime of the receiving water body.

(e) The majority of water used by this industry is 'in-stream' and is often used again downstream by other water users.

(f) Includes losses from seepages and evapotranspiration (where measured) as well as water used by the Water supply, sewerage and drainage services industry.

2.11 WATER SUPPLY AND USE, Victoria—2000–01 *continued*

	USE				
Industry	*Self-extracted*(b) ML	*Mains water*(c) ML	*Reuse water*(d) ML	*In-stream*(e) ML	*Water consumption*(a) ML
Agriculture					
Livestock, pasture, grains & other	535 554	797 233	101 938	—	1 434 725
Dairy farming	209 784	1 423 971	51 219	—	1 684 974
Vegetables	94 096	34 466	2 326	—	130 888
Sugar	—	—	—	—	—
Fruit	104 961	101 243	3 216	—	209 421
Grapes	51 315	180 083	6 495	—	237 892
Cotton	—	—	—	—	—
Rice	26 676	—	—	—	26 676
Total	*1 022 386*	*2 536 996*	*165 193*	—	*3 724 576*
Services to agriculture; hunting & trapping	—	124	52	—	176
Forestry & fishing	2 687	736	1 355	717	4 061
Mining					
Coal mining	—	—	36	—	36
Oil & gas extraction	4 802	260	—	—	5 062
Metal ore mining	1 524	109	—	—	1 633
Other mining	16 525	68	—	16 058	535
Total	*22 851*	*437*	*36*	*16 058*	*7 266*
Manufacturing					
Food, beverage & tobacco	11 060	48 016	882	—	59 958
Textile, clothing, footwear & leather	2	27 822	244	—	28 067
Wood & paper products	1 863	30 369	5 542	—	37 775
Printing, publishing & recorded media	39	19 527	—	—	19 566
Petroleum, coal, chemical & associated products	24	32 090	3 476	—	35 590
Non-metallic mineral products	2 372	2 564	—	—	4 936
Metal products	8	8 830	—	—	8 837
Machinery & equipment	11	46 985	—	—	46 996
Other manufacturing	2	7 182	—	—	7 184
Total	*15 379*	*223 386*	*10 144*	—	*248 909*
Electricity & gas supply(f)	4 425 319	51 119	2 954	2 943 097	1 536 159
Water supply, sewerage & drainage services(g)	4 410 180	737 097	8 211	—	745 307
Construction	—	53	—	—	53
Wholesale & retail trade	—	10 586	265	—	10 851
Accommodation, cafes & restaurants	97	4 675	—	—	4 772
Transport & storage	—	5 247	—	—	5 247
Finance, property & business services	—	8 076	17	—	8 093
Government administration	—	11 900	57	—	11 957
Education	—	6 989	39	—	7 028
Health & community services	—	5 928	45	—	5 973
Cultural, recreational & personal services	2 323	83 602	7 986	—	93 911
Household	2 074	470 193	—	—	472 266
Environment	—	253 172	—	—	253 172
Total	**9 903 296**	**4 410 316**	**196 353**	**2 959 872**	**7 139 777**

— nil or rounded to zero (including null cells)

(a) Water consumption = Self-extracted use + Mains water use + Reuse water use - Mains water supply - In-stream use.

(b) Includes water extracted directly from the environment for use.

(c) Includes water supplied to a user usually through a non-natural network (piped/open channel or other carrier) where an economic transaction has occurred for the exchange of water regardless of method of delivery. Mains water is a subset of the Self-extracted total.

(d) Refers to wastewater that may have been treated to some extent and supplied to another user. It excludes water reused on-site (see Explanatory Notes 12 and 21).

(e) This is a subset of Self-extracted water use.

(f) The majority of water used by this industry is 'in-stream' and is often used again downstream by other water users.

(g) Includes losses from seepages and evapotranspiration (where measured) as well as water used by the Water supply, sewerage and drainage services industry.

2.12 WATER SUPPLY AND USE, Queensland—2000–01

	SUPPLY			
Industry	*Self-extracted*(a) ML	*Mains water*(b) ML	*Reuse water*(c) ML	*Regulated discharge*(d) ML
Agriculture				
Livestock, pasture, grains & other	—	—	—	—
Dairy farming	—	—	—	—
Vegetables	—	—	—	—
Sugar	—	—	—	—
Fruit	—	—	—	—
Grapes	—	—	—	—
Cotton	—	—	—	—
Rice	—	—	—	—
Total	—	—	—	—
Services to agriculture; hunting & trapping	—	—	—	—
Forestry & fishing	—	—	—	2 261
Mining				
Coal mining	—	2 247	—	6 350
Oil & gas extraction	—	—	—	8 256
Metal ore mining	—	—	—	2 574
Other mining	—	—	—	1 016
Total	—	*2 247*	—	*18 196*
Manufacturing				
Food, beverage & tobacco	—	—	—	—
Textile, clothing, footwear & leather	—	—	—	—
Wood & paper products	—	—	—	23 114
Printing, publishing & recorded media	—	—	—	—
Petroleum, coal, chemical & associated products	—	—	—	—
Non-metallic mineral products	—	—	—	—
Metal products	—	—	—	—
Machinery & equipment	—	—	—	—
Other manufacturing	—	—	—	—
Total	—	—	—	*23 114*
Electricity & gas(e)	—	3 194	—	1 459 362
Water supply, sewerage & drainage services(f)	—	2 157 992	23 818	309 029
Construction	—	—	—	—
Wholesale & retail trade	—	—	—	—
Accommodation, cafes & restaurants	—	—	—	—
Transport & storage	—	—	—	—
Finance, property & business services	—	—	—	—
Government administration	—	—	—	—
Education	—	—	—	—
Health & community services	—	—	—	—
Cultural, recreational & personal services	—	—	—	—
Household	—	—	—	—
Environment	6 140 416	—	—	—
Total	**6 140 416**	**2 163 433**	**23 818**	**1 811 962**

— nil or rounded to zero (including null cells)

(a) Includes water extracted directly from the environment for use.

(b) Includes water supplied to a user usually through a non-natural network (piped/open channel or other carrier) where an economic transaction has occurred for the exchange of water regardless of method of delivery. Mains water is a subset of the Self-extracted total.

(c) Refers to wastewater that may have been treated to some extent and supplied to another user. It excludes water reused on-site (see Explanatory Notes 12 and 21).

(d) Refers to water discharged after use where that discharge does not match the natural flow regime of the receiving water body.

(e) The majority of water used by this industry is 'in-stream' and is often used again downstream by other water users.

(f) Includes losses from seepages and evapotranspiration (where measured) as well as water used by the Water supply, sewerage and drainage services industry.

2.12 WATER SUPPLY AND USE, Queensland—2000–01 *continued*

	USE				
Industry	*Self-extracted*(a) ML	*Mains water*(b) ML	*Reuse water*(c) ML	*In-stream*(d) ML	*Water consumption* ML
Agriculture					
Livestock, pasture, grains & other	697 949	80 158	751	—	778 858
Dairy farming	287 836	83	—	—	287 919
Vegetables	98 285	4 789	—	—	103 074
Sugar	554 598	629 475	1 757	—	1 185 829
Fruit	40 614	65 696	1 083	—	107 393
Grapes	43	6 253	—	—	6 296
Cotton	663 223	320 099	1 209	—	984 531
Rice	—	—	—	—	—
Total	*2 342 547*	*1 106 553*	*4 800*	—	*3 453 900*
Services to agriculture; hunting & trapping	—	218	—	—	218
Forestry & fishing	2 261	2 013	28	2 261	2 041
Mining					
Coal mining	20 215	10 196	—	2 848	25 317
Oil & gas extraction	2 332	693	—	600	2 425
Metal ore mining	49 636	14 598	—	—	64 234
Other mining	15 681	1 140	—	202	16 618
Total	*87 864*	*26 627*	—	*3 649*	*108 595*
Manufacturing					
Food, beverage & tobacco	66 378	16 431	837	—	83 647
Textile, clothing, footwear & leather	5	1 136	532	—	1 673
Wood & paper products	59	20 985	—	—	21 043
Printing, publishing & recorded media	np	np	—	—	23 830
Petroleum, coal, chemical & associated products	np	np	3 369	—	12 188
Non-metallic mineral products	935	2 317	—	—	3 252
Metal products	745	18 053	—	—	18 798
Machinery & equipment	2 897	13 431	—	—	16 328
Other manufacturing	1	673	—	—	674
Total	*71 909*	*104 786*	*4 738*	—	*181 433*
Electricity & gas(e)	1 461 597	59 951	106	1 447 605	70 855
Water supply, sewerage & drainage services(f)	2 160 239	210 818	3 367	—	216 432
Construction	5	886	—	—	890
Wholesale & retail trade	—	19 283	—	—	19 283
Accommodation, cafes & restaurants	—	10 714	684	—	11 399
Transport & storage	—	12 825	—	—	12 825
Finance, property & business services	—	16 005	39	—	16 044
Government administration	1 107	13 978	—	—	15 085
Education	4	10 548	581	—	11 133
Health & community services	—	9 195	20	—	9 214
Cultural, recreational & personal services	847	65 697	9 454	—	75 998
Household	12 036	488 875	—	—	500 911
Environment	—	4 462	—	—	4 462
Total	**6 140 416**	**2 163 433**	**23 818**	**1 453 515**	**4 710 718**

— nil or rounded to zero (including null cells)

np not available for publication but included in totals where applicable, unless otherwise indicated

(a) Includes water extracted directly from the environment for use.

(b) Includes water supplied to a user usually through a non-natural network (piped/open channel or other carrier) where an economic transaction has occurred for the exchange of water regardless of method of delivery. Mains water is a subset of the Self-extracted total.

(c) Refers to wastewater that may have been treated to some extent and supplied to another user. It excludes water reused on-site (see Explanatory Notes 12 and 21).

(d) This is a subset of Self-extracted water use.

(e) The majority of water used by this industry is 'in-stream' and is often used again downstream by other water users.

(f) Includes losses from seepages and evapotranspiration (where measured) as well as water used by the Water supply, sewerage and drainage services industry.

2.13 WATER SUPPLY AND USE, South Australia—2000–01

	SUPPLY			
	Self-extracted(a)	*Mains water*(b)	*Reuse water*(c)	*Regulated discharge*(d)
Industry	ML	ML	ML	ML
Agriculture				
Livestock, pasture, grains & other	—	—	—	—
Dairy farming	—	—	—	—
Vegetables	—	—	—	—
Sugar	—	—	—	—
Fruit	—	—	—	—
Grapes	—	—	—	—
Cotton	—	—	—	—
Rice	—	—	—	—
Total	—	—	—	—
Services to agriculture; hunting & trapping	—	—	—	—
Forestry & fishing	—	—	—	793
Mining				
Coal mining	—	—	—	—
Oil & gas extraction	—	—	—	6 072
Metal ore mining	—	—	—	1 378
Other mining	—	—	—	4
Total	—	—	—	*7 454*
Manufacturing				
Food, beverage & tobacco	—	—	—	—
Textile, clothing, footwear & leather	—	—	—	—
Wood & paper products	—	—	—	—
Printing, publishing & recorded media	—	—	—	—
Petroleum, coal, chemical & associated products	—	—	720	—
Non-metallic mineral products	—	—	—	—
Metal products	—	—	—	—
Machinery & equipment	—	—	—	—
Other manufacturing	—	—	—	—
Total	—	—	*720*	—
Electricity & gas(e)	—	362	1 177	301
Water supply, sewerage & drainage services(f)	—	524 132	15 675	84 006
Construction	—	—	—	—
Wholesale & retail trade	—	—	—	—
Accommodation, cafes & restaurants	—	—	—	—
Transport & storage	—	—	—	—
Finance, property & business services	—	—	—	—
Government administration	—	—	—	—
Education	—	—	—	—
Health & community services	—	—	—	—
Cultural, recreational & personal services	—	—	—	—
Household	—	—	—	—
Environment	1 630 941	—	—	—
Total	**1 630 941**	**524 494**	**17 572**	**92 554**

— nil or rounded to zero (including null cells)

(a) Includes water extracted directly from the environment for use.

(b) Includes water supplied to a user usually through a non-natural network (piped/open channel or other carrier) where an economic transaction has occurred for the exchange of water regardless of method of delivery. Mains water is a subset of the Self-extracted total.

(c) Refers to wastewater that may have been treated to some extent and supplied to another user. It excludes water reused on-site (see Explanatory Notes 12 and 21).

(d) Refers to water discharged after use where that discharge does not match the natural flow regime of the receiving water body.

(e) The majority of water used by this industry is 'in-stream' and is often used again downstream by other water users.

(f) Includes losses from seepages and evapotranspiration (where measured) as well as water used by the Water supply, sewerage and drainage services industry.

2.13 WATER SUPPLY AND USE, South Australia—2000–01 *continued*

	USE				
Industry	*Self-extracted*(b) ML	*Mains water*(c) ML	*Reuse water*(d) ML	*In-stream*(e) ML	*Water consumption*(a) ML
Agriculture					
Livestock, pasture, grains & other	466 438	7 129	—	—	473 567
Dairy farming	267 662	52 089	—	—	319 750
Vegetables	45 123	9 229	10 372	—	64 724
Sugar	—	—	—	—	—
Fruit	82 495	78 245	—	—	160 739
Grapes	155 429	126 542	1 701	—	283 673
Cotton	—	—	—	—	—
Rice	—	—	—	—	—
Total	*1 017 147*	*273 234*	*12 073*	—	*1 302 454*
Services to agriculture; hunting & trapping	52	14	—	—	67
Forestry & fishing	917	994	44	793	1 163
Mining					
Coal mining	16	—	—	—	16
Oil & gas extraction	1 291	120	—	—	1 411
Metal ore mining	11 659	1	—	1 095	10 565
Other mining	215	43	—	—	258
Total	*13 180*	*164*	—	*1 095*	*12 250*
Manufacturing					
Food, beverage & tobacco	26 308	23 448	—	—	49 756
Textile, clothing, footwear & leather	—	1 451	—	—	1 451
Wood & paper products	14 606	370	—	—	14 976
Printing, publishing & recorded media	np	np	—	—	2 279
Petroleum, coal, chemical & associated products	1 527	4 076	1 177	—	6 779
Non-metallic mineral products	np	np	—	—	1 084
Metal products	57	5 804	—	—	5 861
Machinery & equipment	23	1 843	—	—	1 866
Other manufacturing	—	1 493	—	—	1 493
Total	*42 884*	*41 485*	*1 177*	—	*85 546*
Electricity & gas(f)	595	756	720	—	1 709
Water supply, sewerage & drainage services(g)	524 132	23 174	938	—	24 112
Construction	19	66	—	—	84
Wholesale & retail trade	78	3 726	—	—	3 804
Accommodation, cafes & restaurants	104	1 384	—	—	1 488
Transport & storage	86	1 752	—	—	1 837
Finance, property & business services	20	2 008	—	—	2 028
Government administration	48	1 181	1 222	—	2 451
Education	—	2 057	28	—	2 085
Health & community services	—	2 218	—	—	2 218
Cultural, recreational & personal services	10 288	10 193	1 369	—	21 850
Household	21 391	159 215	—	—	180 606
Environment	—	873	—	—	873
Total	**1 630 941**	**524 494**	**17 572**	**1 888**	**1 646 625**

— nil or rounded to zero (including null cells)

np not available for publication but included in totals where applicable, unless otherwise indicated

(a) Water consumption = Self-extracted use + Mains water use + Reuse water use - Mains water supply - In-stream use.

(b) Includes water extracted directly from the environment for use.

(c) Includes water supplied to a user usually through a non-natural network (piped/open channel or other carrier) where an economic transaction has occurred for the exchange of water regardless of method of delivery. Mains water is a subset of the Self-extracted total.

(d) Refers to wastewater that may have been treated to some extent and supplied to another user. It excludes water reused on-site (see Explanatory Notes 12 and 21).

(e) This is a subset of Self-extracted water use.

(f) The majority of water used by this industry is 'in-stream' and is often used again downstream by other water users.

(g) Includes losses from seepages and evapotranspiration (where measured) as well as water used by the Water supply, sewerage and drainage services industry.

2.14 WATER SUPPLY AND USE, Western Australia—2000–01

	SUPPLY			
Industry	*Self-extracted*(a) ML	*Mains water*(b) ML	*Reuse water*(c) ML	*Regulated discharge*(d) ML
Agriculture				
Livestock, pasture, grains & other	—	—	—	—
Dairy farming	—	—	—	—
Vegetables	—	—	—	—
Sugar	—	—	—	—
Fruit	—	—	—	—
Grapes	—	—	—	—
Cotton	—	—	—	—
Rice	—	—	—	—
Total	—	—	—	—
Services to agriculture; hunting & trapping	—	—	—	—
Forestry & fishing	—	—	—	6 507
Mining				
Coal mining	—	—	—	8 000
Oil & gas extraction	—	—	—	8 679
Metal ore mining	—	2 144	—	54 667
Other mining	—	—	—	6 697
Total	—	*2 144*	—	*78 043*
Manufacturing				
Food, beverage & tobacco	—	—	—	—
Textile, clothing, footwear & leather	—	—	—	—
Wood & paper products	—	—	—	—
Printing, publishing & recorded media	—	—	—	—
Petroleum, coal, chemical & associated products	—	—	—	—
Non-metallic mineral products	—	—	—	—
Metal products	—	—	—	—
Machinery & equipment	—	—	—	—
Other manufacturing	—	—	—	—
Total	—	—	—	—
Electricity & gas(e)	—	3	584	1 699 485
Water supply, sewerage & drainage services(f)	—	760 224	8 568	138 474
Construction	—	—	—	—
Wholesale & retail trade	—	—	—	—
Accommodation, cafes & restaurants	—	—	—	—
Transport & storage	—	—	—	—
Finance, property & business services	—	—	—	—
Government administration	—	—	—	—
Education	—	—	—	—
Health & community services	—	—	—	—
Cultural, recreational & personal services	—	—	—	—
Household	—	—	—	—
Environment	3 163 697	—	—	—
Total	**3 163 697**	**762 372**	**9 152**	**1 922 509**

— nil or rounded to zero (including null cells)

(a) Includes water extracted directly from the environment for use.

(b) Includes water supplied to a user usually through a non-natural network (piped/open channel or other carrier) where an economic transaction has occurred for the exchange of water regardless of method of delivery. Mains water is a subset of the Self-extracted total.

(c) Refers to wastewater that may have been treated to some extent and supplied to another user. It excludes water reuset on-site (see Explanatory Notes 12 and 21).

(d) Refers to water discharged after use where that discharge does not match the natural flow regime of the receiving water body.

(e) The majority of water used by this industry is 'in-stream' and is often used again downstream by other water users.

(f) Includes losses from seepages and evapotranspiration (where measured) as well as water used by the Water supply, sewerage and drainage services industry.

2.14 WATER SUPPLY AND USE, Western Australia—2000–01 *continued*

	USE				
Industry	*Self-extracted*(b) ML	*Mains water*(c) ML	*Reuse water*(d) ML	*In-stream*(e) ML	*Water consumption*(a) ML
Agriculture					
Livestock, pasture, grains & other	122 014	54 158	—	—	176 172
Dairy farming	7 564	56 943	—	—	64 507
Vegetables	66 453	44 533	—	—	110 986
Sugar	—	123 574	100	—	123 674
Fruit	60 655	4 229	—	—	64 884
Grapes	21 816	769	56	—	22 641
Cotton	2 597	—	—	—	2 597
Rice	—	—	—	—	—
Total	*281 099*	*284 205*	*156*	—	*565 460*
Services to agriculture; hunting & trapping	2 440	25	—	—	2 465
Forestry & fishing	13 856	117	2 959	6 507	10 425
Mining					
Coal mining	21 389	36	—	8 000	13 425
Oil & gas extraction	9 424	272	—	8 533	1 163
Metal ore mining	203 337	6 817	—	41 287	166 722
Other mining	13 738	129	—	190	13 676
Total	*247 887*	*7 253*	—	*58 010*	*194 986*
Manufacturing					
Food, beverage & tobacco	4 939	4 012	—	—	8 951
Textile, clothing, footwear & leather	3	1 084	—	—	1 087
Wood & paper products	1 235	765	—	—	2 000
Printing, publishing & recorded media	37	184	—	—	221
Petroleum, coal, chemical & associated products	np	np	—	—	10 088
Non-metallic mineral products	np	np	233	—	8 048
Metal products	43 059	237	—	—	43 296
Machinery & equipment	222	9 004	234	—	9 460
Other manufacturing	3	96	—	—	99
Total	*63 224*	*19 558*	*467*	—	*83 249*
Electricity & gas(f)	1 716 470	1 746	—	1 699 055	19 158
Water supply, sewerage & drainage services(g)	760 224	113 785	—	—	113 785
Construction	3 198	5 638	—	—	8 836
Wholesale & retail trade	710	15 789	—	—	16 499
Accommodation, cafes & restaurants	2 166	15 727	—	—	17 892
Transport & storage	3 335	11 515	250	—	15 100
Finance, property & business services	119	11 495	—	—	11 614
Government administration	600	3 676	—	—	4 276
Education	8 076	4 699	—	—	12 775
Health & community services	30	5 804	—	—	5 834
Cultural, recreational & personal services	56 339	20 698	5 320	—	82 357
Household	3 925	240 642	—	—	244 567
Environment	—	—	—	—	—
Total	**3 163 697**	**762 372**	**9 152**	**1 763 573**	**1 409 277**

— nil or rounded to zero (including null cells)

np not available for publication but included in totals where applicable, unless otherwise indicated

(a) Water consumption = Self-extracted use + Mains water use + Reuse water use - Mains water supply - In-stream use.

(b) Includes water extracted directly from the environment for use.

(c) Includes water supplied to a user usually through a non-natural network (piped/open channel or other carrier) where an economic transaction has occurred for the exchange of water regardless of method of delivery. Mains water is a subset of the Self-extracted total.

(d) Refers to wastewater that may have been treated to some extent and supplied to another user. It excludes water reuset on-site (see Explanatory Notes 12 and 21).

(e) This is a subset of Self-extracted water use.

(f) The majority of water used by this industry is 'in-stream' and is often used again downstream by other water users.

(g) Includes losses from seepages and evapotranspiration (where measured) as well as water used by the Water supply, sewerage and drainage services industry.

2.15 WATER SUPPLY AND USE, Tasmania—2000–01

	SUPPLY			
Industry	*Self-extracted*(a) ML	*Mains water*(b) ML	*Reuse water*(c) ML	*Regulated discharge*(d) ML
Agriculture				
Livestock, pasture, grains & other	—	—	—	—
Dairy farming	—	—	—	—
Vegetables	—	—	—	—
Sugar	—	—	—	—
Fruit	—	—	—	—
Grapes	—	—	—	—
Cotton	—	—	—	—
Rice	—	—	—	—
Total	—	—	—	—
Services to agriculture; hunting & trapping	—	—	—	—
Forestry & fishing	—	—	—	352 554
Mining				
Coal mining	—	—	—	30
Oil & gas extraction	—	—	—	—
Metal ore mining	—	—	—	21 626
Other mining	—	—	—	50
Total	—	—	—	*21 706*
Manufacturing				
Food, beverage & tobacco	—	—	—	—
Textile, clothing, footwear & leather	—	—	—	—
Wood & paper products	—	—	—	20 430
Printing, publishing & recorded media	—	—	—	—
Petroleum, coal, chemical & associated products	—	—	—	—
Non-metallic mineral products	—	—	—	—
Metal products	—	—	—	—
Machinery & equipment	—	—	—	—
Other manufacturing	—	—	—	—
Total	—	—	—	*20 430*
Electricity & gas(e)	—	—	—	37 404 500
Water supply, sewerage & drainage services(f)	—	110 793	1 551	37 564
Construction	—	—	—	—
Wholesale & retail trade	—	—	—	—
Accommodation, cafes & restaurants	—	—	—	—
Transport & storage	—	—	—	—
Finance, property & business services	—	—	—	—
Government administration	—	—	—	—
Education	—	—	—	—
Health & community services	—	—	—	—
Cultural, recreational & personal services	—	—	—	—
Household	—	—	—	—
Environment	38 182 053	—	—	—
Total	**38 182 053**	**110 793**	**1 551**	**37 836 754**

— nil or rounded to zero (including null cells)

(a) Includes water extracted directly from the environment for use.

(b) Includes water supplied to a user usually through a non-natural network (piped/open channel or other carrier) where an economic transaction has occurred for the exchange of water regardless of method of delivery. Mains water is a subset of the Self-extracted total.

(c) Refers to wastewater that may have been treated to some extent and supplied to another user. It excludes water reused on-site (see Explanatory Notes 12 and 21).

(d) Refers to water discharged after use where that discharge does not match the natural flow regime of the receiving water body.

(e) The majority of water used by this industry is 'in-stream' and is often used again downstream by other water users.

(f) Includes losses from seepages and evapotranspiration (where measured) as well as water used by the Water supply, sewerage and drainage services industry.

2.15 WATER SUPPLY AND USE, Tasmania—2000–01 *continued*

	USE				
Industry	*Self-extracted*(b) ML	*Mains water*(c) ML	*Reuse water*(d) ML	*In-stream*(e) ML	*Water consumption*(a) ML
Agriculture					
Livestock, pasture, grains & other	76 774	7 717	650	—	85 140
Dairy farming	73 208	2 775	—	—	75 983
Vegetables	46 070	3 388	—	—	49 458
Sugar	—	—	—	—	—
Fruit	9 966	291	—	—	10 257
Grapes	625	175	—	—	800
Cotton	—	—	—	—	—
Rice	—	—	—	—	—
Total	*206 642*	*14 347*	*650*	—	*221 639*
Services to agriculture; hunting & trapping	130	124	—	—	254
Forestry & fishing	353 742	898	—	352 554	2 086
Mining					
Coal mining	44	—	—	30	14
Oil & gas extraction	—	—	—	—	—
Metal ore mining	30 500	25	—	9 327	21 198
Other mining	40	—	—	—	40
Total	*30 583*	*25*	—	*9 357*	*21 252*
Manufacturing					
Food, beverage & tobacco	596	4 981	—	—	5 576
Textile, clothing, footwear & leather	41	323	—	—	363
Wood & paper products	62 536	6 335	—	—	68 871
Printing, publishing & recorded media	5	138	—	—	143
Petroleum, coal, chemical & associated products	125	228	—	—	354
Non-metallic mineral products	np	np	—	—	498
Metal products	np	np	—	—	3 218
Machinery & equipment	—	30	—	—	30
Other manufacturing	—	6	—	—	6
Total	*63 757*	*15 302*	—	—	*79 059*
Electricity & gas(f)	37 404 500	36	—	37 404 500	36
Water supply, sewerage & drainage services(g)	110 793	8 785	758	—	9 543
Construction	70	196	—	—	266
Wholesale & retail trade	—	5 115	—	—	5 115
Accommodation, cafes & restaurants	435	1 379	—	—	1 814
Transport & storage	313	2 702	—	—	3 015
Finance, property & business services	—	2 064	—	—	2 064
Government administration	—	884	—	—	884
Education	300	1 058	—	—	1 358
Health & community services	—	1 926	—	—	1 926
Cultural, recreational & personal services	4 769	2 326	143	—	7 238
Household	6 018	53 269	—	—	59 287
Environment	—	358	—	—	358
Total	**38 182 053**	**110 793**	**1 551**	**37 766 411**	**417 194**

— nil or rounded to zero (including null cells)

np not available for publication but included in totals where applicable, unless otherwise indicated

(a) Water consumption = Self-extracted use + Mains water use + Reuse water use - Mains water supply - In-stream use.

(b) Includes water extracted directly from the environment for use.

(c) Includes water supplied to a user usually through a non-natural network (piped/open channel or other carrier) where an economic transaction has occurred for the exchange of water regardless of method of delivery. Mains water is a subset of the Self-extracted total.

(d) Refers to wastewater that may have been treated to some extent and supplied to another user. It excludes water reused on-site (see Explanatory Notes 12 and 21).

(e) This is a subset of Self-extracted water use.

(f) The majority of water used by this industry is 'in-stream' and is often used again downstream by other water users.

(g) Includes losses from seepages and evapotranspiration (where measured) as well as water used by the Water supply, sewerage and drainage services industry.

2.16 WATER SUPPLY AND USE, Northern Territory—2000–01

	SUPPLY			
Industry	*Self-extracted*(a) ML	*Mains water*(b) ML	*Reuse water*(c) ML	*Regulated discharge*(d) ML
Agriculture				
Livestock, pasture, grains & other	—	—	—	—
Dairy farming	—	—	—	—
Vegetables	—	—	—	—
Sugar	—	—	—	—
Fruit	—	—	—	—
Grapes	—	—	—	—
Cotton	—	—	—	—
Rice	—	—	—	—
Total	—	—	—	—
Services to agriculture; hunting & trapping	—	—	—	—
Forestry & fishing	—	—	—	4 350
Mining				
Coal mining	—	—	—	—
Oil & gas extraction	—	—	—	13
Metal ore mining	—	1 829	—	9 887
Other mining	—	—	—	—
Total	—	*1 829*	—	*9 900*
Manufacturing				
Food, beverage & tobacco	—	—	—	—
Textile, clothing, footwear & leather	—	—	—	—
Wood & paper products	—	—	—	—
Printing, publishing & recorded media	—	—	—	—
Petroleum, coal, chemical & associated products	—	—	—	—
Non-metallic mineral products	—	—	—	—
Metal products	—	—	—	—
Machinery & equipment	—	—	—	—
Other manufacturing	—	—	—	—
Total	—	—	—	—
Electricity & gas(e)	—	—	—	—
Water supply, sewerage & drainage services(f)	—	53 343	1 154	18 598
Construction	—	—	—	—
Wholesale & retail trade	—	—	—	—
Accommodation, cafes & restaurants	—	—	—	—
Transport & storage	—	—	—	—
Finance, property & business services	—	—	—	—
Government administration	—	—	—	—
Education	—	—	—	—
Health & community services	—	—	—	—
Cultural, recreational & personal services	—	—	—	—
Household	—	—	—	—
Environment	163 335	—	—	—
Total	**163 335**	**55 172**	**1 154**	**32 847**

— nil or rounded to zero (including null cells)

(a) Includes water extracted directly from the environment for use.

(b) Includes water supplied to a user usually through a non-natural network (piped/open channel or other carrier) where an economic transaction has occurred for the exchange of water regardless of method of delivery. Mains water is a subset of the Self-extracted total.

(c) Refers to wastewater that may have been treated to some extent and supplied to another user. It excludes water reused on-site (see Explanatory Notes 12 and 21).

(d) Refers to water discharged after use where that discharge does not match the natural flow regime of the receiving water body.

(e) The majority of water used by this industry is 'in-stream' and is often used again downstream by other water users.

(f) Includes losses from seepages and evapotranspiration (where measured) as well as water used by the Water supply, sewerage and drainage services industry.

2.16 WATER SUPPLY AND USE, Northern Territory—2000–01 *continued*

	USE				
Industry	*Self-extracted*(b) ML	*Mains water*(c) ML	*Reuse water*(d) ML	*In-stream*(e) ML	*Water consumption*(a) ML
Agriculture					
Livestock, pasture, grains & other	29 792	—	—	—	29 792
Dairy farming	67	—	—	—	67
Vegetables	886	—	—	—	886
Sugar	—	—	—	—	—
Fruit	35 876	—	—	—	35 876
Grapes	3 483	—	—	—	3 483
Cotton	—	—	—	—	—
Rice	—	—	—	—	—
Total	*70 104*	—	—	—	*70 104*
Services to agriculture; hunting & trapping	—	32	—	—	32
Forestry & fishing	4 350	—	241	4 350	241
Mining					
Coal mining	—	—	—	—	—
Oil & gas extraction	13	—	—	13	—
Metal ore mining	6 084	300	—	—	4 556
Other mining	1	1	—	—	2
Total	*6 098*	*301*	—	*13*	*4 557*
Manufacturing					
Food, beverage & tobacco	515	236	—	—	751
Textile, clothing, footwear & leather	—	3	—	—	3
Wood & paper products	—	13	—	—	13
Printing, publishing & recorded media	np	np	—	—	36
Petroleum, coal, chemical & associated products	—	27	—	—	27
Non-metallic mineral products	np	np	—	—	45
Metal products	np	np	—	—	7 957
Machinery & equipment	—	290	—	—	290
Other manufacturing	—	8	—	—	8
Total	*8 315*	*815*	—	—	*9 130*
Electricity & gas(f)	661	—	—	—	661
Water supply, sewerage & drainage services(g)	53 343	8 852	94	—	8 946
Construction	4	22	—	—	26
Wholesale & retail trade	—	1 742	—	—	1 742
Accommodation, cafes & restaurants	14	381	38	—	433
Transport & storage	—	1 474	—	—	1 474
Finance, property & business services	—	599	—	—	599
Government administration	—	13 284	—	—	13 284
Education	—	2 290	—	—	2 290
Health & community services	—	427	—	—	427
Cultural, recreational & personal services	—	813	780	—	1 593
Household	20 445	24 141	—	—	44 586
Environment	—	—	—	—	—
Total	**163 335**	**55 172**	**1 154**	**4 362**	**160 125**

— nil or rounded to zero (including null cells)

np not available for publication but included in totals where applicable, unless otherwise indicated

(a) Water consumption = Self-extracted use + Mains water use + Reuse water use - Mains water supply - In-stream use.

(b) Includes water extracted directly from the environment for use.

(c) Includes water supplied to a user usually through a non-natural network (piped/open channel or other carrier) where an economic transaction has occurred for the exchange of water regardless of method of delivery. Mains water is a subset of the Self-extracted total.

(d) Refers to wastewater that may have been treated to some extent and supplied to another user. It excludes water reused on-site (see Explanatory Notes 12 and 21).

(e) This is a subset of Self-extracted water use.

(f) The majority of water used by this industry is 'in-stream' and is often used again downstream by other water users.

(g) Includes losses from seepages and evapotranspiration (where measured) as well as water used by the Water supply, sewerage and drainage services industry.

CHAPTER 3 MAINS WATER SUPPLY

INTRODUCTION

This chapter presents information on mains water supplied in Australia during 2000–01. For the purpose of the water account mains water is defined as water that is supplied to a user often through a non-natural network (piped or open channel), and where an economic transaction has occurred for the exchange of water. This can include treated or raw water. In some cases, such as for irrigation, natural waterways may be used to deliver water.

Mains water in the water account excludes reuse water. Reuse water refers to wastewater that may have been treated to some extent and supplied to another user. Reuse water is covered in Chapter 4.

Most of the information presented in this chapter relates to the WATER SUPPLY, SEWERAGE AND DRAINAGE SERVICES (subdivision 37) as defined in the Australian and New Zealand Standard Industrial Classification 1993 (ANZSIC). Businesses in this subdivision are typically referred to as the WATER SUPPLY industry. These businesses provide a water storage, purification or supply service and are often referred to as water providers. In Australia, the WATER SUPPLY industry supplies almost all (99%) of mains water. This chapter also includes information on water used and water discharged by the water providers themselves.

The information presented in this chapter is based on data collected by the ABS through a direct survey of water providers, as well as information on industry performance collected by the Water Services Association of Australia (WSAA), Australian National Committee on Irrigation and Drainage (ANCID), and the Australian Water Association (AWA). For more detail on the methodology and sources of data refer to paragraphs 8 – 21 of the Explanatory Notes at the end of this publication.

MAIN FINDINGS

The main findings in this chapter are:

- In 2000–01 there were 479 water providers in Australia, collectively supplying 12,784 GL of mains water. This volume was 11% higher than in 1996–97.
- The majority of mains water supplied by water providers, was supplied by irrigation/rural water providers (63% of total mains water in 2000–01).
- Mains water contributed 34% of total water use in Australia in 2000–01.
- Victoria had the highest percentage use of mains water with 38% of all water used from this source. Tasmania had the lowest, with only 21% of all water from a mains supply (excluding all hydro-electric in-stream use).
- Surface water is by far the greatest source of water for the WATER SUPPLY industry, with 12,042 GL or 94% of total mains water being derived from this source in 2000–01.
- Western Australia had the highest proportion of mains water sourced from groundwater with 250 GL or 44% of all mains water in this state being derived from groundwater in 2000–01. This is followed by the Northern Territory where 7% or 4 GL of mains supply is sourced from groundwater.

MAIN FINDINGS *continued*

- In 2000–01 desalination as a source provided 253 ML of water for mains supply.
- 1,769 GL of system water losses were reported by the WATER SUPPLY industry in 2000–01.
- System water losses were the highest for irrigation/rural water providers in 2000–01, representing 16% of their total supply. Metropolitan water providers reported losses of 8% and non-major urban water providers reported 11%.
- The WATER SUPPLY industry discharged 1,837 GL of water to land and water bodies in 2000–01 in the form of regulated discharge. 821 GL (or 45%) of this water discharged was from New South Wales and the Australian Capital Territory combined. Victoria had the next highest volume of water discharge by the WATER SUPPLY industry, with 429 GL (or 23%) of total regulated discharge in this state.
- Nationally, most discharge by the WATER SUPPLY industry was into the ocean with 1,136 GL or 62% of total regulated discharge.

VOLUME OF MAINS WATER SUPPLIED BY WATER PROVIDERS

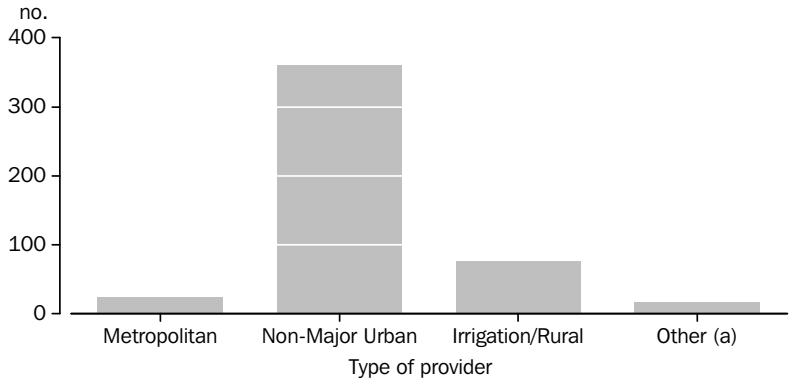
Water providers are commonly divided into three types; metropolitan providers (with over 50,000 connections), non-major urban providers (between 10,000 and 50,000 connections and often local governments), and irrigation/rural water providers.

There are a few hundred urban water providers that have less than 10,000 connections that have been grouped with the non-major urban providers for the purpose of this chapter. Several industrial businesses (mainly MINING and MANUFACTURING businesses) also provided a water service in 2000–01 (graph 3.1). These businesses have been grouped into the 'Other' category of water providers.

In 2000–01 there were 479 water providers in Australia. Table 3.9 presents this information by state and territory. Most water providers in Australia (75%) are in the non-major urban category, and most are part of local government authorities.

The services offered by water providers include reticulated water supply, sewerage, irrigation water, drainage, and bulk water supply.

3.1 NUMBER OF WATER PROVIDERS, by type—2000–01

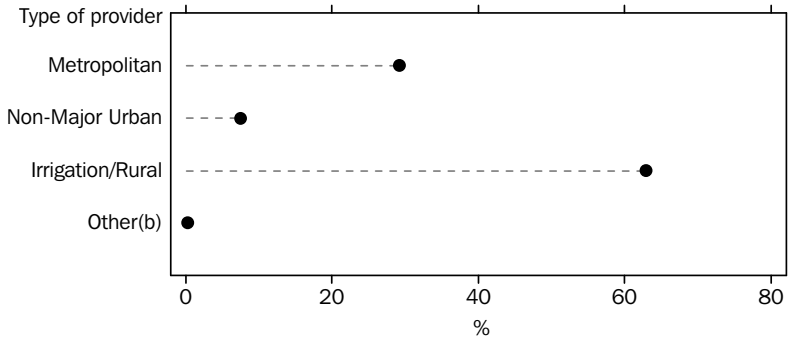


(a) Includes businesses mainly involved in Mining, Manufacturing and Electricity and gas supply industries that supply water.

VOLUME OF MAINS WATER SUPPLIED BY WATER PROVIDERS *continued*

Although the majority of water providers are in the non-major urban category, the vast majority of mains water is supplied by irrigation/rural water providers (see graph 3.2). These water providers collectively supplied 63% of total water supply during 2000–01. Water providers in the 'Other' category provided a very small proportion of total water supply in 2000–01 (less than 0.5%).

3.2 PROPORTION OF MAINS WATER SUPPLY(a), by provider type—2000–01

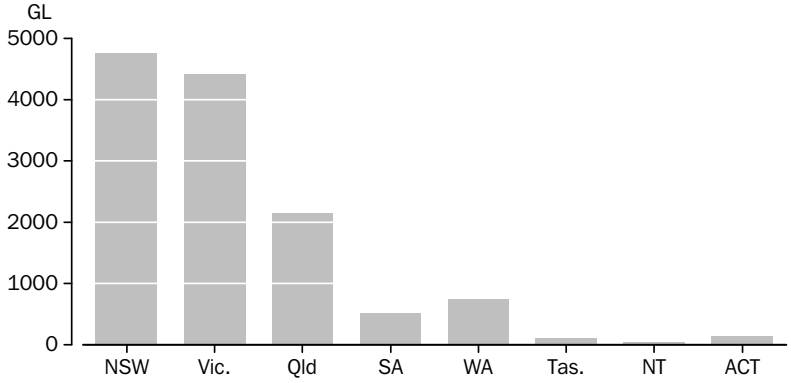


(a) Calculated against gross (unreconciled) water supply. Includes bulk transfers to other water providers.
(b) Includes businesses mainly involved in Mining, Manufacturing and Electricity and gas supply industries that supply water.

In addition to the direct supply of mains water to users, many water providers also supply mains water to other water providers, usually in the form of bulk sales. This makes monitoring the total volume of water supplied difficult. The water supply information presented herein has been reconciled to avoid double counting.

Graph 3.3 and table 3.10 show the volume of mains water supplied in each state and territory during 2000–01. Of the 12,784 GL mains water supplied in Australia in 2000–01, New South Wales accounted for the largest volume (4,606 GL or 36% of mains water supplied in Australia), followed by Victoria (4,410 GL or 34%) and Queensland (2,163 GL or 17%). The lowest volume was in the Northern Territory with 55 GL or less than 0.5% of Australia's mains water supply.

3.3 MAINS WATER SUPPLY(a)(b)—2000–01



(a) For Water supply, sewerage and drainage services industry only.
(b) Excludes water provided by other industrial businesses.

VOLUME OF MAINS WATER SUPPLIED BY WATER PROVIDERS *continued*

Table 3.11 presents the volume of mains water used by state and territory as a proportion of the total water use for 1996–97 and 2000–01. Reliance on mains water varies between states and territories. In 2000–01 Victoria had the highest proportion of mains water supplied (38% of the total water used in that state excluding hydro-electric in-stream use), followed by Western Australia (35%) and Queensland (31%). The lowest proportions of mains water supplied were in Tasmania (21%) and South Australia (24%). Reliance on mains water between 1996–97 and 2000–01 decreased slightly in Victoria, Tasmania and Northern Territory but increased slightly in New South Wales and the Australian Capital Territory combined, Queensland, South Australia and Western Australia.

SOURCE OF MAINS WATER SUPPLIED BY WATER PROVIDERS

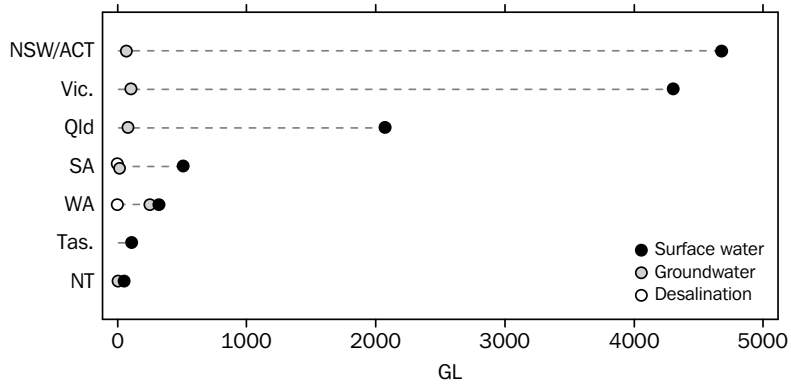
In this edition of the water account, the source of water supplied as mains water has been presented for water providers. These sources have been classified as surface water, groundwater, and desalination. The source of mains water refers to the source at the location where the water provider extracted the water before supplying it to other users.

Table 3.12 and graph 3.4 show the sources of mains water for the WATER SUPPLY industry for 2000–01. The main source of water supplied as mains water, is surface water, accounting for 12,042 GL or 96% of total mains water supplied.

All states except Western Australia sourced over 90% of their mains supply from surface water. Tasmania had the highest proportion sourced from surface water (100%), followed by New South Wales and the Australian Capital Territory combined (99%) and Victoria (98%). Western Australia had the lowest proportion with just over half of mains water being derived from surface water (56%).

Groundwater accounted for only 4% or 532 GL of mains water supply. However groundwater was a significant source in Western Australia, where 44% of the mains water supply (or 250 GL) was sourced from groundwater in 2000–01. This was followed by the Northern Territory where 7% (or 4 GL) of mains water supply was sourced from groundwater.

3.4 SOURCE OF MAINS WATER(a)(b)—2000–01



(a) For Water supply, sewerage and drainage services industry only.
(b) Excludes water provided by other industrial businesses.

SOURCE OF MAINS WATER SUPPLIED BY WATER PROVIDERS *continued*

Desalination is a process where salt is removed from water which has a high salt content(usually seawater or brackish water) to make it suitable for use (for human consumption and sometimes for industrial purposes).

In 2000–01 desalination provided 253 ML of mains supply water (see table 3.12). Western Australia (192 ML) and South Australia (61 ML) were the only states using desalination for mains water supply in 2000–01.

The main impediment to the use of desalination for mains water supply is the high cost (GCCC, 2003; Schonfeldt, 2000). However cost has fallen considerably over the last few decades (URS Australia, 2002) and technological advances are making it a more viable option (WA Water Corp., 2003).

MAINS WATER SUPPLIED FOR ENVIRONMENTAL PURPOSES

Water allocated to the environment, or for environmental purposes, is known as environmental flows (Quinn and Thoms 2002). The provision of water for environmental purposes is aimed at increasing the ecological and economic sustainability of Australia's water industry, and is largely the result of the COAG Water Reform Framework developed in 1994. Methods for allocating water to the environment vary considerably across Australia, and are often not on a volumetric basis. More information on environmental flows is included in Chapter 11.

Water providers often have some responsibility for supplying mains water for environmental purposes. The responsibility of water providers to supply mains water for environmental purposes varies between jurisdictions. Table 3.13 shows the volume of mains water provided by the WATER SUPPLY industry during 2000–01 specifically for environmental purposes. The total volume of environmental flows supplied by the WATER SUPPLY industry was 450,493 ML. Over half of the water supplied to the environment by the WATER SUPPLY industry in 2000–01 was supplied in Victoria (253,172 ML) followed by New South Wales and the Australian Capital Territory combined (191,628 ML), and Queensland (4,462 ML). There were relatively small allocations of water for environmental purposes in the South Australian and Tasmanian WATER SUPPLY industries (873 ML and 358 ML respectively) and no allocations in Western Australia and the Northern Territory.

MAINS WATER USE BY THE WATER SUPPLY INDUSTRY

For the purpose of the water account, mains water use by the WATER SUPPLY industry includes water used directly by the industry as well as system water losses. What constitutes 'water losses' varies between water providers, and can include water lost through the supply system (resulting from leakages from underground pipes or from evaporation from open channels), and customer meter errors. Customer meter errors have not been attributed to the water providers in the water account.

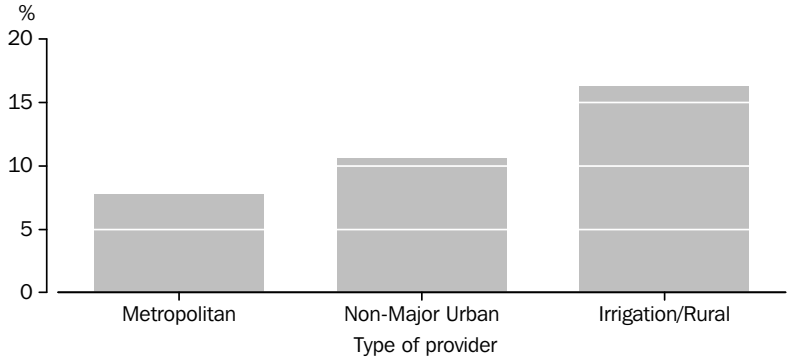
System Water Losses

Graph 3.5 presents the percentage of total water supply that system water losses comprised, by provider type in 2000–01. System water losses are highest for irrigation/rural water providers and represent 16% of their total supply. This is due to the nature of their supply systems which are often open channels that are susceptible to evaporation. Metropolitan water losses were estimated as 8% and non-major urban estimated as 11%.

System Water Losses

continued

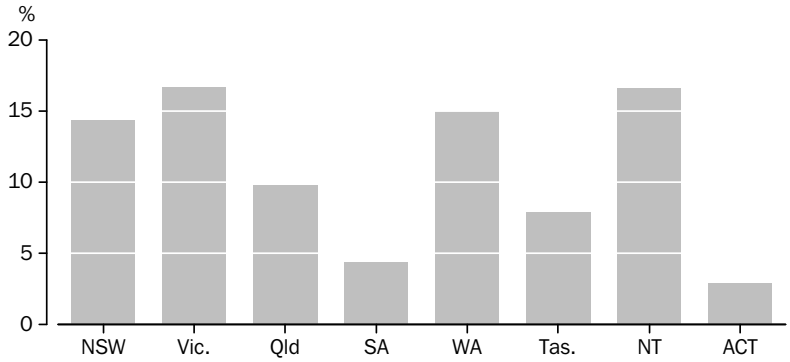
3.5 SYSTEM WATER LOSSES(a)(b), proportion of total supply(c)—2000–01



(a) For Water supply, sewerage and drainage services industry only.
(b) Excludes supply by other industrial businesses.
(c) Total supply excludes bulk supplies.

Table 3.14 shows the percentage of total water supply that system water losses comprised, by state and territory for 2000–01. Losses as a proportion of total water supply were highest in both Victoria and Northern Territory (17% each), followed by Western Australia (15%) and New South Wales (14%) (graph 3.6). The lowest proportion of losses were recorded in the Australian Capital Territory (3%) and South Australia (4%). The system water losses experienced in each state or territory, are related to the proportion of water supplied by each type of water provider in that state or territory.

3.6 SYSTEM WATER LOSSES(a)(b), proportion of total supply(c)—2000–01



(a) For Water supply, sewerage and drainage services industry only.
(b) Excludes supply by other industrial businesses.
(c) Total supply excludes bulk supplies.

Losses are to be expected from water supply systems and the AWA (2002) suggests that losses below 6% are unlikely to be achievable or economically feasible. The level of losses reported in 2000–01 varied considerably, largely as a result of different supply system characteristics. The level of losses in a supply system will depend on the method of delivery, age and condition of the infrastructure, climatic conditions, and the metering network.

Metering

Metering of water use in Australia has increased in recent years. With the exception of Hobart, virtually all households and businesses in capital and major cities of Australia are metered (Piccinin and Donlon 2003). In Australia the proportion of unaccounted water reported by non-major urban water providers has declined from 20% in 1997–98 to 16% in 1999–2000 (AWA 2001).

Increases in the use of meters have also been recorded by irrigation/rural water suppliers, with the proportion of metered supply points in surface water supplies rising from 92% to 94% between 1998–99 and 2000–01 (ANCID 2000; 2002).

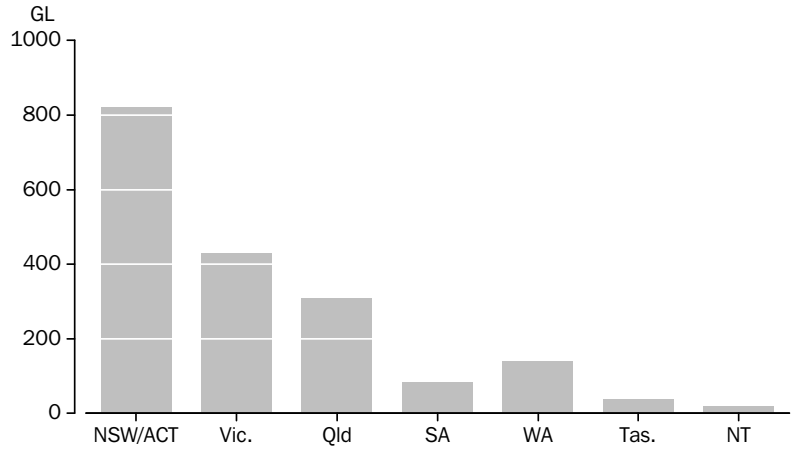
DISCHARGE BY THE WATER SUPPLY INDUSTRY

Water is discharged either as regulated or unregulated water. Regulated discharge refers to water discharged after use where that discharge does not match the natural flow regime of the receiving water body. For example, wastewater discharged into a river, ocean or land outfall by a sewerage service provider is considered a regulated discharge. Water discharged from a household is not considered to be a regulated discharge because it is usually discharged into a sewerage system, and is considered to be a form of unregulated discharge. Unregulated discharge volumes, or non-point discharges are not included in this publication.

With the exception of the ELECTRICITY AND GAS SUPPLY industry, the WATER SUPPLY industry accounts for the largest proportion of regulated discharge in Australia, mainly in the form of sewage and other wastewater. In addition, it is likely that drainage water from irrigation water providers also makes a significant contribution to regulated discharge.

In 2000–01 the WATER SUPPLY industry discharged 1,837 GL, of which 821 GL (or 45%) was from New South Wales and the Australian Capital Territory combined (graph 3.7). Victoria had the next highest volume of water discharged by the WATER SUPPLY industry, with 429 GL (or 23%) discharged (table 3.15).

3.7 REGULATED DISCHARGE, Water supply industry—2000–01

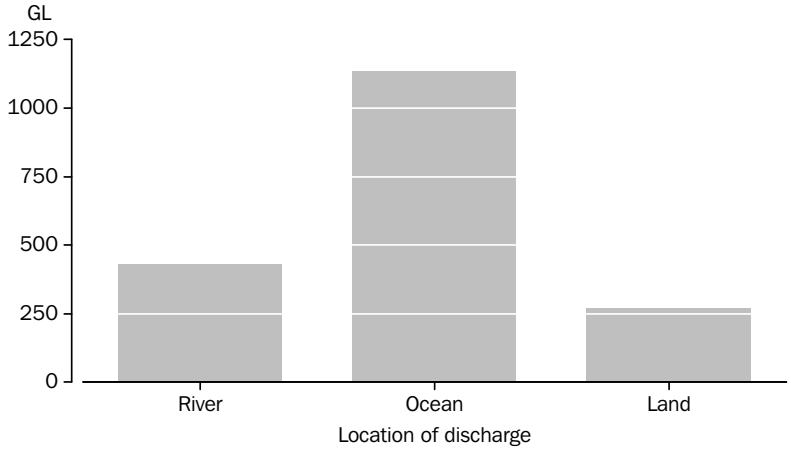


In 2000–01 oceans received 1,136 GL or 62% of total regulated discharges (graph 3.8). Rivers and other water bodies received 430 GL or 23% of regulated discharges in 2000–01. Discharges to land were 271 GL or 15% of regulated discharges.

DISCHARGE BY THE WATER SUPPLY INDUSTRY *continued*

There was considerable variation between states and territories in the amount of water discharged to different receiving locations (table 3.15). In Tasmania, 30,014 ML (or 80% of all regulated discharges) was to rivers, while only 7,499 ML (or 20% of all regulated discharges) was to oceans. In Victoria the majority of discharge was into the ocean (199,730 ML or 47%), though discharges to land were also very significant (181,530 ML or 42%). Confidentiality issues prevent the ABS from releasing the information for South Australia, Western Australia and the Northern Territory.

3.8 REGULATED DISCHARGE, Water supply industry, by location—2000–01



3.9 WATER PROVIDERS—2000–01

	NSW	*Vic.*	*Qld*	*SA*	*WA*	*Tas.*	*NT*	*ACT*	*Aust.*
Metropolitan	4	9	5	1	1	2	1	1	24
Non-Major Urban	126	10	162	—	32	31	—	—	361
Irrigation/Rural	6	6	50	9	2	4	—	—	77
Other	2	3	4	3	2	1	2	—	17
Total	**138**	**28**	**221**	**13**	**37**	**38**	**3**	**1**	**479**

— nil or rounded to zero (including null cells)

3.10 MAINS WATER SUPPLY, by industry—1996–97 and 2000–01

	NSW/ACT(a)	*Vic.*	*Qld*	*SA*	*WA*	*Tas.*	*NT*	*Aust.*
	ML	ML	ML	ML	ML	ML	ML	ML
2000–01								
Water supply industry(b)	(c) 4 748 295	4 410 180	2 157 992	524 132	760 224	110 793	53 343	12 764 958
Other industries(d)	(e) 8 987	136	5 441	362	2 147	—	1 829	18 902
All industries	(f) 4 757 282	4 410 316	2 163 433	524 494	762 372	110 793	55 172	12 783 860
1996–97								
Water supply industry(b)	4 274 510	4 816 461	1 362 939	336 931	572 302	96 084	48 249	11 507 477
Other industries(d)	—	—	4 905	—	282	12 869	—	18 056
All industries	4 274 510	4 816 461	1 367 844	336 931	572 585	108 953	48 249	11 525 533

— nil or rounded to zero (including null cells)
(a) NSW and ACT not able to be separated 1996–97.
(b) Water supply, sewerage and drainage services industry.
(c) NSW 4,596,889 ML; ACT 151,406 ML.
(d) Includes water supplied by other industries including Mining, Manufacturing and Electricity and gas supply industries.
(e) NSW 8,987 ML; ACT 0 ML.
(f) NSW 4,605,876 ML; ACT 151,406 ML.
Note: Sums may not necessarily equal totals due to rounding.

3.11 WATER USE, by source—1996–97 and 2000–01

	NSW/ACT	Vic.	Qld	SA	WA	Tas.	NT	Aust.
2000–01								
Volume (ML)								
Mains	4 757 281	4 410 315	2 163 432	524 493	762 372	110 793	55 171	12 783 858
Self-extracted	13 247 414	9 903 296	6 140 416	1 630 941	3 163 697	38 182 053	163 335	72 431 152
Reuse	266 964	196 353	23 818	17 572	9 152	1 551	1 154	516 563
Proportion of total use (%)(a)								
Mains	34	38	31	24	35	21	26	34
Self-extracted	64	60	68	75	64	79	74	65
Reuse	2	2	—	1	—	—	1	1
1996–97								
Volume (ML)								
Mains	4 274 510	4 816 461	1 367 844	336 931	572 585	108 953	48 249	11 525 533
Self-extracted	11 055 337	9 928 992	4 364 473	1 261 434	1 612 754	40 376 994	103 385	68 703 370
Reuse	24 342	32 509	39 545	8 375	24 036	1 124	4 492	134 424
Proportion of total use (%)(a)								
Mains	33	42	27	21	28	26	31	34
Self-extracted	67	58	72	79	70	74	66	66
Reuse	—	—	1	1	1	—	3	—

— nil or rounded to zero (including null cells)

(a) Total use for this analysis includes Self Extracted Use + Mains Water Use + Reuse Water Use - In-stream Use.

Note: Sums may not necessarily equal totals due to rounding.

3.12 MAINS WATER SUPPLY(a), by source of water—2000–01

	NSW/ACT	Vic.	Qld	SA	WA	Tas.	NT	Aust.
	ML	ML	ML	ML	ML	ML	ML	ML
2000–01								
Surface water	4 679 342	4 304 336	2 073 830	505 729	318 004	110 793	49 662	12 041 696
Groundwater	68 953	105 844	84 162	18 342	249 861	—	3 681	530 843
Desalination	—	—	—	61	192	—	—	253
Total	**4 748 295**	**4 410 180**	**2 157 992**	**524 132**	**568 057**	**110 793**	**53 343**	**12 572 792**
Total 1996–97	**4 274 510**	**4 816 461**	**1 362 939**	**336 931**	**572 302**	**96 084**	**48 249**	**11 507 477**

— nil or rounded to zero (including null cells)

(a) Water supply, sewerage and drainage services industry only.

3.13 WATER SUPPLIED FOR ENVIRONMENTAL PURPOSES—2000–01

	NSW/ACT	Vic.	Qld	SA	WA	Tas.	NT	Aust.
Volume (ML)								
Water supply industry(a)	191 628	253 172	4 462	873	—	358	—	450 493
Other industries(b)	8 900	—	—	—	—	—	—	8 900
Total(c)	**200 528**	**253 172**	**4 462**	**873**	—	**358**	—	**459 393**
Total Mains water supplied	*4 757 281*	*4 410 315*	*2 163 432*	*524 493*	*762 372*	*110 793*	*55 171*	*12 783 858*
Proportion of total mains water supplied (%)	4	6	—	—	—	—	—	4

— nil or rounded to zero (including null cells)

(a) Water supply, sewerage and drainage services industry.

(b) Includes water supplied by other industries including Mining, Manufacturing and Electricity and gas supply industries.

(c) Excludes environmental provisions made by government.

3.14 SYSTEM WATER LOSSES(a)—2000–01

	NSW	Vic.	Qld	SA	WA	Tas.	NT	ACT	Aust.
System losses (ML)	661 769	737 173	210 818	23 174	113 785	8 785	8 852	4 370	1 768 727
Proportion of total supply (%)(b)	14	17	10	4	15	8	17	3	14

(a) Includes the Water supply, sewerage and drainage services industry only.

(b) Total supply excluding bulk supplies.

Note: Sums may not necessarily equal totals due to rounding.

3.15 REGULATED DISCHARGE(a), by location of discharge—2000–01

	NSW/ACT	*Vic.*	*Qld*	*SA*	*WA*	*Tas.*	*NT*	*Aust.*
	ML	ML	ML	ML	ML	ML	ML	ML
River	208 681	47 365	105 821	np	np	30 014	np	430 331
Ocean	580 929	199 730	197 566	np	np	7 499	np	1 135 746
Land	31 266	181 530	5 641	np	np	51	np	271 093
Total	**820 876**	**428 624**	**309 029**	**84 006**	**138 474**	**37 564**	**18 598**	**1 837 170**

np not available for publication but included in totals where applicable, unless otherwise indicated

(a) Includes the Water supply, sewerage and drainage services industry only.

Note: Sums will not necessarily equal totals due to rounding.

CHAPTER 4 WATER REUSE

INTRODUCTION

This chapter focuses on water reuse in Australia in 2000–01. It compares the amount of reuse water supplied and used between states and territories, and between main industry groups. Reuse water used by industry groups is also found in Chapter 2, as well as in their respective chapters (Chapters 3–7).

Reuse water is defined as 'wastewater that may have been treated to some extent, and then used again without first being discharged to the environment. This definition of reuse water is consistent with the first edition of the water account, although it was then referred to as 'effluent reuse'.

Reuse water is supplied mainly by the WATER SUPPLY industry, but may also be supplied by other industries (such as MINING and MANUFACTURING businesses). Reuse water supplied by irrigation/rural water providers through regional reuse schemes has also been included in the water account. The reporting of reuse volumes from regional reuse schemes has improved between the editions of the water account.

Volumes of on-site reuse water were collected and presented in the previous publication for the MINING and MANUFACTURING industries. Due to data limitations, on-site reuse has not been included in this edition of the water account. Care should therefore be taken when comparing reuse figures between editions in the MINING and MANUFACTURING industries.

For further information on the data sources and methods used to calculate reuse water use, refer to the Explanatory Notes, paragraph 21.

The use of reuse water has increased almost threefold since 1996–97, although the volume used is still relatively small. In 1996–97 there were 134,424 GL of reuse water used in Australia, which made up less than 1% of total water use in that year. By 2000–01 this volume had increased to 516,563 ML, however this still accounted for less than 1% of total water use. A large proportion of reuse water use in this water account is sourced from rural/irrigation regional reuse schemes, which reflects better reporting of these volumes between editions. Reuse water made up 4% of total water supplied by water providers in 2000–01. This compares to 1% in 1996–97.

MAIN FINDINGS

- The use of reuse water has increased dramatically from 134,424 ML in 1996–97 to 516,564 ML in 2000–01.
- The AGRICULTURE industry was the largest user of reuse water in 2000–01, accounting for 423,264 ML (or 82% of all reuse water use in Australia), followed by the OTHER INDUSTRIES with 35,859 ML (7% of total reuse water use), and the WATER SUPPLY industry with 23,056 ML (4% of total reuse water use).
- The AGRICULTURE industry used 90% of all reuse water in New South Wales and the Australian Capital Territory combined, 84% in Victoria, 68% in South Australia, and 42% in Queensland.

MAIN FINDINGS *continued*

- In 2000–01 the use of reuse water was highest in New South Wales and the Australian Capital Territory combined, where 266,963 ML was used (or 52% of all reuse). This compares to 1996–97 when reuse water use was highest in Queensland, where 39,545 ML was used (or 29% of all reuse water use)
- Increases in reuse water use were reported in most industries between 1996–97 and 2000–01. The greatest increase was by the AGRICULTURE industry where reuse water use increased from 38,118 ML in 1996–97 to 423,264 ML in 2000–01.
- Reuse water made up 4% of total water supplied by water providers in 2000–01. This compares to 1% in 1996–97.

SUPPLY OF REUSE WATER

In 2000–01 almost 100% of reuse water was supplied by the WATER SUPPLY industry (table 4.12). A total of 511,337 ML of reuse water was supplied, accounting for 4% of the total water supplied by the WATER SUPPLY industry. This is an increase of 428,899 ML since 1996–97 when reuse accounted for less than 1% of total water supply. The increases in the volume of reuse water supplied between the reference periods can be attributed to an increasing trend for water providers to supply more of their wastewater to other users rather than discharge it. The increases in the volume of reuse water used reported in this water account are consistent with other sources of reuse water data (ANCID 2001, 2002; WSAA 2002).

There have been significant investments and improvements in wastewater treatment in recent years. Water reuse has been identified as one of the most cost-effective ways of improving water use efficiencies in cities where water resources are constrained (Dillon 2000). Limits imposed on the discharging of nutrients to receiving waters are also likely to be a factor for recent increases in reuse water use. For example, the Australian Government Clean Seas Program, introduced in 1997, aimed to reduce pollution of coastal, marine and estuarine environments by wastewater discharges through increased wastewater reuse (National Heritage Trust 2003).

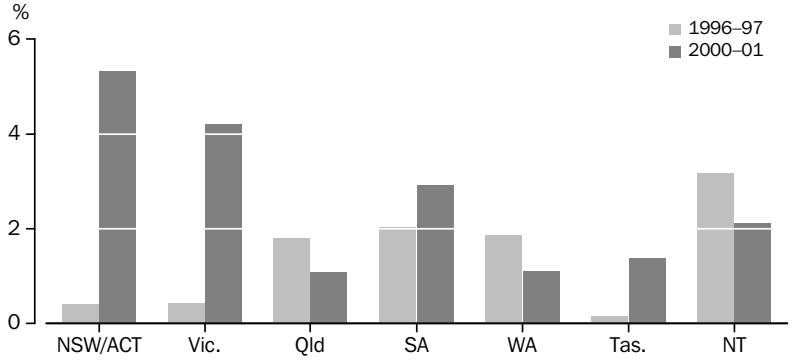
Results show that the contribution that reuse water makes to total water supply is increasing rapidly in Australia. As a proportion of the total water supplied by the WATER SUPPLY industry in 2000–01, reuse water was 4% (table 4.12). In 1996–97 reuse water made up less than 1% of total water supply.

By state and territory, reuse as a proportion of total supply by the WATER SUPPLY industry has also changed since 1996–97 (table 4.12 and graph 4.1). The most significant change in the contribution of reuse has been in New South Wales and the Australian Capital Territory combined, where reuse water made up less than 0.5% of total water supply in 1996–97, compared with over 5% in 2000–01. Similar increases were recorded in Victoria where use of reuse water was 0.4% in 1996–97 and 4.2% in 2000–01, and Tasmania where reuse was up from 0.2% in 1996–97 to 1.4% in 2000–01.

SUPPLY OF REUSE WATER

continued

4.1 REUSE WATER, contribution to total supply(a)(b)(c)—1996–97 and 2000–01



(a) Total Supply = Mains water supply + Reuse water supply.
(b) For Water supply, sewerage and drainage services industry only.
(c) Excludes water provided by other industrial businesses.

USE OF REUSE WATER

The use of reuse water has increased substantially between 1996–97 and 2000–01, from 134,424 ML to 516,563 ML (table 4.12).

Table 4.12 shows the volume of reuse water used by the main industry groups by state and territory for 1996–97 and 2000–01. Increases in reuse water use are shown in some industries between 1996–97 and 2000–01 (graph 4.2). The greatest increase was by the AGRICULTURE industry. Use of reuse water has also increased in the MANUFACTURING industry since 1996–97, despite on-site reuse not being included in the 2000–01 volumes. It is certain that this increase would have been greater if on-site reuse was included. A notable increase in use of reuse water was also seen in the WATER SUPPLY industry since 1996–97.

The AGRICULTURE industry was the largest user of reuse water in 2000–01, accounting for 423,264 ML or 82% of all reuse water used in Australia (graph 4.2). The majority of reuse water used by the AGRICULTURE industry is for application to pastures (45%), although rice crops were also significant users (29%). Refer to Chapter 5 for more detail on reuse within the AGRICULTURE industry.

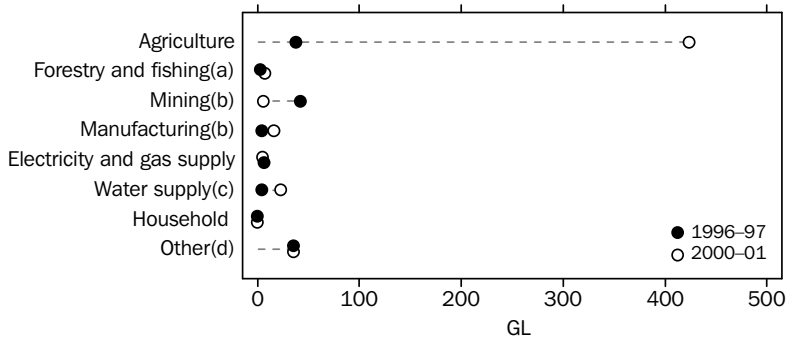
Following the AGRICULTURE industry, the next largest user of reuse water were the OTHER INDUSTRIES (which include service and administration industries) with 35,859 ML used (or 7% of total reuse water use in Australia), and the WATER SUPPLY industry where 23,056 ML (or 4% of total reuse water use) was used. Most reuse water used by the OTHER INDUSTRIES is applied to golf courses and sporting grounds, while for the WATER SUPPLY industry, reuse water is usually applied to pastures and other land owned by water providers.

Households used the smallest volume of reuse water in 2000–01 (167 ML) mainly for watering gardens.

USE OF REUSE WATER

continued

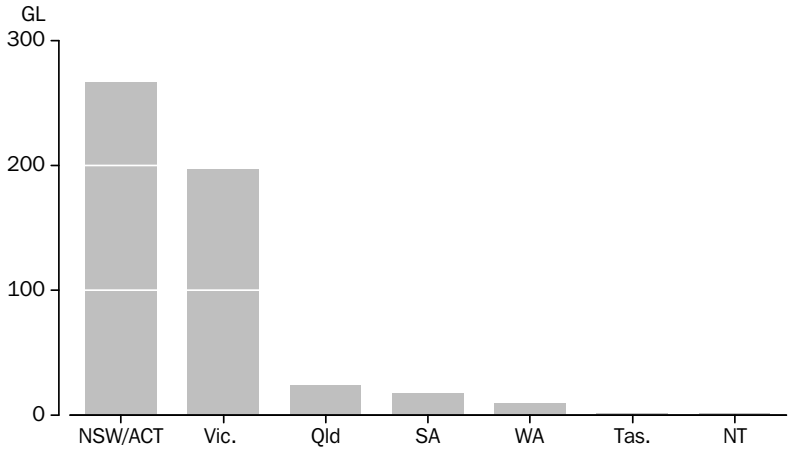
4.2 REUSE WATER USE, Australia—1996–97 and 2000–01



(a) Includes Services to agriculture; hunting and trapping.
(b) On-site reuse was included in this industry in 1996–97 and not in 2000–01.
(c) Includes Sewerage and drainage services.
(d) Includes mainly Services and Administrative industries. For more detail refer to Appendix 4.

Graph 4.3 presents use of reuse water by state and territory for 2000–01. Of the total 516,563 ML of reuse water used in Australia in 2000–01, New South Wales and the Australian Capital Territory combined were the largest users (266,963 ML or 52% of all reuse water used in Australia), followed by Victoria (196,353 ML or 38%). The lowest volume of reuse water use was in the Northern Territory where 1,154 ML or less than 1% was used.

4.3 REUSE WATER USE, by state and territory—2000–01

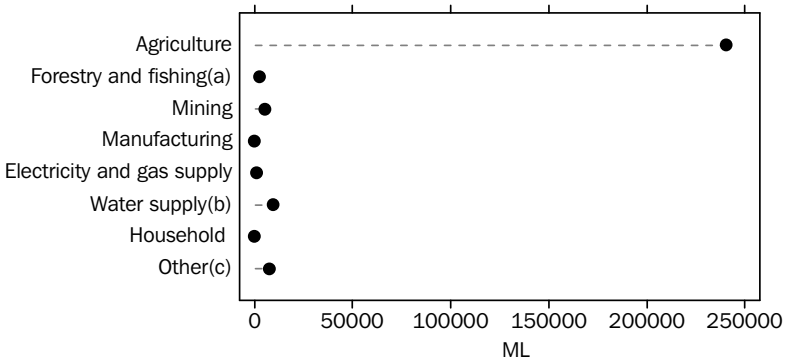


New South Wales and the Australian Capital Territory

Graphs 4.4 to 4.11 present an industry perspective of reuse water use for each state and territory in 2000–01. In New South Wales and the Australian Territory combined, the AGRICULTURE industry was the largest user of reuse water, with almost all reuse water (240,391 ML) being used for this purpose (graph 4.4). The WATER SUPPLY industry and OTHER INDUSTRIES made up the majority of the remaining volume with 9,698 ML and 7,522 ML respectively. Water use by OTHER INDUSTRIES is mainly for golf courses and sporting grounds.

New South Wales and the Australian Capital Territory continued

4.4 REUSE WATER USE, New South Wales and Australian Capital Territory—2000–01

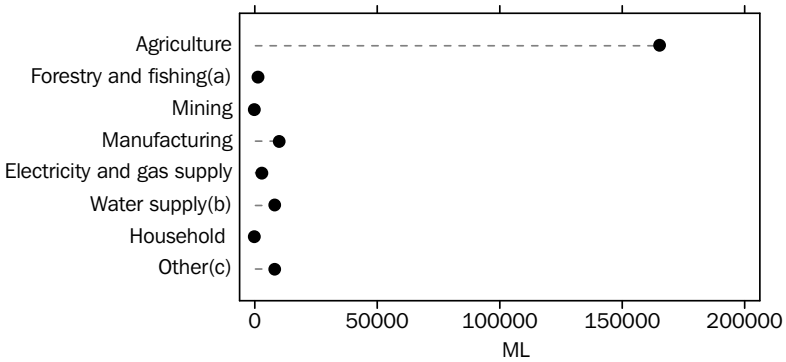


(a) Includes Services to agriculture; hunting and trapping.
(b) Includes Sewerage and drainage services.
(c) Includes mainly Services and Administrative industries. For more detail refer to Appendix 4.

Victoria

The AGRICULTURE industry was the largest user of reuse water in Victoria in 2000–01 accounting for 165,193 ML (or 84%) of all reuse water used in this state (graph 4.5). The next largest user of reuse water was the MANUFACTURING industry (10,144 ML or 5%), followed by OTHER INDUSTRIES (8,408 ML or 4%), and the WATER SUPPLY industry (8,211 ML or 4%).

4.5 REUSE WATER USE, Victoria—2000–01



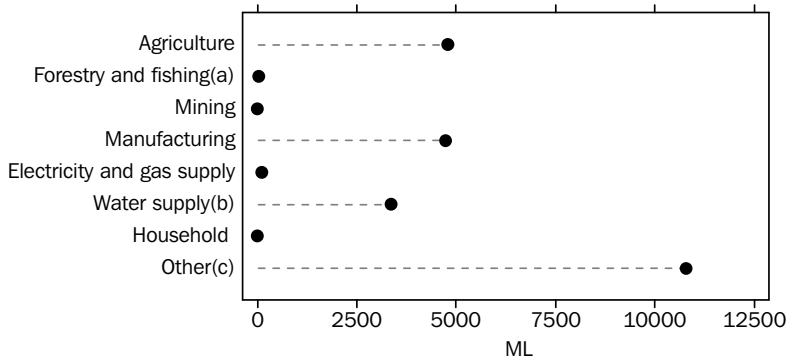
(a) Includes Services to agriculture; hunting and trapping.
(b) Includes Sewerage and drainage services.
(c) Includes mainly Services and Administrative industries. For more detail refer to Appendix 4.

Queensland

Graph 4.6 shows that in Queensland, the largest user of reuse water was OTHER INDUSTRIES (10,778 ML, or 45% of all the reuse water used in this state). The AGRICULTURE and MANUFACTURING industries were also significant users of reuse water, with 4,800 ML (20%) and 4,738 ML (20%) used respectively.

Queensland continued

4.6 REUSE WATER USE, Queensland—2000–01

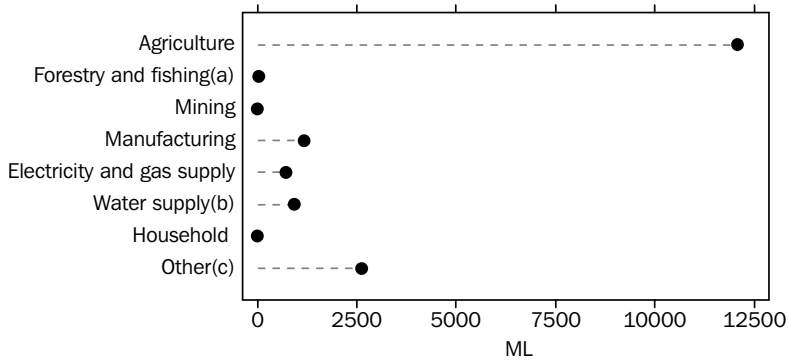


(a) Includes Services to agriculture; hunting and trapping.
(b) Includes Sewerage and drainage services.
(c) Includes mainly Services and Administrative industries. For more detail refer to Appendix 4.

South Australia

The largest user of reuse water in South Australia was the AGRICULTURE industry, with 12,073 ML or 69% of reuse water used in 2000–01(graph 4.7). The next largest users were OTHER INDUSTRIES (2,619 ML) and the MANUFACTURING industry (1,177 ML).

4.7 REUSE WATER USE, South Australia—2000–01



(a) Includes Services to agriculture; hunting and trapping.
(b) Includes Sewerage and drainage services.
(c) Includes mainly Services and Administrative industries. For more detail refer to Appendix 4.

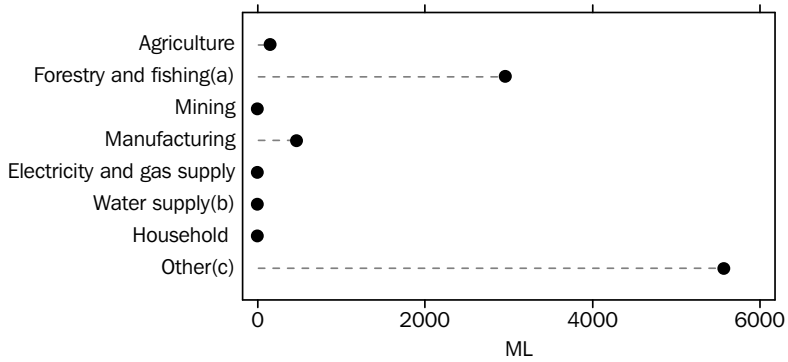
Western Australia

In Western Australia, OTHER INDUSTRIES were the largest users of reuse water (5,570 ML or 61%) (graph 4.8). The FORESTRY AND FISHING industry was also a significant user of reuse water, mainly for forestry (2,959 ML or 32% of total reuse water use in this state). This represents the largest use of reuse water by the FORESTRY AND FISHING industry of all the states and territories.

Western Australia

continued

4.8 REUSE WATER USE, Western Australia—2000–01

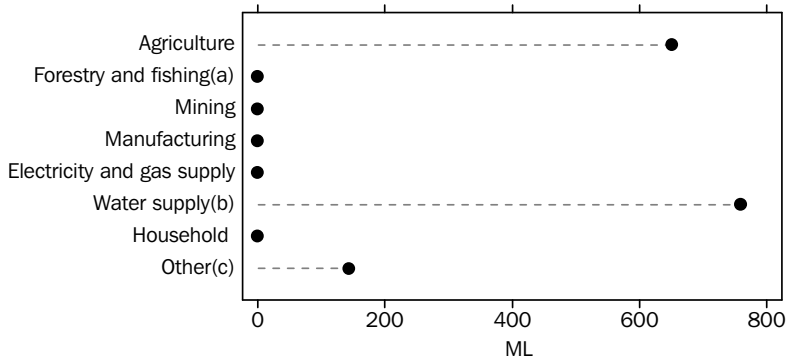


(a) Includes Services to agriculture; hunting and trapping.
(b) Includes Sewerage and drainage services.
(c) Includes mainly Services and Administrative industries. For more detail refer to Appendix 4.

Tasmania

The largest user of reuse water in Tasmania was the WATER SUPPLY industry accounting for 758 ML or 49% of the state's reuse water (graph 4.9). The AGRICULTURE industry was the second largest user of reuse water, with 650 ML or 42% of all reuse water used.

4.9 REUSE WATER USE, Tasmania—2000–01



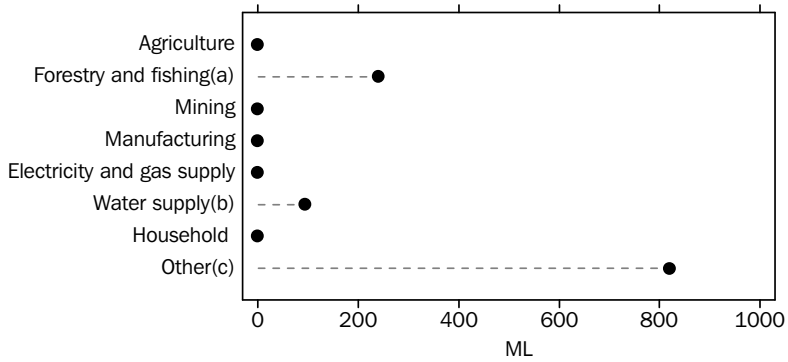
(a) Includes Services to agriculture; hunting and trapping.
(b) Includes Sewerage and drainage services.
(c) Includes mainly Services and Administrative industries. For more detail refer to Appendix 4.

Northern Territory

In the Northern Territory, OTHER INDUSTRIES were the most significant users of reuse water accounting for 819 ML (or 71%) of the total 1,154 ML of reuse water used (graph 4.10). The FORESTRY AND FISHING industry also used a considerable proportion of reuse water in 2000–01 (21% or 241 ML).

Northern Territory continued

4.10 REUSE WATER USE, Northern Territory—2000–01



(a) Includes Services to agriculture; hunting and trapping.
(b) Includes Sewerage and drainage services.
(c) Includes mainly Services and Administrative industries. For more detail refer to Appendix 4.

Limits to increased use of reuse water

Although there has been a significant increase in the use of reuse water between 1996–97 and 2000–01, there are several limitations to further increases. These include public health concerns, social acceptance, availability of expertise and cost of infrastructure (reuse water is supplied through separate infrastructure to mains water). In addition, volumes of wastewater that could be used as a source of reuse water are in low lying areas around cities and the pumping costs associated with delivering this water often mean that it is not economical to deliver.

4.11 REUSE WATER SUPPLY—1996–97 and 2000–01

	NSW/ACT	Vic.	Qld	SA	WA	Tas.	NT	Aust.
				2000–01				
Volume per industry (ML)								
Water supply industry(a)	266 964	193 608	23 818	15 675	8 568	1 551	1 154	511 337
Other industries(b)	—	2 745	—	1 897	584	—	—	5 226
Total	*266 964*	*196 353*	*23 818*	*17 572*	*9 152*	*1 551*	*1 154*	*516 563*
Proportion of total water supplied (%)(c)	5.3	4.2	1.1	2.9	1.1	1.4	2.1	3.9
				1996–97				
Volume per industry (ML)								
Water supply industry(a)	17 589	20 444	24 782	6 968	10 926	151	1 579	82 438
Other industries(b)	6 753	12 065	14 763	1 407	13 110	973	2 913	51 986
Total	*24 342*	*32 509*	*39 545*	*8 375*	*24 036*	*1 124*	*4 492*	*134 424*
Proportion of total water supplied (%)(c)	0.4	0.4	1.8	2.0	1.9	0.2	3.2	0.7

— nil or rounded to zero (including null cells)

(a) Water supply, sewerage and drainage services industry.

(b) Includes water supplied by other industries including Mining, Manufacturing and Electricity and gas supply industries.

(c) Total water supplied = Mains water + Reuse water.

Note: Sums may not necessarily equal totals due to rounding.

4.12 REUSE WATER USE—1996–97 and 2000–01

	NSW/ACT	Vic.	Qld	SA	WA	Tas.	NT	Aust.
	ML	ML	ML	ML	ML	ML	ML	ML
2000–01								
Agriculture	240 391	165 193	4 800	12 073	156	650	—	423 264
Forestry & fishing(a)	2 569	1 408	28	44	2 959	—	241	7 249
Mining(b)	5 406	36	—	—	—	—	—	5 441
Manufacturing(b)	10	10 144	4 738	1 177	467	—	—	16 536
Electricity & gas supply	1 210	2 954	106	720	—	—	—	4 991
Water supply, sewerage & drainage services	9 689	8 211	3 367	938	—	758	94	23 056
Household	167	—	—	—	—	—	—	167
Other(c)	7 522	8 408	10 778	2 619	5 570	143	819	35 859
Total	**266 964**	**196 353**	**23 818**	**17 572**	**9 152**	**1 551**	**1 154**	**516 563**
Proportion of total reuse (%)	52	38	5	3	2	—	—	100
1996–97								
Agriculture	8 305	18 178	9 629	1 487	47	20	452	38 118
Forestry & fishing(a)	113	12	—	836	2 108	—	—	3 068
Mining(b)	8 440	7 665	11 907	—	10 786	100	2 913	41 811
Manufacturing(b)	501	525	21	1 407	1 442	873	—	4 769
Electricity & gas supply	1 232	3 876	1 804	—	—	—	—	6 912
Water supply, sewerage & drainage services	—	492	2 424	—	1 424	—	—	4 339
Household	—	—	—	—	—	—	—	—
Other(c)	5 753	1 763	13 760	4 645	8 229	131	1 127	35 407
Total	**24 342**	**32 509**	**39 545**	**8 375**	**24 036**	**1 124**	**4 492**	**134 424**
Proportion of total reuse (%)	18	24	29	6	18	1	3	100

— nil or rounded to zero (including null cells)

(a) Includes Services to agriculture; hunting and trapping.

(b) On-site reuse water use was included in Mining and Manufacturing industries in 1996–97.

(c) Includes mainly Services and Administrative industries.

Note: Sums may not necessarily equal totals due to rounding.

CHAPTER 5 WATER USE — AGRICULTURE

INTRODUCTION

This chapter examines the use of water within the Australian AGRICULTURE industries. Water used by agriculture includes water applied through irrigation to crops, pastures, or fed to livestock, that has been directly extracted from the environment by farmers (e.g. from bores, on-farm dams, rivers) or by water providers (e.g. irrigation authorities). It does not include the use of rainwater. Since the AGRICULTURE industry does not use water in-stream, or supply water to other users, water use is equal to water consumption.

To calculate the amount of water used by the AGRICULTURE industries, the ABS has used information collected from irrigation authorities, data on water application rates for crops (ML/ha) from state and territory environment and agriculture contacts, and irrigated area and livestock numbers from the ABS 2001 Agricultural Census. Additional detail on the methodology is found in the Explanatory Notes, paragraphs 22, and 33–38.

Water use comparisons with the first water account have not been made in this chapter, although changes in irrigated areas and irrigated methods have been included. Water use by agriculture is largely influenced by climatic conditions (see Appendix 1) and this must be taken into account when assessing changes in water use.

MAIN FINDINGS

- Total water use by the AGRICULTURE industry was 16,660 GL in 2000–01.
- Of the water used by the AGRICULTURE industry 9,132 GL was from self-extracted sources, 7,105 GL was from mains (e.g. supplied by irrigation authorities) and 423 GL was reuse water.
- As a proportion of Australian water consumption, AGRICULTURE industry water use accounted for 67% in 2000–01.
- The largest users of water within the AGRICULTURE industry were LIVESTOCK, PASTURE, GRAINS AND OTHER AGRICULTURE (5,568 GL), COTTON (2,908 GL), DAIRY FARMING (2,834 GL) and RICE (1,951 GL).
- The area of irrigated agricultural land has increased from 2.1 million hectares in 1996–97 to 2.5 million hectares in 2000–01, an increase of 22%.
- The gross value of irrigated agricultural production amounted to $9.6 billion in 2000–01. (Note: Gross value is not a proxy for the highest value water use).
- As a proportion of the total gross value of agricultural production, irrigated agricultural production was 28% in 2000–01.

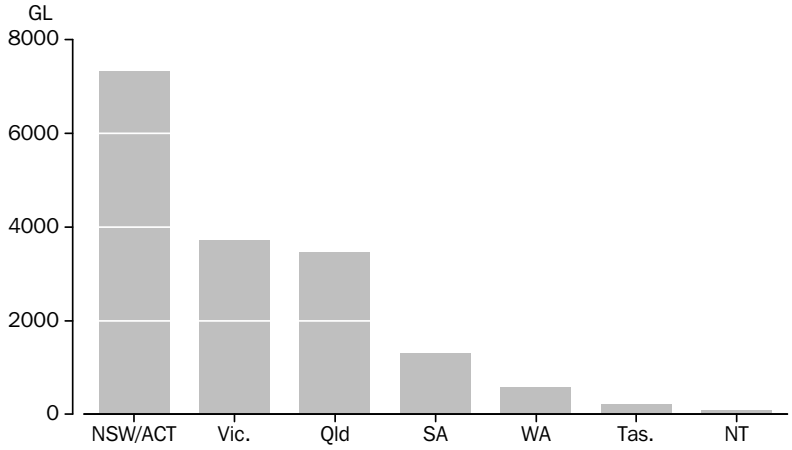
AGRICULTURE

Water use

The AGRICULTURE industry used 16,660 GL of water in 2000–01 (table 5.7), making up 67% of total water consumption in Australia during that period. Water use varied between crops and between states and territories. New South Wales and the Australian Capital Territory combined were the largest users of water for agriculture accounting for 7,322 GL or 44% of Australian agricultural water use (graph 5.1).

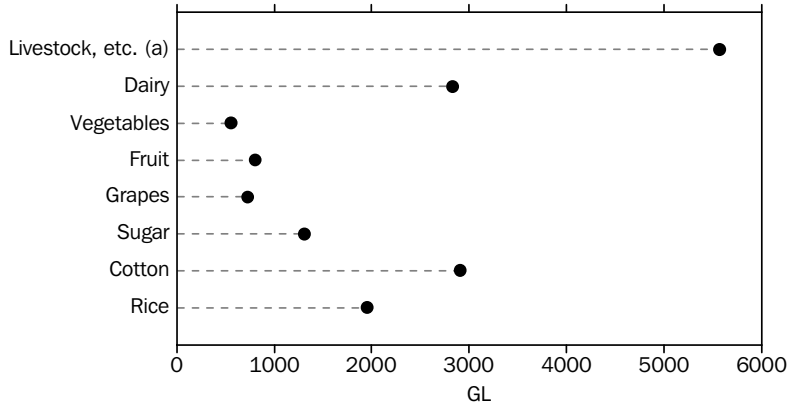
Water use continued

5.1 WATER USE, Agriculture—2000–01



In 2000–01, LIVESTOCK, PASTURE, GRAINS AND OTHER AGRICULTURE was the largest user of water in agriculture (5,568 GL or 33%), followed by COTTON (2,908 GL or 17%), DAIRY FARMING (2,834 GL or 17%) and RICE (1,951 GL or 12%) (graph 5.2). LIVESTOCK, PASTURE, GRAINS AND OTHER AGRICULTURE includes cut flowers, nurseries, turf growing and other commodities for which disaggregation is not possible owing to the way data were collected in the ABS 2001 Agricultural Census. DAIRY FARMING includes livestock and irrigated pastures and grains for dairy farming purposes.

5.2 WATER USE, Agriculture—2000–01



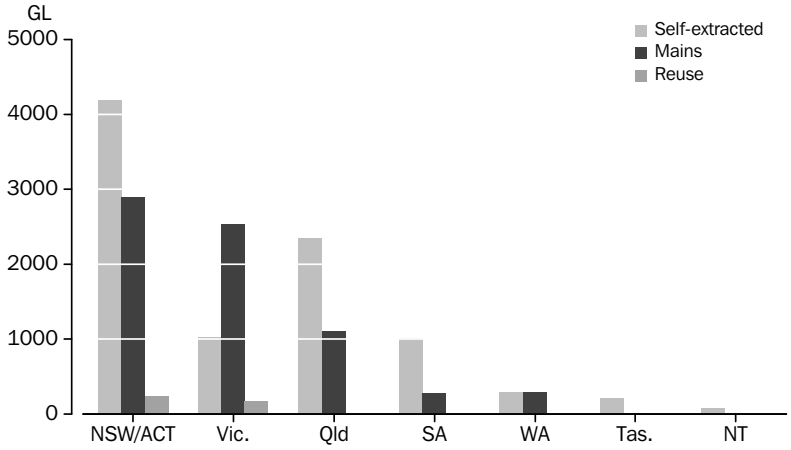
(a) Includes Livestock, pasture, grains and other agriculture (excluding Dairy farming).

Source of water

The majority of the water used by the AGRICULTURE industry in Australia was self-extracted (9,132 GL or 55%), with mains water (7,105 GL or 43%) and reuse water (423 GL or 3%) accounting for the remainder (table 5.8). There was significant variation between the states and territories (graph 5.3). The use of mains water by the AGRICULTURE industry (7,105 GL) is in general agreement with the volume of water use by agriculture (6,545 GL) reported in the *ANCID Benchmarking Report for 2000–01* (ANCID 2002). The difference between the two estimates is due to the ABS estimate including additional water providers.

Source of water continued

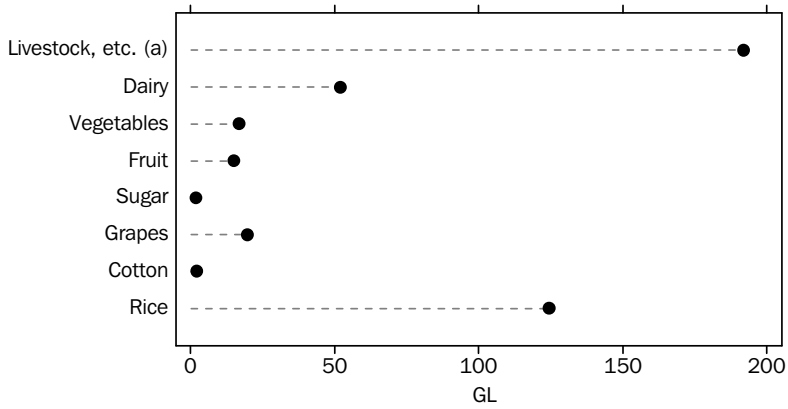
5.3 SOURCE OF WATER, Agriculture—2000–01



Reuse water

The use of reuse water by the AGRICULTURE industry was 423,264 ML in 2000–01 (table 5.8). Reuse accounted for 4% of total agricultural water use in Victoria, and 3% in New South Wales. The largest user of reuse water was the LIVESTOCK, PASTURE, GRAINS AND OTHER AGRICULTURE industry (191,879 ML), followed by RICE (124,501 ML) and DAIRY FARMING (51,855 ML) (graph 5.4 and table 5.9). Within LIVESTOCK, PASTURE, GRAINS AND OTHER AGRICULTURE and DAIRY FARMING, most reuse water was used to irrigate pastures. Reuse water used by the AGRICULTURE industry includes water from regional reuse schemes, but does not include on-farm reuse or recycling (see Glossary).

5.4 REUSE WATER USE, Agriculture—2000–01



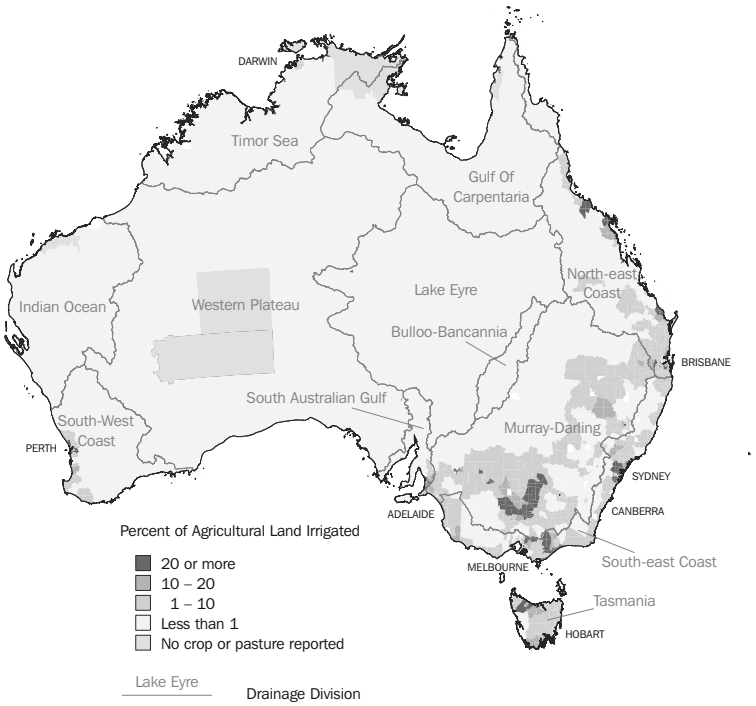
(a) Includes Livestock, pasture, grains and other agriculture (excluding Dairy farming).

Irrigated land

Map 5.5 shows the proportion of crops and pastures irrigated in Australia, while table 5.10 shows the area irrigated by crop type for each state and territory. New South Wales and the Australian Capital Territory combined had the largest area irrigated with 1.1 million hectares or 43% of the total irrigated area. The Northern Territory had the smallest area of irrigated land (4,000 hectares).

Irrigated land continued

5.5 PROPORTION OF CROPS AND PASTURES IRRIGATED, by Drainage Division—2000–01

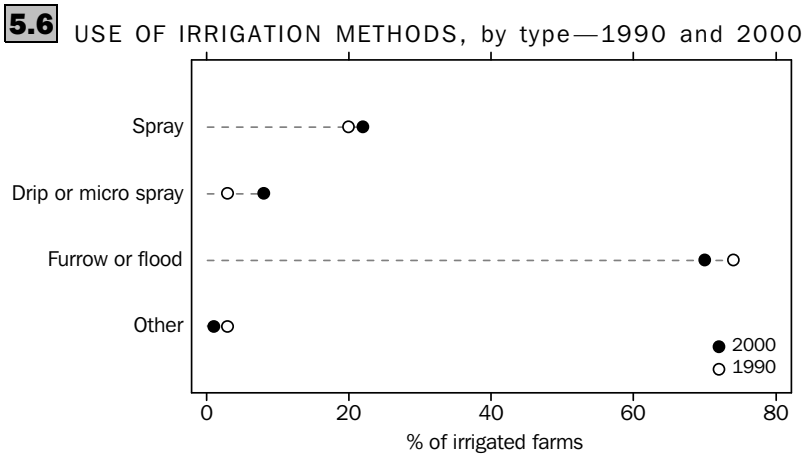


The area of irrigated land increased from 2.1 million hectares in 1996–97 to 2.5 million hectares in 2000–01 (table 5.10), representing a 22% increase in irrigated agricultural land. There have been increases in the area irrigated for all crops, with the largest absolute increase being in the area of irrigated cotton from 315,000 hectares in 1996–97 to 437,000 hectares in 2000–01. In percentage terms the largest increase was a 90% increase in the area of grapes irrigated from 70,000 hectares to 133,000 hectares.

Irrigation methods

Graph 5.6 shows there has been an uptake of more efficient irrigation methods between 1990–2000. New data on the use of irrigation methods have been collected by the ABS in respect of 2002–03 and should be available towards the end of 2004.

5.6 USE OF IRRIGATION METHODS, by type—1990 and 2000



Source: ABS 1992; ABS 2001c.

Value of irrigated agricultural production

Estimating the value of agricultural production that results from irrigation is difficult. This is because water used by crops comes from a variety of sources. In particular, rainwater, which is not included in the water account, is usually a component of the water used by irrigated crops, and the timing and location of rainfalls affect the amount of irrigation water required. Other factors such as evaporation also affect irrigation water requirements. These factors contribute to regional and temporal variations in the use of water for irrigation.

In addition, water is not the only input to agricultural production from irrigated land. Land, fertiliser, labour, machinery and other inputs are also used and to separate the contribution that these factors make to total production is practically impossible with current data. Therefore, the estimates of the gross value of agricultural production presented in table 5.11 attribute all of the gross value of production from irrigated land to irrigated agricultural production. The gross value of irrigated production should not be used as a proxy for determining the highest value water uses. Further details on the methods used to derive the estimates are presented in the Explanatory Notes paragraphs 33 to 38.

The total gross value of irrigated agricultural production in 2000–01 was $9,618 million (table 5.11). In 2000–01 gross irrigated agricultural production represented 28% of the gross value of all agriculture production. VEGETABLES were the largest contributor to the value ($1,817 million or 19%), followed by FRUIT ($1,590 million or 17%) and DAIRY FARMING ($1,499 million or 16%).

5.7 WATER USE, Agriculture by industry—2000–01

	NSW/ACT	*Vic.*	*Qld*	*SA*	*WA*	*Tas.*	*NT*	*Aust.*
	ML	ML	ML	ML	ML	ML	ML	ML
Livestock, pasture, grains, dairy & other								
Livestock, pasture, grains & other	2 590 220	1 434 725	778 858	473 567	176 172	85 140	29 792	5 568 474
Dairy farming	401 219	1 684 974	287 919	319 750	64 507	75 983	67	2 834 418
Total	*2 991 439*	*3 119 698*	*1 066 777*	*793 317*	*240 678*	*161 123*	*29 859*	*8 402 892*
Vegetables	95 694	130 889	103 074	64 724	110 986	49 458	886	555 711
Fruit	214 061	209 421	107 393	160 739	64 884	10 257	35 876	802 632
Grapes	174 352	237 892	6 296	283 673	22 641	800	3 483	729 137
Sugar	1 169	—	1 185 829	—	123 674	—	—	1 310 671
Cotton	1 921 050	—	984 531	—	2 597	—	—	2 908 178
Rice	1 924 484	26 676	—	—	—	—	—	1 951 160
Total	**7 322 249**	**3 724 576**	**3 453 900**	**1 302 454**	**565 460**	**221 639**	**70 104**	**16 660 381**

— nil or rounded to zero (including null cells)

5.8 WATER USE, Agriculture by source—2000–01

	NSW/ACT	*Vic.*	*Qld*	*SA*	*WA*	*Tas.*	*NT*	*Aust.*
	ML	ML	ML	ML	ML	ML	ML	ML
Self-extracted	4 192 170	1 022 386	2 342 547	1 017 147	281 099	206 642	70 104	9 132 095
Mains	2 889 687	2 536 996	1 106 553	273 234	284 205	14 347	—	7 105 022
Reuse	240 391	165 193	4 800	12 073	156	650	—	423 264
Total	**7 322 249**	**3 724 576**	**3 453 900**	**1 302 454**	**565 460**	**221 639**	**70 104**	**16 660 381**

— nil or rounded to zero (including null cells)

5.9 WATER USE, Agriculture by industry and source—2000–01

	Self-extracted	*Mains*	*Reuse*	*Total*
	ML	ML	ML	ML
Livestock, pasture, grains, dairy & other				
Livestock, pasture, grains & other	3 471 109	1 905 485	191 879	5 568 474
Dairy farming	1 210 701	1 571 863	51 855	2 834 418
Total	*4 681 810*	*3 477 348*	*243 734*	*8 402 892*
Vegetables	422 008	117 033	16 670	555 711
Fruit	491 250	296 557	14 825	802 632
Grapes	345 371	364 190	19 576	729 137
Sugar	555 668	753 129	1 875	1 310 671
Cotton	2 502 002	404 090	2 085	2 908 178
Rice	133 986	1 692 674	124 501	1 951 160
Total	**9 132 095**	**7 105 022**	**423 264**	**16 660 381**

5.10 AREA OF IRRIGATED CROPS AND PASTURES, by industry—1996–97 and 2000–01

	2000–01								1996–97
	NSW/ACT	*Vic.*	*Qld*	*SA*	*WA*	*Tas.*	*NT*	*Aust.*	*Aust.*
	'000 ha	'000 ha	'000 ha	'000 ha	'000 ha	'000 ha	'000 ha	'000 ha	'000 ha
Livestock, pasture, grains, dairy and other									
Livestock, pasture, grains and other	509	214	113	51	11	27	—	924	na
Dairy farming(a)	67	340	25	23	6	17	—	479	na
Total	*576*	*554*	*138*	*74*	*17*	*44*	—	*1 403*	*1 175*
Vegetables	18	25	32	14	9	17	—	116	89
Fruit	26	25	33	18	8	3	—	116	82
Grapes	32	34	2	57	8	1	3	133	70
Sugar(b)	—	—	208	—	4	—	—	211	173
Cotton(b)	298	—	139	—	—	—	—	437	315
Rice(c)	177	2	—	—	—	—	—	179	152
Total	**1 073**	**640**	**511**	**163**	**46**	**68**	**4**	**2 506**	**2 057**

— nil or rounded to zero (including null cells)
na not available
(a) In 1996–97, data included in 'Livestock, pasture, grains and other agriculture'.
(b) In 2000–01, data not collected in Qld, SA, Tas. and NT.
(c) In 2000–01, data for SA and Tas. are included in 'Livestock, pasture, grains, and other agriculture'.
Note: Totals will not equal sums if more than one crop type is grown on a given area during the reference period.

5.11 GROSS VALUE OF IRRIGATED AGRICULTURAL PRODUCTION—2000–01

	NSW/ACT	*Vic.*	*Qld*	*SA*	*WA*	*Tas.*	*NT*	*Aust.*
	$m	$m	$m	$m	$m	$m	$m	$m
Livestock, pasture, grains, dairy & other								
Livestock, pasture, grains & other	322	452	486	110	153	64	4	1 501
Dairy farming	178	956	123	126	38	78	—	1 499
Total	*500*	*1 408*	*608*	*236*	*191*	*142*	*4*	*2 999*
Vegetables	228	465	545	248	186	143	2	1 817
Fruit	223	370	584	235	102	45	31	1 590
Grapes	225	328	15	685	82	9	12	1 355
Sugar	1	—	278	—	5	—	—	284
Cotton	848	—	373	—	1	—	—	1 222
Rice	346	4	—	—	—	—	—	350
Total	**2 371**	**2 574**	**2 402**	**1 405**	**567**	**339**	**49**	**9 618**

— nil or rounded to zero (including null cells)

CHAPTER 6 WATER USE — MINING AND MANUFACTURING

INTRODUCTION

This chapter presents data on water use in the MINING and MANUFACTURING industries. These industries use water for cleaning, cooling, product movement, and as a raw material. The MINING and MANUFACTURING industries use water from both mains supply and self-extracted sources. For the MANUFACTURING industry, water use equals water consumption. However for the MINING industry, water use does not equal water consumption, as some businesses use water in-stream or supply mains water to other users.

Information in this chapter is based on data obtained through surveys of businesses in the MINING and MANUFACTURING industries (ANZSIC 1101–2949). In the first water account, water use estimates were derived for these industries using limited data. This edition uses the results of an ABS survey, resulting in better estimates for these industries in 2000–01.

On-site reuse was included as reuse water in the first edition of the water account, but has not been included in this edition. On-site reuse volumes are significant within the MINING and MANUFACTURING industries, but only reuse water that has been supplied (e.g. from sewage treatment plants) to these industries has been reported for 2000–01.

MAIN FINDINGS

Mining

- In 2000–01, total water use by the MINING industry was 534,273 ML.
- Water consumption by the MINING industry was 400,622 ML in 2000–01, or 1.6% of total water consumption in Australia during this period.
- The METAL ORE industry was the largest user of water within the MINING industry (340,999 ML) in 2000–01, followed by COAL MINING (123,860 ML) and OTHER MINING (50,207 ML).
- Most water used by the MINING industry was in Western Australia (255,140 ML), followed by Queensland (114,491 ML), New South Wales and the Australian Capital Territory (90,965 ML), and Tasmania (30,609 ML).
- 49,197 ML of water used by the MINING industry was derived from mains, and 479,636 ML was from self-extracted sources.
- The MINING industry supplied 6,220 ML of mains water to other users.

Manufacturing

- In 2000–01, the MANUFACTURING industry used 866,061 ML or 3.5% of total water use in Australia during this period.
- The FOOD, BEVERAGE AND TOBACCO industry was the highest user of water in the MANUFACTURING industry using 241,509 ML of water during 2000–01, followed by the METAL PRODUCTS (116,840 ML) and MACHINERY AND EQUIPMENT (111,832 ML) industries. OTHER MANUFACTURING (12,857 ML) used the smallest volume of water within the MANUFACTURING industry.

Manufacturing continued

- Most water used by the MANUFACTURING industry was in Victoria (248,909 ML) followed by Queensland (181,433 ML), New South Wales and the Australian Capital Territory (178,735 ML) and South Australia (85,546 ML).
- The MANUFACTURING industry used 553,700 ML of mains water and 295,825 ML of self-extracted water.
- The total volume of reuse water used by the MANUFACTURING industry was 16,536 ML. Of this volume, 8,022 ML was used by the PETROLEUM, COAL AND CHEMICAL PRODUCT industry, and 5,553 ML was used by the WOOD AND PAPER PRODUCT industry.

MINING

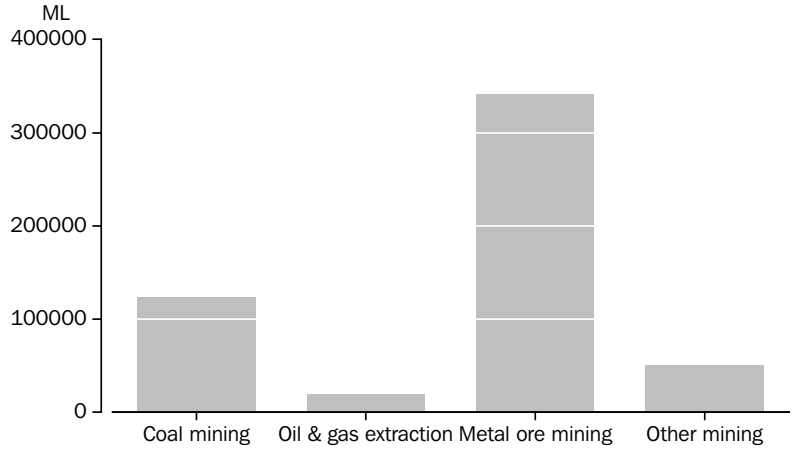
The MINING industry consists of five subdivisions; COAL MINING, OIL AND GAS EXTRACTION, METAL ORE MINING, OTHER MINING, and SERVICES TO MINING industries. The SERVICES TO MINING industry accounts for a very small proportion of water use (1,985 ML, or less than 0.5% of total water use in the MINING industry). No state data were available so this subdivision has been excluded from the water account analysis.

Most water used in the MINING industry is from self-extracted sources. Water is often obtained from mine dewatering — a process where water is collected on mine sites through rainfall, run-off and infiltration, and later discharged. Mine dewatering is considered to be a self-extracted water source for the MINING industry in both water account publications. In 1996–97, many mining businesses were unable to provide estimates of the volume of water discharged from mine dewatering processes. However, by 2000–01 more businesses were able to supply this information, resulting in a substantial increase in these estimates between 1996–97 and 2000–01.

Water use

The MINING industry used 534,273 ML, in 2000–01. As shown in graph 6.1, during 2000–01 the METAL ORE MINING industry was the largest user of water within the MINING industry (340,999 ML), followed by COAL MINING (123,860 ML), OTHER MINING (50,207 ML), and OIL AND GAS EXTRACTION (19,208 ML).

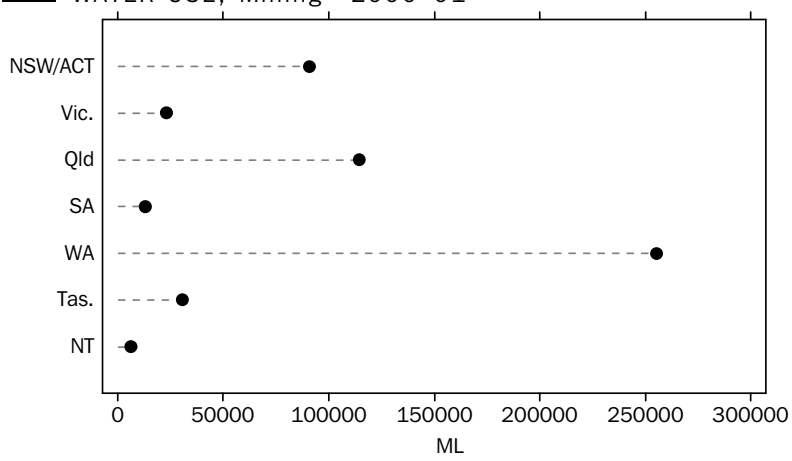
6.1 WATER USE, Mining—2000–01



Graph 6.2 presents data for total water use in the MINING industry by state and territory for 2000–01. Almost half the water used by the MINING industry in 2000–01 was in Western Australia (255,140 ML). This was followed by Queensland (114,491 ML), New South Wales and the Australian Capital Territory combined (90,965 ML), and Tasmania (30,609 ML).

Water use continued

6.2 WATER USE, Mining—2000–01

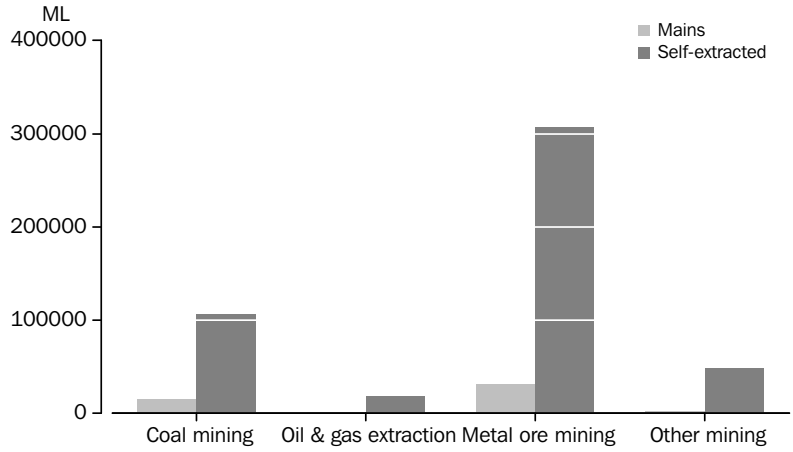


Water source

The MINING industry is mostly reliant on self-extracted water, with 90% (479,635 ML) of total water use derived from this source during 2000–01 (table 6.9). Water use from mains was 49,196 ML over the same period.

Of self-extracted water used in the MINING industry, the majority was used by the METAL ORE MINING industry (306,883 ML) then COAL MINING (106,472 ML) and OTHER MINING (48,419 ML) (graph 6.3). Of water supplied by mains, again the biggest user was the METAL ORE MINING industry (31,362 ML). This was followed by COAL MINING (14,701 ML) and OTHER MINING (1,788 ML). The OIL AND GAS EXTRACTION industry used the least self-extracted water and mains water.

6.3 SOURCE OF WATER, Mining—2000–01



Reuse water

The total volume of reuse water used by the MINING industry in 2000–01 was 5,441 ML. Of this, 2,754 ML was used by the METAL ORE MINING industry, while 2,687 ML was used by the COAL MINING industry (table 6.10). These volumes only include reuse water reported to have been supplied to the MINING industry (for example from sewage treatment plants), and do not include on-site recirculation of water.

Water supply

Table 6.9 shows the MINING industry also supplies water to other users (mainly households) in the form of mains water. Total water supplied by the MINING industry to mains supply was 6,220 ML in 2000–01.

Water discharge

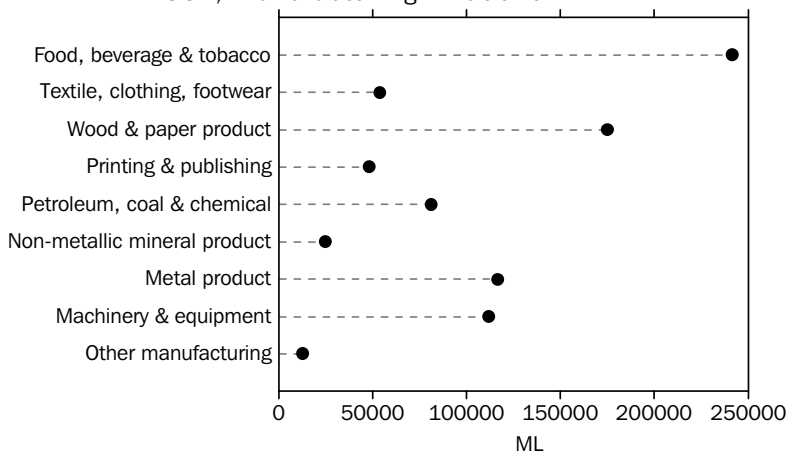
Water discharged by the MINING industry amounted to 198,937 ML in 2000–01 (table 6.9). Discharge includes water from mine dewatering processes, as this water is discharged after use. The highest volume of water discharged was reported for Western Australia (78,043 ML) which reflects the size of the MINING industry in that state. The MINING industry in New South Wales and the Australian Capital Territory combined discharged the next largest volumes of water (44,153 ML) followed by Tasmania (21,706 ML), Victoria (19,486 ML), Queensland (18,196 ML), the Northern Territory (9,900 ML) and South Australia (7,454 ML). More information on MINING industry discharges are found in the flow tables presented in Chapter 2.

MANUFACTURING

Water use

In 2000–01, total water use in the MANUFACTURING industries was 866,061 ML or 3.5% of total water use in Australia over this period (table 6.11). As shown in graph 6.4, the FOOD, BEVERAGE AND TOBACCO industry was the highest user of water within the MANUFACTURING industry with 241,509 ML used. This was followed by the WOOD AND PAPER PRODUCT industry (174,851 ML), METAL PRODUCTS (116,840 ML) and MACHINERY AND EQUIPMENT (111,832 ML) industries. OTHER MANUFACTURING used the smallest volume of water within the MANUFACTURING industry (12,857 ML).

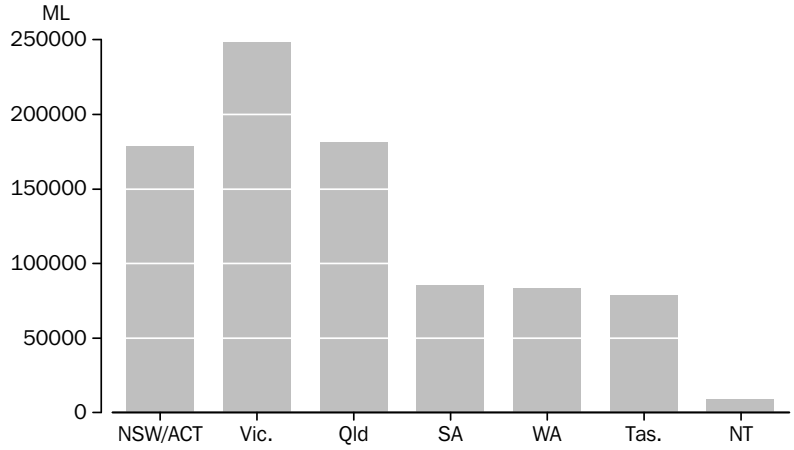
6.4 WATER USE, Manufacturing—2000–01



Victoria was the state with the highest water use in the MANUFACTURING industry during 2000–01 with 248,909 ML (graph 6.5). This was followed by Queensland (181,433 ML), New South Wales and the Australian Capital Territory (178,735 ML) and South Australia (85,546 ML).

Water use continued

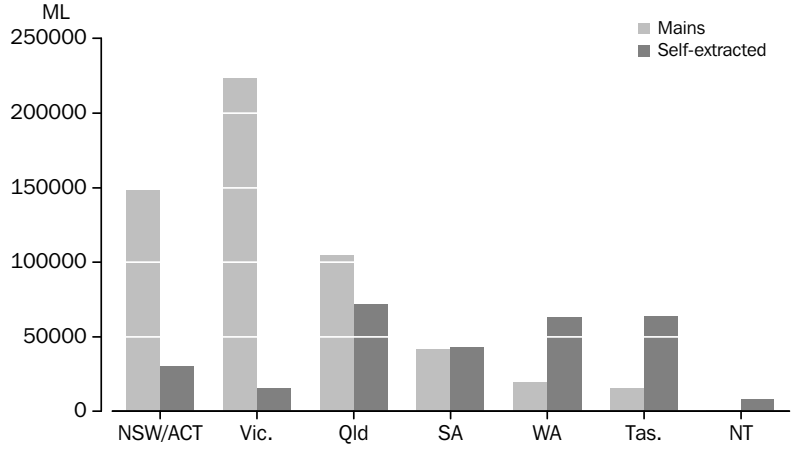
6.5 WATER USE, Manufacturing—2000–01



Water source

During 2000–01 the MANUFACTURING industry used 553,700 ML of mains water and 295,825 ML of self-extracted water (table 6.11). Overall, the MANUFACTURING industry was most reliant on mains water, with 64% of total water intake being derived from this source in 2000–01. By state and territory, the reliance on mains water for manufacturing varied (graph 6.6), Victoria being the most dependent on this source (90%), followed by New South Wales and the Australian Capital Territory combined (83%). The Northern Territory was the least dependent (only 9% of water intake from mains supply). The varied reliance on water from self-extracted and mains sources is due to the different structure and types of MANUFACTURING industries occurring within the states and territories as well as the availability of different water sources.

6.6 SOURCE OF WATER, Manufacturing—2000–01

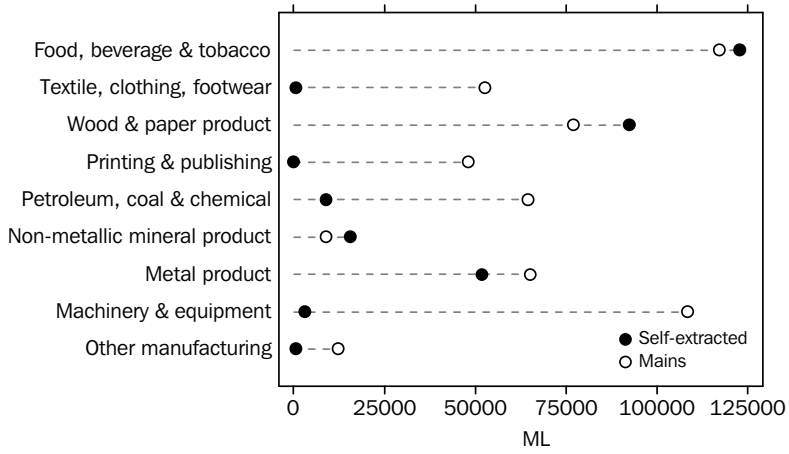


Graph 6.7 shows the PRINTING, PUBLISHING AND RECORDED MEDIA industry had the highest reliance on mains water (100%) followed by the TEXTILE, CLOTHING, FOOTWEAR AND LEATHER (98%), MACHINERY AND EQUIPMENT (97%), and OTHER MANUFACTURING (96%) industries. The FOOD, BEVERAGE AND TOBACCO and MACHINERY AND EQUIPMENT industries used the greatest volumes of mains water (116,986 ML and 108,442 ML respectively, refer to table 6.12).

Water source continued

The NON-METALLIC MINERAL PRODUCT industry had the highest reliance upon water from self-extracted sources (63%), followed by the WOOD AND PAPER PRODUCT industry (53%). The FOOD, BEVERAGE AND TOBACCO, and the WOOD AND PAPER PRODUCT industries used the greatest volumes of self-extracted water (122,804 ML and 92,409 ML respectively, refer to table 6.12).

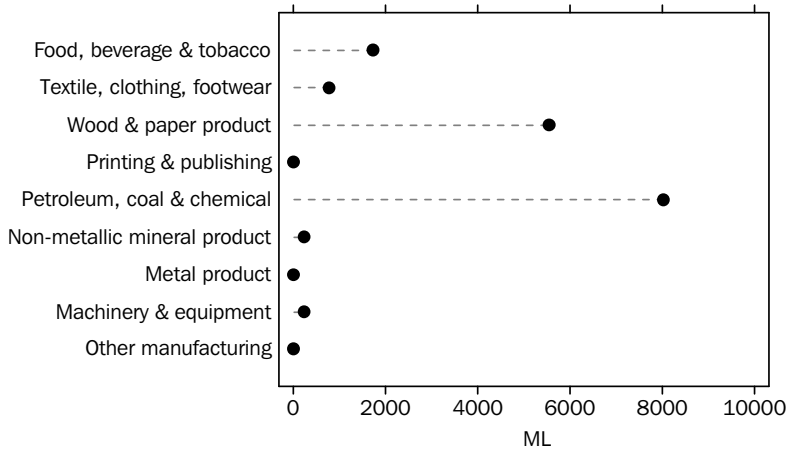
6.7 SOURCE OF WATER, Manufacturing—2000–01



Reuse water

The total volume of reuse water used by the MANUFACTURING industry in 2000–01 was 16,536 ML. Of this volume, 8,022 ML was used by the PETROLEUM, COAL AND CHEMICAL PRODUCT industry, and 5,553 ML was used by the WOOD AND PAPER PRODUCT industry (graph 6.8). The FOOD, BEVERAGE AND TOBACCO industry was another significant user of reuse water, using 1,719 ML in 2000–01. Minor users of reuse water included the TEXTILE, CLOTHING, FOOTWEAR AND LEATHER (776 ML), MACHINERY AND EQUIPMENT (234 ML), and the NON-METALLIC MINERAL PRODUCT (233 ML) industries. These volumes only include reuse water reported to have been supplied to the MANUFACTURING industry (for example from sewage treatment plants), and do not include on-site recirculation of water.

6.8 REUSE WATER USE, Manufacturing—2000–01



Regulated discharge

The volume of regulated discharged by the MANUFACTURING industry was 50,928 ML in 2000–01. However, only regulated discharge from the WOOD AND PAPER PRODUCT industry is reported. Most wastewater produced by the MANUFACTURING industry goes to sewage treatment plants rather than being directly discharged by these businesses. Table 6.11 outlines the volumes of regulated discharge by the MANUFACTURING industry by state and territory for 2000–01, where the highest was reported for Queensland (23,114 ML), followed by Tasmania (20,430 ML), New South Wales and the Australian Capital Territory combined (7,022 ML), and Victoria (361 ML). There was no reported discharge by this industry in South Australia, Western Australia or the Northern Territory.

6.9 WATER USE, SUPPLY AND DISCHARGE, Mining—2000–01

	NSW/ACT	*Vic.*	*Qld*	*SA*	*WA*	*Tas.*	*NT*	*Aust.*
	ML	ML	ML	ML	ML	ML	ML	ML
Water use								
Mains(a)	14 388	437	26 627	164	7 253	25	301	49 196
Self-extracted(b)	71 171	22 851	87 864	13 180	247 887	30 583	6 098	479 635
Reuse(c)	5 406	36	—	—	—	—	—	5 441
Total(d)	*90 965*	*23 324*	*114 491*	*13 345*	*255 140*	*30 609*	*6 399*	*534 273*
Water consumption(e)	51 718	7 266	108 595	12 250	194 986	21 252	4 557	400 622
Water supplied to mains	—	—	2 247	—	2 144	—	1 829	6 220
Regulated discharge	44 153	19 486	18 196	7 454	78 043	21 706	9 900	198 937
In-stream use(f)	39 247	16 058	3 649	1 095	58 010	9 357	13	127 430

— nil or rounded to zero (including null cells)

(a) Includes water supplied to a user usually through a non-natural network (piped/open channel or other carrier) where an economic transaction had occurred for the exchange of water regardless of method of delivery.

(b) Includes water extracted directly from the environment for use.

(c) Excludes water reused on-site (see Explanatory Note 12).

(d) Total water use = Mains water use + Self-extracted use + Reuse water use.

(e) Water consumption = Self-extracted use + Mains water use + Reuse water use - Mains water supply - In-stream use.

(f) In-stream use is a subset of Self-extracted water use.

Note: Sums may not necessarily equal totals due to rounding.

6.10 WATER USE, Mining by subdivision and source—2000–01

Subdivision	*Mains water*(a)	*Self-extracted*(b)	*Reuse water*(c)	*Total*(d)
Coal mining	14 701	106 472	2 687	123 860
Oil & gas extraction	1 346	17 862	—	19 208
Metal ore mining	31 362	306 883	2 754	340 999
Other mining	1 788	48 419	—	50 207
Total	49 197	479 636	5 441	534 273

— nil or rounded to zero (including null cells)

(a) Includes water supplied to a user usually through a non-natural network (piped/open channel or other carrier) where an economic transaction had occurred for the exchange of water regardless of method of delivery.

(b) Includes water extracted directly from the environment for use.

(c) Excludes water reused on-site (see Explanatory Note 12).

(d) Total water use = Mains water use + Self-extracted use + Reuse water use.

Note: Sums may not necessarily equal totals due to rounding.

6.11 WATER USE, Manufacturing by source—2000–01

	NSW/ACT	*Vic.*	*Qld*	*SA*	*WA*	*Tas.*	*NT*	*Aust.*
	ML	ML	ML	ML	ML	ML	ML	ML
Water use								
Mains(a)	148 368	223 386	104 786	41 485	19 558	15 302	815	553 700
Self-extracted(b)	30 356	15 379	71 909	42 884	63 224	63 757	8 315	295 825
Reuse water(c)	10	10 144	4 738	1 177	467	—	—	16 536
Total(d)	*178 735*	*248 909*	*181 433*	*85 546*	*83 249*	*79 059*	*9 130*	*866 061*
Regulated discharge	7 022	361	23 114	—	—	20 430	—	50 928

— nil or rounded to zero (including null cells)

(a) Includes water supplied to a user usually through a non-natural network (piped/open channel or other carrier) where an economic transaction had occurred for the exchange of water regardless of method of delivery.

(b) Includes water extracted directly from the environment for use.

(c) Excludes water reused on-site (see Explanatory note 12).

(d) Total water use = Mains water use + Self-extracted use + Reuse water use.

Note: Sums may not necessarily equal totals due to rounding.

6.12 WATER USE, Manufacturing by subdivision and source—2000–01

Subdivision	*Mains*(a)	*Self-extracted*(b)	*Reuse water*(c)	*Total*(d)
Food, beverage & tobacco	116 986	122 804	1 719	241 509
Textile, clothing, footwear & leather	52 582	497	776	53 855
Wood & paper products	76 890	92 409	5 553	174 851
Printing, publishing & recorded media	48 107	81	—	48 188
Petroleum, coal, chemical & other products	64 372	8 979	8 022	81 372
Non-metallic mineral products	8 894	15 630	233	24 757
Metal products	65 142	51 698	—	116 840
Machinery & equipment	108 442	3 156	234	111 832
Other manufacturing	12 285	572	—	12 857
Total	**553 700**	**295 825**	**16 536**	**866 061**

— nil or rounded to zero (including null cells)

(a) Includes water supplied to a user usually through a non-natural network (piped/open channel or other carrier) where an economic transaction has occurred for the exchange of water regardless of method of delivery.

(b) Includes water extracted directly from the environment for use.

(c) Excludes water reused on-site. (See Explanatory Note 12).

(d) Total water use = Mains water use + Self-extracted use + Reuse water use.

Note: Sums may not necessarily equal totals due to rounding.

CHAPTER 7 WATER USE — ELECTRICITY AND GAS SUPPLY ...

INTRODUCTION

The ELECTRICITY AND GAS SUPPLY industry is a significant user of water, mostly for hydro-electricity power generation. The water used for hydro-electricity power generation is not considered a consumptive use. This is because water extracted for use passes through turbines to generate electricity and is immediately discharged and made available for downstream users. Therefore, water use for hydro-electricity power generation is treated differently from other water uses and called in-stream use. In this chapter, water use will be identified as either including or excluding in-stream water use (note: this is different from water consumption which is water use, less in-stream, less water supplied to other businesses). The ELECTRICITY AND GAS SUPPLY industry also supplies a small amount of water, and this is briefly covered in this chapter.

Information in this chapter is based on data obtained from an ABS census of electricity generators in the ELECTRICITY AND GAS SUPPLY industry (ANZSIC 3610–3620).

MAIN FINDINGS

The main findings of this chapter are:

- Including in-stream use, total water use by the ELECTRICITY AND GAS SUPPLY industry in 2000–01 was 49,244 GL.
- Excluding in-stream use, total water use by the ELECTRICITY AND GAS SUPPLY industry was 1,700 GL.
- Water consumption in 2000–01 by the ELECTRICITY AND GAS SUPPLY industry was 1,688 GL, or 7% of total water consumption in Australia.
- Including in-stream use, water use by the ELECTRICITY AND GAS SUPPLY industry was greatest in Tasmania where 37,405 GL were used. The next largest users were Victoria (4,479 GL) and New South Wales and the Australian Capital Territory combined (4,118 GL).
- Self-extracted water accounted for 99.7% (49,116 GL) of total water use (including in-stream use) by the ELECTRICITY AND GAS SUPPLY industry in 2000–01.
- Regulated discharge (including in-stream use) by the ELECTRICITY AND GAS SUPPLY industry was 47,681 GL.

ELECTRICITY AND GAS SUPPLY

Water use

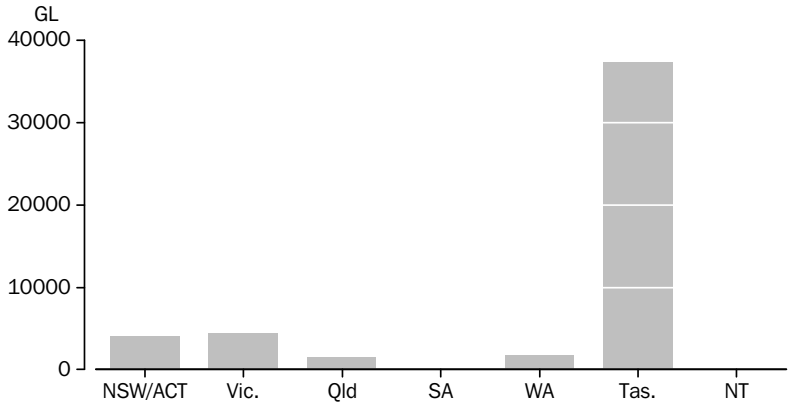
In-stream use by hydro-electricity power stations in the ELECTRICITY AND GAS SUPPLY industry was 47,544 GL in 2000–01 (table 7.6). Including in-stream use, total water use by the ELECTRICITY AND GAS SUPPLY industry was 49,244 GL (table 7.5). This volume excludes seawater which is important to the operations of businesses in this industry — only freshwater is in scope for this publication (see Explanatory Notes paragraph 9).

Excluding in-stream use, total water use by the ELECTRICITY AND GAS SUPPLY industry was 1,700 GL in 2000–01, while total consumption was 1,688 GL (refer to Chapter 2 and Glossary for definition of water consumption).

Water use continued

Graph 7.1 shows water use (including in-stream use) by the ELECTRICITY AND GAS SUPPLY industry by state and territory for 2000–01. The largest user was Tasmania, which used a total of 37,405 GL in 2000–01. The next largest users were Victoria (4,479 GL) and New South Wales and the Australian Capital Territory combined (4,118 GL).

7.1 WATER USE (INCLUDING IN-STREAM USE)(a), Electricity and gas supply—2000–01

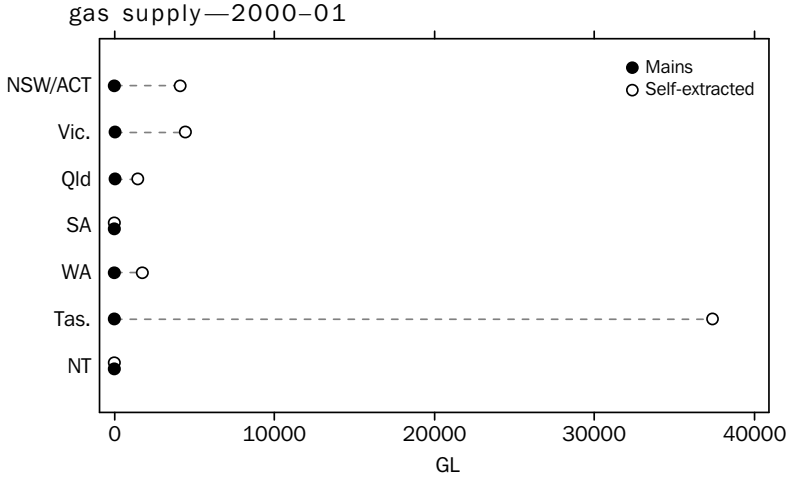


(a) Values for South Australia and Northern Territory too low to show on graph.

Water source

Graph 7.2 shows that virtually all of the water used by the ELECTRICITY AND GAS SUPPLY industry was from a self-extracted source with 49,116 GL or 99.7% of total use (including in-stream use). Water use from mains supply accounted for only 123 GL or 0.3% of total use (including in-stream use). Tasmania used the most self-extracted water (37,405 GL), followed by Victoria (4,425 GL), and New South Wales and the Australian Capital Territory combined (4,107 GL).

7.2 SOURCE OF WATER (INCLUDING IN-STREAM USE), Electricity and gas supply—2000–01



Reuse water

The ELECTRICITY AND GAS SUPPLY industry used 4,991 ML of reuse water in 2000–01 (table 7.5). Of this volume, 2,954 ML was used in Victoria, 1,210 ML in New South Wales and the Australian Capital Territory combined, 720 ML in South Australia, and 106 ML in Queensland. The other states and territories reported no use. These volumes only

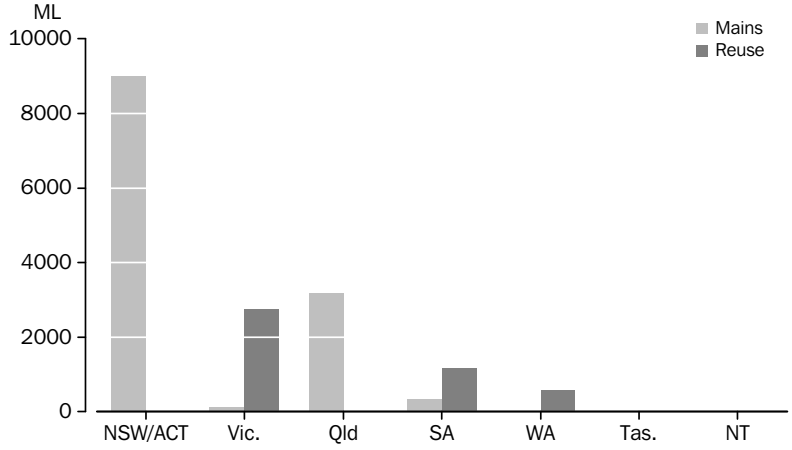
Reuse water continued

include reuse reported to have been supplied to the ELECTRICITY AND GAS SUPPLY industry (for example from sewage treatment plants or the mining industry), and do not include on-site reuse of water.

Water supply

In 2000–01 the ELECTRICITY AND GAS SUPPLY industry supplied a small amount of mains and reuse water to other users in the form of mains and reuse water (table 7.6). Mains water supplied by the ELECTRICITY AND GAS SUPPLY industry was 12,682 ML in 2000–01. Graph 7.3 shows that New South Wales and the Australian Capital Territory combined supplied the most mains water to other users (8,987 ML), followed by Queensland (3,194 ML). The industry also supplied reuse water to other users (4,506 ML). Of this volume, Victoria supplied 2,745 ML, or 61% of total reuse supplied to other users.

7.3 SUPPLY OF WATER, Electricity and gas supply—2000–01



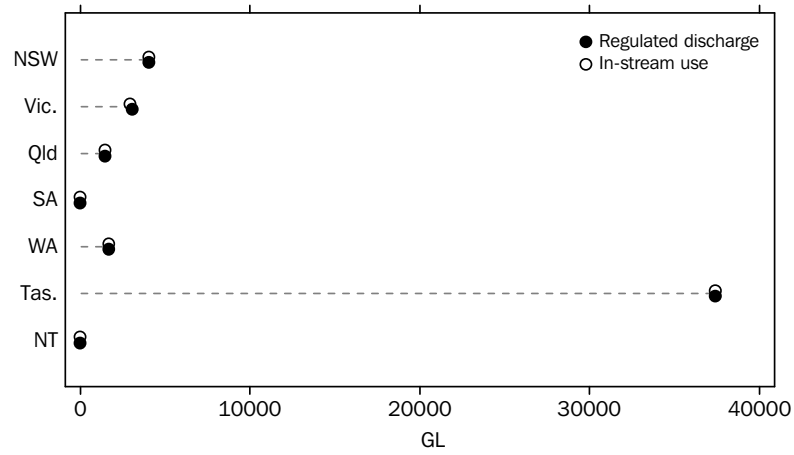
Regulated discharge and in-stream use

Water used in-stream by the ELECTRICITY AND GAS SUPPLY industry is a component of water discharge. The total volume of discharge by the ELECTRICITY AND GAS SUPPLY industry was 47,681 GL in 2000–01. In-stream use made up 47,544 GL or 99.7% of total discharge (table 7.6). Graph 7.4 shows regulated discharge and in-stream use by state and territory for 2000–01.

The ELECTRICITY AND GAS SUPPLY industry in Tasmania discharged 37,405 GL in 2000–01, the highest volume of any of the states and territories, and in-stream use accounted for all (100%) total regulated discharge. New South Wales and the Australian Capital Territory combined discharged 4,053 GL (in-stream use 4,050 GL). Victoria discharged 3,065 GL (in-stream use 2,943 GL). The lowest volume of regulated discharge was by South Australia (301 ML), and no regulated discharge was reported in the Northern Territory.

Regulated discharge and in-stream use continued

7.4 REGULATED DISCHARGE AND IN-STREAM USE, Electricity and gas supply—2000–01



7.5 WATER USE, Electricity and gas supply—2000–01

	NSW/ACT	*Vic.*	*Qld*	*SA*	*WA*	*Tas.*	*NT*	*Aust.*
	ML	ML	ML	ML	ML	ML	ML	ML
Mains(a)	9 330	51 119	59 951	756	1 746	36	—	122 937
Self-extracted(b)	4 107 257	4 425 319	1 461 597	595	1 716 470	37 404 500	661	49 116 399
Reuse water(c)	1 210	2 954	106	720	—	—	—	4 991
Total water use (including in-stream use)(d)(e)	4 117 797	4 479 392	1 521 654	2 071	1 718 216	37 404 536	661	49 244 327
Total water use (excluding in-stream use)(d)(e)	68 187	1 536 295	74 049	2 071	19 161	36	661	1 700 460
Water consumption(f)	59 200	1 536 159	70 855	1 709	19 158	36	661	1 687 778

— nil or rounded to zero (including null cells)

(a) Includes water supplied to a user usually through a non-natural network (piped/open channel or other carrier) where an economic transaction had occurred for the exchange of water regardless of method of delivery.

(b) Includes water extracted directly from the environment for use.

(c) Excludes water reused on-site (see Explanatory Note 12).

(d) In-stream use is a subset of Self-extracted water use.

(e) Total water use = Mains water use + Self-extracted use + Reuse water use.

(f) Water consumption = Self-extracted use + Mains water use + Reuse water use - Mains water supply - In-stream use.

Note: Sums will not necessarily equal totals due to rounding.

7.6 WATER SUPPLY, DISCHARGE AND IN-STREAM USE, Electricity and gas supply—2000–01

	NSW/ACT	*Vic.*	*Qld*	*SA*	*WA*	*Tas.*	*NT*	*Aust.*
	ML	ML	ML	ML	ML	ML	ML	ML
Water supplied to mains	8 987	136	3 194	362	3	—	—	12 682
Water supplied as reuse	—	2 745	—	1 177	584	—	—	4 506
Regulated discharge	4 053 044	3 064 547	1 459 362	301	1 699 485	37 404 500	—	47 681 239
In-stream use	4 049 610	2 943 097	1 447 605	—	1 699 055	37 404 500	—	47 543 867

— nil or rounded to zero (including null cells)

CHAPTER 8 WATER USE — REMAINING INDUSTRIES

INTRODUCTION

This chapter presents information on water use by industries not already covered in Chapters 5 to 7. This group includes the SERVICES TO AGRICULTURE; HUNTING AND TRAPPING, and FORESTRY AND FISHING industries (ANZSIC 0211–0420). It also includes the CONSTRUCTION; WHOLESALE AND RETAIL TRADE; ACCOMMODATION, CAFES AND RESTAURANTS; TRANSPORT AND STORAGE; FINANCE, PROPERTY AND BUSINESS SERVICES; GOVERNMENT ADMINISTRATION; EDUCATION; HEALTH AND COMMUNITY SERVICES; and, CULTURAL, RECREATIONAL AND PERSONAL SERVICES industries, which are collectively referred to in this chapter as OTHER INDUSTRIES (ANZSIC 4111–9634).

For OTHER INDUSTRIES, water consumption is equal to water use. However the FORESTRY AND FISHING industry uses water in-stream and as such, water consumption does not equal water use in this industry.

Information for the industries discussed in this chapter was compiled using a combination of data provided by the water providers, state and territory regulatory departments, and ABS surveys.

MAIN FINDINGS

- Total water use by the remaining industries was 1,226,780 ML in 2000–01.
- Total water use by the OTHER INDUSTRIES was 832,100 ML in 2000–01.
- 76% (632,920 ML) of total water used by the OTHER INDUSTRIES was sourced from mains, and 20% (163,321 ML) from self-extracted sources in 2000–01.
- The highest volume of water used in 2000–01 by the OTHER INDUSTRIES was in New South Wales and the Australian Capital Territory combined, which accounted for 30% (253,768 ML) of total water use.
- CULTURAL, RECREATIONAL AND PERSONAL SERVICES industry accounted for 47% (395,049 ML) of total water use by OTHER INDUSTRIES. This industry made up 80% (131,327 ML) of OTHER INDUSTRIES total self-extracted use, 37% (231,230 ML) of total mains use, and 91% (32,492 ML) of total reuse water use in 2000–01.
- In 2000–01 total water use by the SERVICES TO AGRICULTURE, HUNTING AND TRAPPING industry was 3,901 ML, while the FORESTRY AND FISHING industry used 390,779 ML.
- Tasmania accounted for the greatest volume of total water use (including in-stream water use) by the FORESTRY AND FISHING industry, using 354,640 ML during 2000–01.

SERVICES TO AGRICULTURE; HUNTING AND TRAPPING, AND FORESTRY AND FISHING INDUSTRIES

Water use

In 2000–01 the total water use by the SERVICES TO AGRICULTURE; HUNTING AND TRAPPING, and the FORESTRY AND FISHING industries was 3,901 ML and 390,779 ML respectively (table 8.3).

Water use for AQUACULTURE is considered non-consumptive and mostly occurs in-stream, where water is utilised within a river or stream and immediately discharged. In-stream use is a component of regulated discharge (it comprises 100% in the case of this industry during 2000–01). In-stream use by the FORESTRY AND FISHING industry during 2000–01 was 367,756 ML (table 8.5).

Water use continued

For information on how water consumption is calculated for the FORESTRY AND FISHING industry refer to Chapter 2. Total water consumption by this industry was 23,022 ML during 2000–01 (table 8.3).

Table 8.4 presents data for water use by the SERVICES TO AGRICULTURE; HUNTING AND TRAPPING industry by state and territory. Western Australia was the state where this industry used the most water during 2000–01 (2,465 ML), followed by New South Wales and the Australian Capital Territory combined (690 ML), Tasmania (254 ML), and Queensland (218 ML). Victoria and South Australia used 176 ML and 67 ML respectively, with the Northern Territory (32 ML) reporting the least volume of water used by the SERVICES TO AGRICULTURE industry.

In 2000–01, 71% (2,770 ML) of water used by the SERVICES TO AGRICULTURE; HUNTING AND TRAPPING industry was from self-extracted sources with 26% (1,027 ML) sourced from mains supply (table 8.4). A small proportion of total water use was reuse water (104 ML).

Table 8.5 presents data for water use by the FORESTRY AND FISHING industry by state and territory. Tasmania (354,640 ML) accounted for the greatest volume of water use by this industry. This volume reflects in-stream use for aquaculture purposes in Tasmania. Western Australia was also a significant user of water with 16,932 ML used by the industry in 2000–01. Water use by the FORESTRY AND FISHING industry was similar across the remaining states and territories, with the Northern Territory using 4,591 ML, Queensland using 4,302 ML and New South Wales and the Australian Capital Territory combined using 3,580 ML. South Australia accounted for the least volume of water used by this industry (1,955 ML).

Table 8.5 shows that almost 97% (378,389 ML) of water used by this industry was from self-extracted sources in 2000–01, with water from mains sources accounting for only 1% (5,245 ML). The FORESTRY AND FISHING industry was a significant user of reuse water, which accounted for 2% (7,145 ML) of total use.

OTHER INDUSTRIES

Water use

Total water use for the OTHER INDUSTRIES was 832,100 ML in 2000–01 (table 8.6). Table 8.6 shows that 76% (632,920 ML) of water used by the OTHER INDUSTRIES was sourced from mains in 2000–01, and 20% (163,321 ML) from self-extracted sources. The dependence on mains sources is expected as most of OTHER INDUSTRIES are service and administration industries that are located in metropolitan and urban areas that are well serviced by water providers. A significant volume of total water used was reuse water, which made up 4% (35,859 ML) of total use in 2000–01.

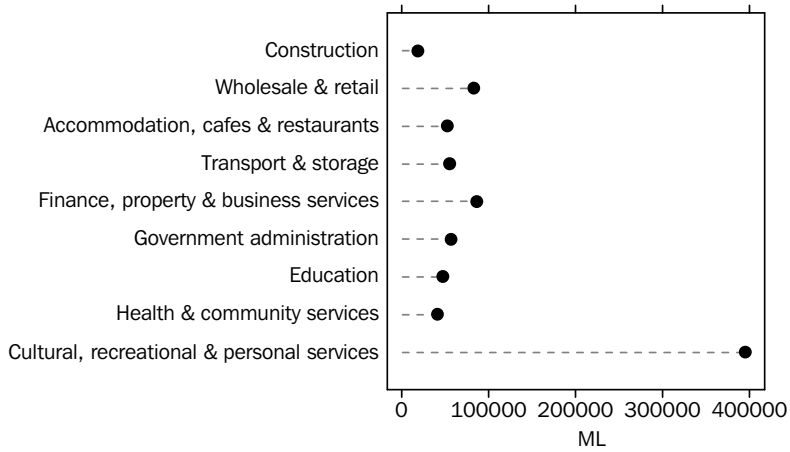
The highest volume of water used in 2000–01 by the OTHER INDUSTRIES was in New South Wales and the Australian Capital Territory combined, which accounted for 30% (253,768 ML) of total use (graph 8.1). Western Australia used 175,183 ML while Queensland used 171,871 ML. The Northern Territory (21,868 ML) used the least volume of water by OTHER INDUSTRIES.

Water use continued

8.1 WATER USE, Other industries—2000–01

Graph 8.2 shows the contributions that the different industries make up of OTHER INDUSTRIES total water use. The CULTURAL, RECREATIONAL AND PERSONAL SERVICES industry accounted for 47% (395,049 ML) of total water use by OTHER INDUSTRIES. This industry made up 80% (131,327 ML) of OTHER INDUSTRIES self-extracted use, 37% (231,230 ML) of mains use, and 91% (32,492 ML) of reuse water use in 2000–01 (table 8.3). Total water use by the CULTURAL, RECREATIONAL AND PERSONAL SERVICES industry is comparatively high as much water is used to water parks and gardens, golf courses, ovals and other sports grounds.

8.2 WATER USE, Other industries—2000–01



The FINANCE, PROPERTY AND BUSINESS SERVICES industry was also a significant user of water, with a total use of 86,345 ML in 2000–01, along with the WHOLESALE AND RETAIL TRADE industry which accounted for 82,346 ML over the same period. The GOVERNMENT ADMINISTRATION industry used 56,374 ML. The CONSTRUCTION industry used the least water, with 18,079 ML in 2000–01.

Water use continued

Table 8.6 shows reuse water use for the OTHER INDUSTRIES. Of the total volume used (35,859 ML), the CULTURAL, RECREATIONAL AND PERSONAL SERVICES industry accounts for the majority of reuse water used by the OTHER INDUSTRIES (32,492 ML in 2000–01). Most of the reuse water used by this industry has been used to water parks and gardens, golf courses, ovals and other sports grounds. The GOVERNMENT ADMINISTRATION industry was also a significant user of reuse water, using 1,279 ML in 2000–01. This water has been reported to be used for defence purposes. The ACCOMMODATION, CAFES AND RESTAURANTS and the EDUCATION industries used 734 ML and 719 ML respectively in 2000–01. No reuse water was reported to be used by the CONSTRUCTION industry.

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8.3 WATER USE AND CONSUMPTION, Remaining industries—2000–01

Remaining industries	*Mains*(a) ML	*Self-extracted*(b) ML	*Reuse*(b) ML	*Total use*(c) ML	*Water consumption*(d) ML
Services to agriculture; Forestry and fishing					
Services to agriculture; hunting & trapping	1 027	2 770	104	3 901	3 901
Forestry & fishing	5 245	378 389	7 145	390 779	23 022
Total	*6 272*	*381 159*	*7 249*	*394 680*	*26 924*
Other industries					
Construction	14 665	3 414	—	18 079	18 079
Wholesale & retail trade	81 248	833	265	82 346	82 346
Accommodation, cafes & restaurants	45 794	5 283	734	51 811	51 811
Transport & storage	50 660	3 846	250	54 756	54 756
Finance, property & business services	85 437	852	56	86 345	86 345
Government administration	50 895	4 200	1 279	56 374	56 374
Education	34 826	10 955	719	46 500	46 500
Health & community services	38 165	2 611	64	40 840	40 840
Cultural, recreational & personal services	231 230	131 327	32 492	395 049	395 049
Total	*632 920*	*163 321*	*35 859*	*832 100*	*832 100*
TOTAL	**639 192**	**544 480**	**43 108**	**1 226 780**	**859 024**

— nil or rounded to zero (including null cells)

(a) Includes water supplied to a user usually through a non-natural network (piped/open channel or other carrier) where an economic transaction has occurred for the exchange of water regardless of method of delivery.

(b) Excludes water reused on-site (See Explanatory Note 12).

(c) Total Water Use = Mains Water Use + Self-Extracted Use + Reuse Water Use.

(d) Water consumption = Self-extracted use + Mains water use + Reuse water use - Mains water supply - In-stream water use.

8.4 WATER USE, Services to agriculture; hunting and trapping—2000–01

	NSW/ACT ML	*Vic.* ML	*Qld* ML	*SA* ML	*WA* ML	*Tas.* ML	*NT* ML	*Aust.* ML
Mains(a)	491	124	218	14	25	124	32	1 027
Self-extracted(b)	148	—	—	52	2 440	130	—	2 770
Reuse(c)	52	52	—	—	—	—	—	104
Total	*690*	*176*	*218*	*67*	*2 465*	*254*	*32*	*3 901*

— nil or rounded to zero (including null cells)

(a) Includes water supplied to a user usually through a non-natural network (piped/open channel or other carrier) where an economic transaction has occurred for the exchange of water regardless of method of delivery.

(b) Includes water extracted directly from the environment for use.

(c) Excludes water reused on-site (See Explanatory Note 12).

8.5 WATER USE, DISCHARGE AND IN-STREAM USE, Forestry and fishing—2000–01

	NSW/ACT	Vic.	Qld	SA	WA	Tas.	NT	Aust.
	ML	ML	ML	ML	ML	ML	ML	ML
Water use								
Mains(a)	487	736	2 013	994	117	898	—	5 245
Self-extracted(b)	576	2 687	2 261	917	13 856	353 742	4 350	378 389
Reuse(c)	2 517	1 355	28	44	2 959	—	241	7 145
Total	*3 580*	*4 778*	*4 302*	*1 955*	*16 932*	*354 640*	*4 591*	*390 779*
Regulated discharge(d)	575	717	2 261	793	6 507	352 554	4 350	367 756
In-stream use(e)	575	717	2 261	793	6 507	352 554	4 350	367 756

— nil or rounded to zero (including null cells)

(a) Includes water supplied to a user usually through a non-natural network (piped/open channel or other carrier) where an economic transaction had occurred for the exchange of water regardless of method of delivery.

(b) Includes water extracted directly from the environment for use.

(c) Excludes water reused on-site (see Explanatory Note 12).

(d) Refers to water discharged after use where that discharge does not match the natural flow regime of the receiving water body.

(e) This is a subset of Self-extracted water use and Regulated discharge.

Note: Sums may not necessarily equal totals due to rounding.

8.6 WATER USE, Other industries—2000–01

	NSW/ACT	Vic.	Qld	SA	WA	Tas.	NT	Aust.
	ML	ML	ML	ML	ML	ML	ML	ML
Mains(a)	178 429	137 056	159 129	24 584	95 041	17 650	21 031	632 920
Self-extracted(b)	67 817	2 420	1 963	10 643	74 572	5 888	18	163 321
Reuse(c)	7 522	8 408	10 778	2 619	5 570	143	819	35 859
Total	*253 768*	*147 884*	*171 871*	*37 846*	*175 183*	*23 680*	*21 868*	*832 100*

(a) Includes water supplied to a user usually through a non-natural network (piped/open channel or other carrier) where an economic transaction has occurred for the exchange of water regardless of method of delivery.

(b) Includes water extracted directly from the environment for use.

(c) Excludes water reused on-site (See Explanatory Note 12).

CHAPTER 9 WATER USE — HOUSEHOLDS

INTRODUCTION

This chapter presents data on water use by Australian households, also referred to as domestic water use. For the purpose of the water account, water used by households is defined as any water that is used for human consumption (such as for drinking and cooking) as well as water used by households for cleaning or outdoors (such as water for gardens and swimming pools).

Since households do not use water in-stream, or supply water to other users, water use is equal to water consumption. The information in this chapter is based on data obtained by the ABS through direct surveys of water providers, and other peak industry bodies (including the AWA and WSAA). Information on the methodology can be found in the Explanatory Notes, paragraph 29.

This chapter also includes a section that discusses the prevalence of rainwater tanks in Australian households, based on data collected in the ABS household surveys and first presented in the 2001 publication *Environmental Issues: People's Views and Practices, March 2001* (cat. no. 4602.0) (ABS 2001d). Additional information is also available for New South Wales in 2002 in *Domestic Water Use, New South Wales October 2002* (cat. no. 4616.1) (ABS 2003a) and for Western Australia in 2003 in the 2004 electronic publication *Domestic Water Use, Western Australia*, (cat. no. 4616.5.55.00) (ABS 2004a).

MAIN FINDINGS

The main findings in this chapter are:

- Total water use by the household sector was 2,181,447 ML in 2000–01 accounting for 8.8% of total water consumption in Australia. This compares with 1,828,999 ML in 1996–97 where water accounted for 8.2% of total water consumption.
- Total water use by households increased 19% between 1996–97 and 2000–01.
- Of the total volume of water used by households, New South Wales households used the most water (642,622 ML), followed by Queensland (500,911 ML) and Victoria (472,266 ML). The Australian Capital Territory (36,601 ML) and Northern Territory households used the least amount of water (44,586 ML).
- The average household water use for Australia was 115 kL/capita during 2000–01.
- The Northern Territory had the highest average household water use per capita (212 kL/capita), followed by Queensland (137 kL/capita). New South Wales had the lowest average household water use per capita (101 kL/capita).

HOUSEHOLD WATER USE

Water use

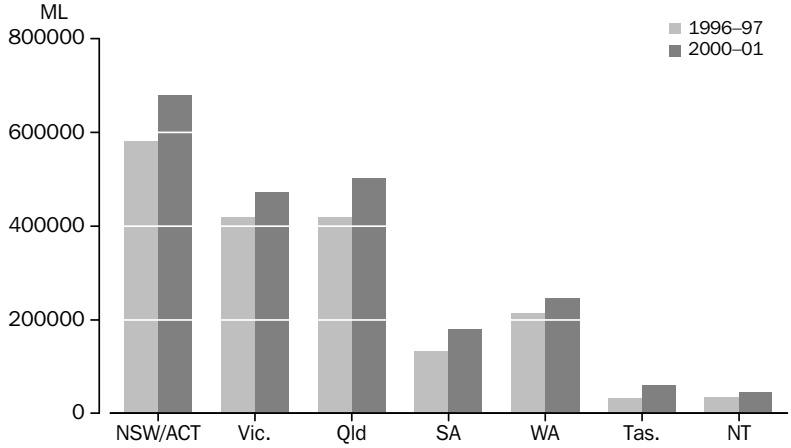
Data on total water use by the household sector over the period 2000–01 are presented in tables 9.5—9.8. Table 9.5 summarises total water use in the household sector by state and territory for 2000–01 including totals for 1993–94 and 1996–97, taken from the first water account. In 2000–01 the total water used by households was 2,181,447 ML, increasing from 1,828,999 ML in 1996–97 and 1,703,736 ML in 1993–94. This rise can be attributed in part to an increase of population (6% nationally from 1993–94 to 2000–01), and better coverage and reporting in this edition of the water account. Climate plays a

Water use continued

significant role in household water use, explaining some of the differences between states and territories.

Graph 9.1 shows that New South Wales and the Australian Capital Territory combined used the largest volume of water for household use (679,223 ML) followed by Queensland (500,911 ML) and Victoria (472,266 ML). Household water use increased in all states from 1996–97 to 2000–01. The largest percentage increases in household water use were in Tasmania, followed by South Australia.

9.1 WATER USE, Households—1996–97 and 2000–01

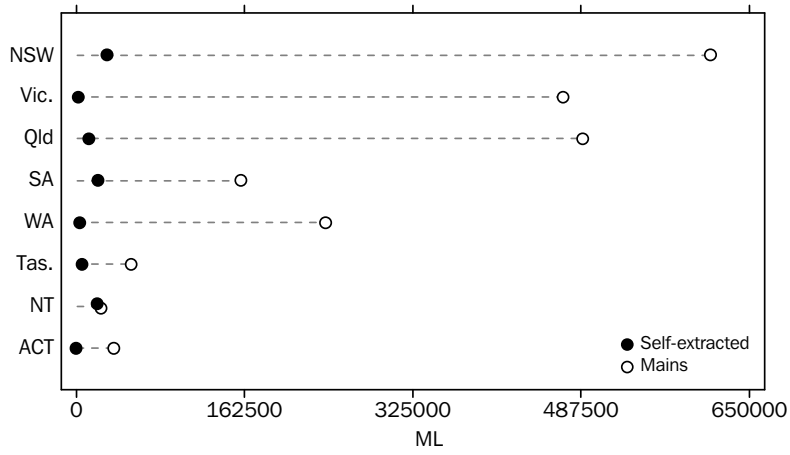


Water source

Of the total water used by households in 2000–01, 96% (2,085,768 ML) was supplied by mains and 4% (95,512 ML) of water was from a self-extracted source (i.e. rainwater tanks and direct extraction from surface waterways or groundwater).

Graph 9.2 shows that households in Victoria, Western Australia and the Australian Capital Territory reported little or no use of self-extracted water during 2000–01. The Northern Territory had the highest percentage of water supplied from a self-extracted source (46%) followed by South Australia (12%).

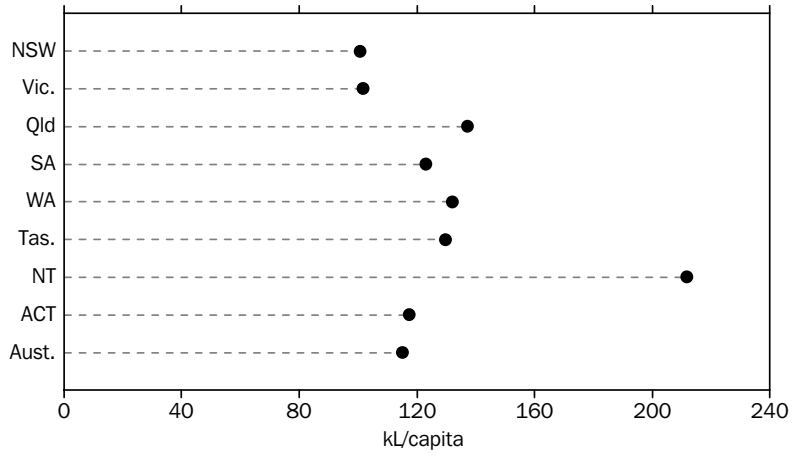
9.2 SOURCE OF WATER, Households—2000–01



Average water use

Australians on average used 115 kL/capita during 2000–01 (graph 9.3). The Northern Territory reported the highest household water use per capita (212 kL/capita), followed by Queensland (137 kL/capita) and Western Australia (132 kL/capita). New South Wales had the lowest per capita water use of household water (101 kL/capita) followed by Victoria (102 kL/capita) and the Australian Capital Territory (117 kL/capita). Refer to table 9.6 for more information.

9.3 WATER USE PER CAPITA, Households—2000–01



In comparison Australian households used on average 280 kL of water per year in 2000–01 (table 9.6), with an average of 2.6 persons per household (ABS 2002a). The Northern Territory had the highest water use (620 kL per household) in 2000–01. This was followed by Queensland (338 kL per household) and Western Australia (317 kL per household). Victoria had the lowest water use per household (247 kL per household) and then New South Wales (250 kL per household) and the Australian Capital Territory (301 kL per household).

Location of use

Table 9.7 shows that for all states and territories, the majority of household water was used for outdoor purposes (44%). Queensland, South Australia, Western Australia and the Australian Capital Territory all reported using over 50% of the household water for outdoor purposes. New South Wales used 25% of household water for outdoor purposes and Victoria reported using 35% outdoors. Indoor use, including bathrooms (20%) and toilets (15%) accounted for a significant proportion of household water use in Australia. Nationally, 8% of water used by households (or less than 1% of total water use in Australia) was used in the kitchen.

Rainwater tanks

Information in this section is based on data collected in the ABS household surveys and first presented in the publication *Environmental Issues: People's Views and Practices 2001* (cat. no. 4602.0) (ABS 2001d).

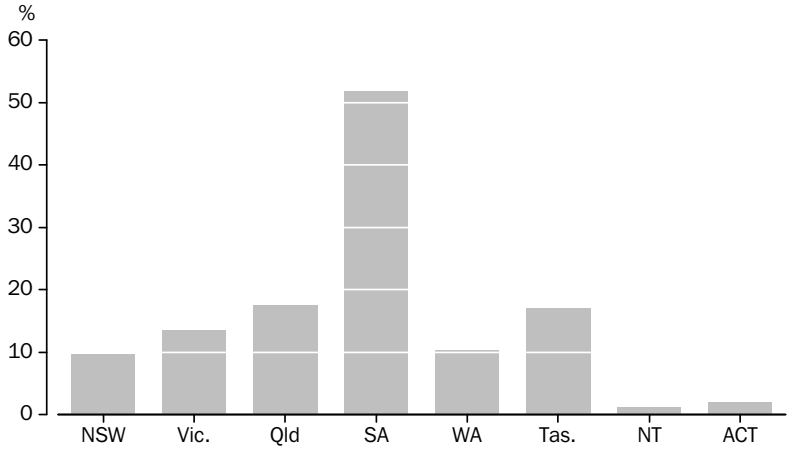
As shown in table 9.8, South Australia had the highest number of rainwater tanks in March 2001 (318,600). This can be attributed to more people reporting dissatisfaction with the taste of tap-water in South Australia (ABS 2001d). Victoria (244,700) had the next highest number of rainwater tanks followed by Queensland (244,000) and

Rainwater tanks continued

New South Wales (236,000). The lowest number of rainwater tanks was recorded in the Australian Capital Territory (2,500) and the Northern Territory (700).

Graph 9.4 shows the proportion of households with rainwater tanks. South Australia had the highest proportion of rainwater tanks with 51.8% of households reporting they had a rainwater tank. This was followed by Queensland (17.5%) and Tasmania (17.2%). The state or territory with the lowest proportion of households with rainwater tanks was the Northern Territory, with 1.3% of households reporting that they had a rainwater tank.

9.4 PROPORTION OF HOUSEHOLDS WITH RAINWATER TANKS—March 2001



The actual volume of water from rainwater tanks used by households in Australia is poorly understood. In the water account, water use from rainwater tanks is included in the self-extracted component of the estimates.

Reuse water

Use of reuse water by households is virtually non-existent in Australia. Current health legislation and the absence of infrastructure, are among the reasons for the absence of mains supply of reuse water to households. However, there are several examples of houses that have on-site grey water recycling capabilities in Australia. This policy is widely supported by environment agencies and government departments. (For example see *Queensland Water Recycling Strategy Paper*, *Water Development Plan for Tasmania and the South Australian State Water Plan 2000*). On-site recycling and reuse is out of scope for this edition of the water account, these volumes are not reported in this publication.

9.5 WATER USE, Households by source—1993–94, 1996–97 and 2000–01

	STATE AND TERRITORY 2000–01								AUST.		
	NSW	*Vic.*	*Qld*	*SA*	*WA*	*Tas.*	*NT*	*ACT*	*1993–94*	*1996–97*	*2000–01*
	ML	ML	ML	ML	ML	ML	ML	ML	ML	ML	ML
Mains	612 832	470 193	488 875	159 215	240 642	53 269	24 141	36 601	1 676 665	1 796 076	2 085 768
Self-extracted	29 623	2 074	12 036	21 391	3 925	6 018	20 445	—	27 071	32 923	95 512
Reuse	167	—	—	—	—	—	—	—	—	—	167
Total	642 623	472 266	500 911	180 606	244 567	59 287	44 586	36 601	1 703 736	1 828 999	2 181 447

— nil or rounded to zero (including null cells)

Note: Sums may not necessarily equal totals due to rounding.

9.6 WATER USE, Households—per capita and per household—1993–94, 1996–97 and 2000–01

	NSW	*Vic.*	*Qld*	*SA*	*WA*	*Tas.*	*NT*	*ACT*	*Aust.*
VOLUME PER CAPITA (kL/capita)									
2000–01	101	102	137	123	132	130	212	117	115
1996–97	96	96	124	92	124	69	172	115	102
1993–94	np	93	131	89	126	67	194	np	95
VOLUME PER HOUSEHOLD (kL/household)									
2000–01	250	247	338	280	317	285	620	301	280
1996–97	253	263	348	236	341	181	585	280	282
1993–94	np	255	359	228	342	177	598	np	260

np not available for publication but included in totals where applicable, unless otherwise indicated

9.7 WATER USE, Households by location of use—2000–01

Location	NSW %	Vic. %	Qld %	SA %	WA %	ACT %	Aust. %
Bathroom	26	26	19	15	17	16	20
Toilet	23	19	12	13	11	14	15
Laundry	16	15	10	13	14	10	13
Kitchen	10	5	9	10	8	5	8
Outdoor	25	35	50	50	50	55	44
Total	**100**	**100**	**100**	**100**	**100**	**100**	**100**

Note: Data not available for Tasmania and the Northern Territory.

Sums may not necessarily equal due to rounding.

Source: ActewAGL 2003; Day, P. 2003, personal communication; Sydney Water 2001; Water Corporation 2001; WaterSmart 2001; Waterwise (n.d.).

9.8 RAINWATER TANKS—MARCH 2001

	NSW	Vic.	Qld	SA	WA	Tas.	NT	ACT	Aust.
Number ('000)	236.0	244.7	244.0	318.6	76.3	32.8	0.7	2.5	1155.7
Proportion of households with rainwater tanks (%)	9.7	13.5	17.5	51.8	10.4	17.2	1.3	2.0	15.7

Source: ABS 2001d

CHAPTER 10 WATER STOCKS

INTRODUCTION

This chapter presents information on Australia's water stocks and water storage infrastructure. Water stocks are usually divided into surface water and groundwater resources. The first edition of the water account presented information on water stocks for Victoria only as, at the time, comprehensive information was not available for the other states and territories. Widespread data are now available, and some information on water stocks for all states and territories is presented in this chapter. Data on water storage infrastructure were not presented in the first water account and the information presented here is limited to the number and storage capacity of large dams.

The data presented in this chapter represent the most up-to-date information available on water stocks and have been reviewed by relevant state and territory water management authorities. Much of the data presented in this chapter is based on the *Australia Water Resource Assessment 2000* (National Land and Water Resources Audit 2001), which had as its reference year 1998. Data from NLWRA (2001) has been combined with new data supplied to the ABS by Western Australia and Northern Territory government water management agencies. Because of the nature of the data and the way it is compiled (e.g. based on running averages of annual run-off), the use of 1998 data to represent 2000 was considered appropriate by the ABS and relevant agencies (including the Bureau of Meteorology).

The data have been consolidated to state and territory level in this chapter, but are available in more detail from the NLWRA web site, or the ABS. Surface water data are available by surface water management area (SWMA), and groundwater resource information is available for each of the groundwater provinces. Refer to Appendix 2 and 3 for these boundaries.

Since the first water account, data collection and reporting on Australia's surface water and groundwater resources has improved. In particular this chapter of the water account has benefited from the data on water resources compiled in the *Australian Water Resources Assessment 2000* (NLWRA 2001). In this chapter some comparisons are made with the *1985 Review of Australia's Water Resources and Water Use* (AWRC 1987a; AWRC 1987b), however because of differences in methodologies and the changing of boundaries relating to surface and groundwater management units since 1985, differences must be interpreted cautiously. It is also important to note that data on water stocks are compiled using calendar years, not financial years. The ABS has not attempted to adjust the calendar year data on water stocks so that it matches the financial year data on water supply and use presented elsewhere in this publication.

DIFFERENCES WITH FIRST EDITION

In the first edition of the water account, Environmental Allocated volumes were included in the surface water asset tables. These volumes are defined as the amount of water allocated to the environment to maintain the river's ecology. A limitation of this approach for estimating the stock of surface water in Australia is that many allocations for

DIFFERENCES WITH FIRST EDITION *continued*

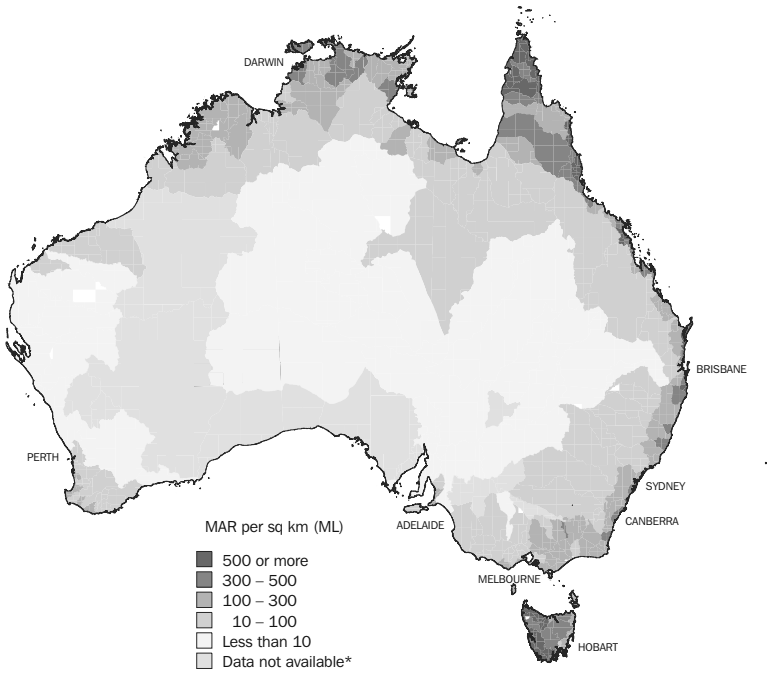
river basins are not derived on a megalitres per year basis but on passing flows at specific times of the year. For example, the amount of passing flow allocations for environmental purposes will not be identified by this approach. In addition, provisions for the environment in some states and territories are made through changes in licensing and water management arrangements and not necessarily direct allocation of volumetric entitlements to the environment. For these reasons, and following consultation with various state and territory agencies, Environmental Allocated volumes have not been included in this edition of the water account.

WATER STOCKS

Surface water

Surface water resources are often represented by Mean Annual Run-off (MAR). MAR is the average annual streamflow passing a specified point (NLWRA 2001) or the maximum average annual flow observed in a river basin (AWRC 1987a). In 2000 the MAR for Australia was 385,923 GL, but the distribution was geographically uneven (map 10.1 and table 10.9).

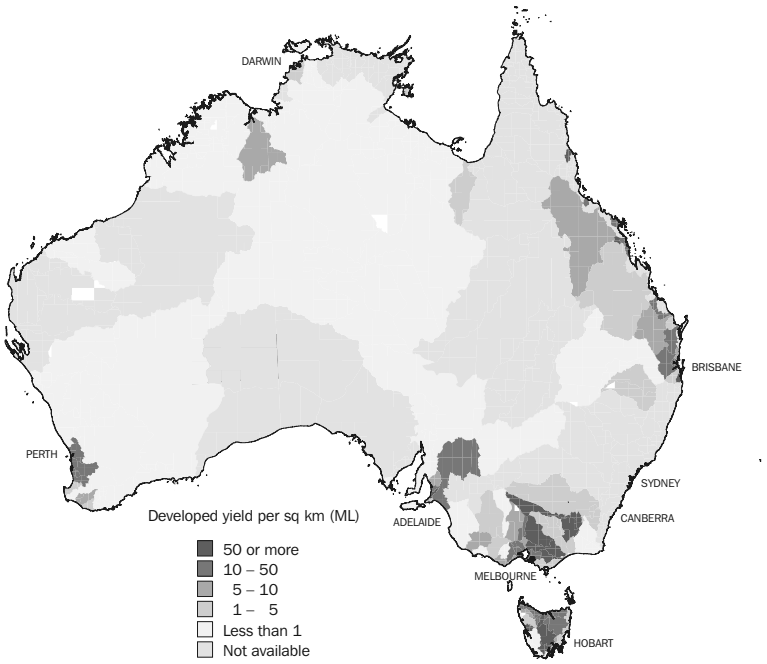
10.1 SURFACE WATER, Mean Annual Run-off (MAR) per sq km, by river basin—2000



Note: *Data not available for a range of reasons. Refer to <http://audit.ea.gov.au/anra/water/docs/state_technical/> for more information.
Source: Adapted from AWRC 1987a; AWRC 1987b; NLWRA 2001.

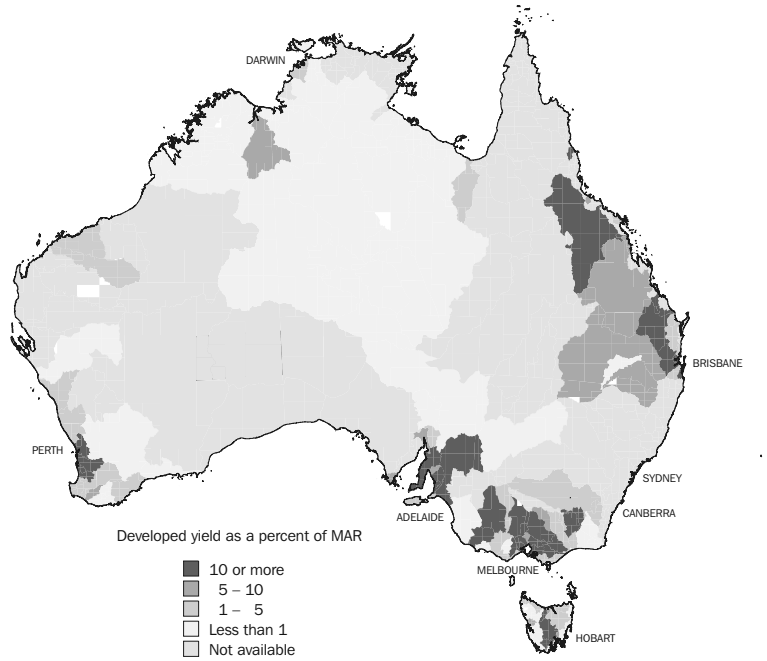
Surface water continued

10.2 SURFACE WATER, Developed yield per sq km, by river basin—2000



Source: Adapted from AWRC 1987a; AWRC 1987b; NLWRA 2001.

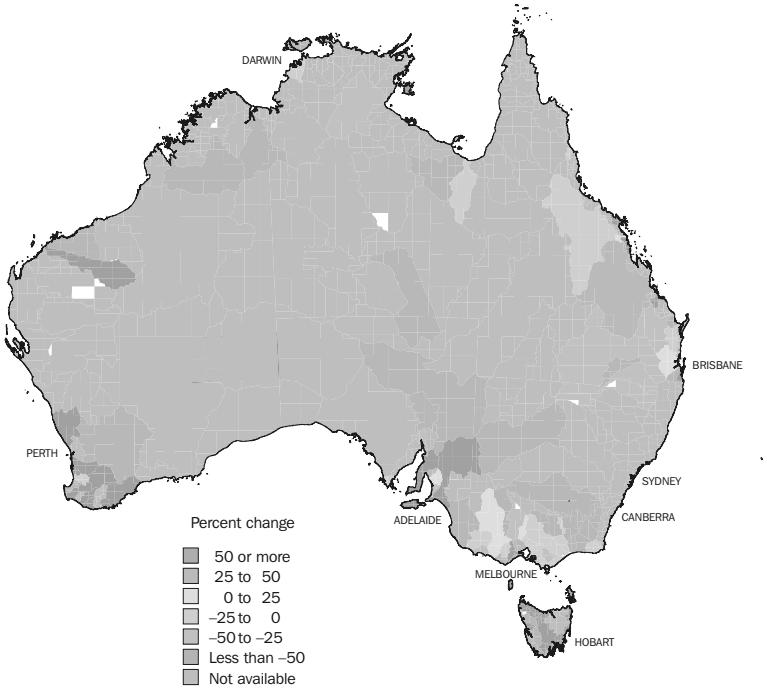
10.3 SURFACE WATER, Developed yield as a percentage of Mean Annual Run-off (MAR)—2000



Source: Adapted from AWRC 1987a; AWRC 1987b; NLWRA 2001.

Surface water continued

10.4 SURFACE WATER, Change in developed yield as a percentage of Mean Annual Run-off (MAR)—1985–2000



Source: Adapted from AWRC 1987a; AWRC 1987b; NLWRA 2001.

Developed yield (also referred to as Economic Allocated volumes) is the average annual volume of water that can be diverted for use with the existing infrastructure (NLWRA 2001). The developed yield demonstrates the extent to which surface water assets are, or can be, used. In 2000 developed yield was approximately 20,870 GL representing 5% of Australia's MAR. Map 10.2 and table 10.9 show developed yield, while map 10.3 shows the developed yield as a percentage of MAR in 2000. Map 10.4 shows the change in developed yield as a percentage of MAR between 1985 and 2000.

Some of the MAR is used in the period it falls (e.g. the calendar or financial year) but part of this resource is stored in dams to be used in the future. The amount of water held in dams is also part of the water stock and this is examined later in the chapter. The amount of water stored in dams is an important consideration for water managers. For example, when levels of water fall below average levels then decisions about water allocation are often made. This was the case recently during the severe drought conditions experienced in much of Australia after the reference period of this water account. Many agricultural producers had their water allocations reduced, while water restrictions were placed on households in many urban areas (see *Year Book Australia, 2004* (cat. no. 1301.0)) (ABS 2004b).

Groundwater stocks

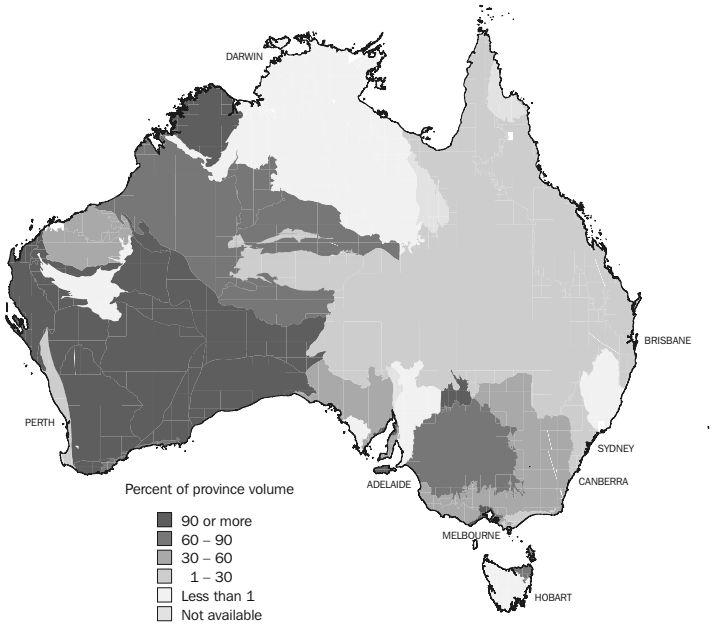
The volume of groundwater that exists in Australia is not known with certainty. The volume changes as water percolates through the ground to aquifers (underground water resources) and through water being extracted (e.g. from bores). Instead of an absolute measure of groundwater stock, a proxy is used. This is the amount of water that can be sustainably extracted, referred to as sustainable yield. Sustainable yield is defined by the NLWRA (2001) as:

Groundwater stocks continued

Sustainable yield. Level of extraction measured over a specified planning time frame that should not be exceeded to protect the higher value social, environmental and economic uses associated with the aquifer.

The NLWRA (2001) estimated the sustainable yield of groundwater in Australia to be 29,173 GL. It is important to note that groundwater is not all of equal quality. In particular, the concentration of salt dissolved in water varies (map 10.5 and table 10.10). The level of dissolved salt is important as it determines the potential uses of the water. The higher the salt level the less suitable the water is for human consumption or agriculture. Typically, a salinity level of more than 1500 mg/L restricts the use of water for irrigation. Map 10.5 shows the percentage of groundwater resource in each province with salinity over 1500 mg/L in 2000. Map 10.6 shows the percentage change of salinity over 1500 mg/L in these provinces from 1985 to 2000. Salt occurs naturally in Australian soils but through irrigation and land clearing the levels of salt affected land and water can increase (see *Salinity on Australian Farms* (cat. no. 4616.0)) (ABS 2002b).

10.5 GROUNDWATER, Percentage of volume in province with salinity over 1500 mg per L—2000

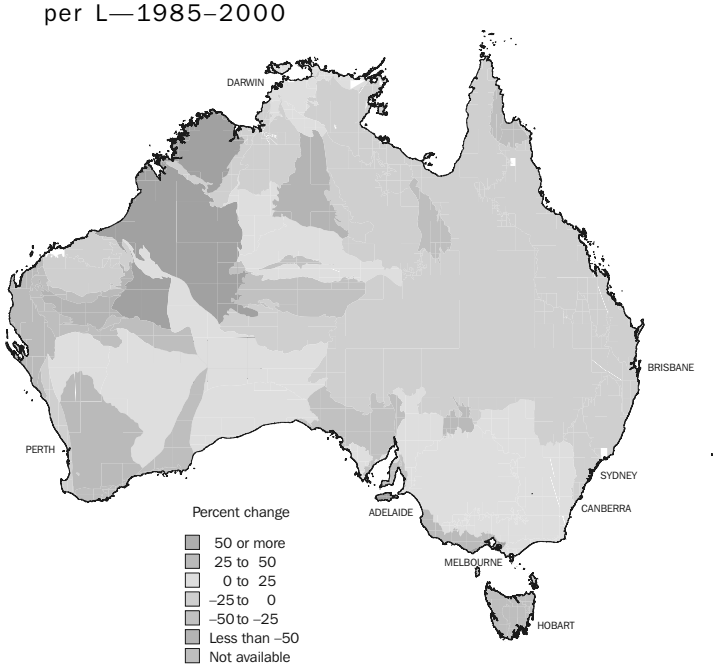


Source: Data based on NLWRA 2001.
Australian Groundwater Provinces (2000) are based on data provided in 2000 with the permission of the Queensland Department of Natural Resources and Mines, Environment ACT, NSW Department of Land and Water Conservation, NT Department of Lands, Planning and Environment, SA Department of Water Resources, Tasmanian Department of Primary Industries, Water and Environment, Victorian Department of Natural Resources and the Environment, WA Water and Rivers Commission, and the Australian Surveying and Land Information Group.

Groundwater stocks

continued

10.6 GROUNDWATER, Percentage change of salinity over 1500 mg per L—1985–2000



Source: Data based on AWRC 1987a; AWRC 1987b; NLWRA 2001. Australian Groundwater Provinces (2000) are based on data provided in 2000 with the permission of the Queensland Department of Natural Resources and Mines, Environment ACT, NSW Department of Land and Water Conservation, NT Department of Lands, Planning and Environment, SA Department of Water Resources, Tasmanian Department of Primary Industries, Water and Environment, Victorian Department of Natural Resources and the Environment, WA Water and Rivers Commission, and the Australian Surveying and Land Information Group.

WATER ASSETS

There are several dimensions to water assets. The first is the physical availability of water that was covered in the first part of this chapter under water stocks. Next is the administrative (e.g. licences and entitlements) and physical infrastructure (dams, pipes, etc.) that are used to store and deliver water.

Valuing the surface and ground water stocks is not an easy matter. Water is one of the natural resources that can theoretically be included on the National Balance Sheet. The ABS already includes three classes of natural resources on the balance sheet: land, subsoil assets and timber (see Chapter 25, *Environment by Numbers: Selected Articles on Australia's Environment* (cat. no. 4617.0)) (ABS 2003b). A value for water has not yet been calculated as there are still some theoretical and practical obstacles to developing an appropriate estimation technique (or techniques).

A large limitation is the lack of appropriate data, but it is also apparent that water is currently priced to recover costs of water delivery and does not include a price for the water itself. In many cases, and particularly with rural water providers, the costs of water delivery are not covered. The National Competition Council reports on water reforms (NCC 2001a–f) note that most urban water providers are either earning positive rates of return or are on a path to earning positive rates of return on the water supply infrastructure, but that rural water providers typically do not. The Productivity Commission in its report *Water Rights Arrangements in Australia and Overseas* (PC 2003, p. 254) mirrored these sentiments.

WATER ASSETS *continued*

One deficiency is the lack of consistent data on the value of the infrastructure that is used to store and deliver water to users. Data on the value of water storage and supply infrastructure is publicly available for some water providers, but is not available for all water providers. In addition, the methods used to estimate values vary. For example, in some cases a replacement value is used, while in others it is the written down replacement value. Much of the publicly available information that is available on the value of water supply infrastructure is found in the reports of ANCID (2002), AWA (2002) and WSAA (2001). Some information on water pricing is available from these reports and a selection of this information is presented in Chapter 11.

Water storages

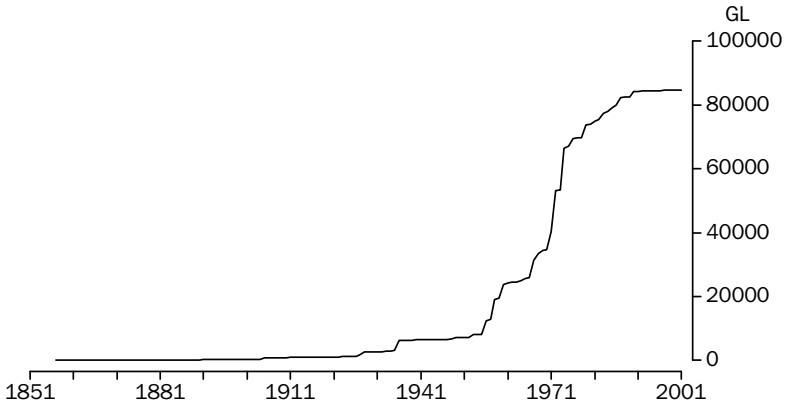
While the value of the water supply and storage infrastructure is a matter of some debate, the storage capacity of large dams in each state and territory except the Australian Capital Territory is available from the ANCOLD *Register of Large Dams* and is presented in graph 10.7 and table 10.11. Large dams are defined as dams with a crest or wall height of greater than 15 metres, or as dams with a dam wall height of greater than 10 metres but meeting other size criteria as follows: having a crest more than 500 metres in length; creating a reservoir capacity of no less than 1,000 ML; the ability to deal with a flood discharge of no less than 2,000 cubic metres per second; or, being of unusual design (ANCOLD 2001). Using this definition there are approximately 500 large dams in Australia with a storage capacity of 84,793 GL. Tasmania (24,340 GL) and New South Wales (24,814 GL) have the largest storage capacity, while the Australian Capital Territory (124 GL) and South Australia (261 GL) have the least. Most of Australia's dam capacity has been built since 1970 (graph 10.8). Dams on farms are estimated to account for around 9% of water stored in Australia (NLWRA 2001).

10.7 WATER STORAGE CAPACITY OF LARGE DAMS—2001

Source: Adapted from ANCOLD 2001, ActewAGL 2003, NCA 2004.

Water storages continued

10.8 WATER STORAGE CAPACITY OF LARGE DAMS, Australia—1857–2001



Source: Adapted from ANCOLD 2001, ActewAGL 2003, NCA 2004.

Water storage levels

Ideally the water account would present information on the volume of water held in large dams of each state and territory. Data on dam levels are readily available from the web sites of many water authorities. For example, data for Victoria for 2000 and the 2000–01 financial year are presented as part of a regular ABS series in *State and Regional Indicators, Victoria* (cat. no. 1367.2) (ABS 2001e). However, data were not able to be obtained for all jurisdictions so are not presented in this publication.

10.9 SURFACE WATER STOCKS—2000

	NSW	Vic.	QLD	SA	WA	Tas.	NT	ACT	Aust.
Mean annual run-off (ML/yr)	41 926 000	20 188 300	157 208 576	1 936 800	43 133 800	45 582 113	75 428 200	520 037	385 923 826
Developed yield (ML)	6 010 171	6 326 240	3 244 024	750 808	856 754	3 542 690	54 383	85 200	20 870 270

Source: Adapted from AWRC 1987a, AWRC 1987b, NLWRA 2001.

10.10 SUSTAINABLE YIELD GROUNDWATER, by level of salinity—2000

Level of salinity	*NSW*	*Vic.*	*Qld*	*SA*	*WA*	*Tas.*	*NT*	*Aust.*
Volume (ML)								
Less than 1500 mg/L								
Less than 500 mg/L	698 215	193 560	1 373 040	55 850	1 898 876	1 585 388	4 412 001	10 216 930
500–1000 mg/L	3 927 969	827 000	994 530	228 640	1 061 380	766 705	287 238	8 093 462
1000–1500 mg/L	34 000	386 357	119 460	679 515	995 171	449	454 972	2 669 924
Total	*4 660 184*	*1 406 917*	*2 487 030*	*964 005*	*3 955 427*	*2 352 542*	*5 154 211*	*20 980 317*
1500 mg/L and over								
1500–3000 mg/L	812 450	243 735	113 540	252 645	1 467 640	178 230	139 306	3 207 547
3000–5000 mg/L	1 550	707 133	29 750	600	588 568	—	182 917	1 510 518
5000–14000 mg/L	440 400	200 750	62 730	761 900	841 195	—	—	2 306 975
More than 14000 mg/L	—	797 000	—	—	370 668	—	—	1 167 668
Total	*1 254 400*	*1 948 618*	*206 020*	*1 015 145*	*3 268 071*	*178 230*	*322 223*	*8 192 707*
Total sustainable yield	**5 914 584**	**3 355 535**	**2 693 050**	**1 979 150**	**7 223 498**	**2 530 772**	**5 476 434**	**29 173 024**
Proportion (%)								
Less than 1500 mg/L	79	42	92	49	55	93	94	72
1500 mg/L and over	21	58	8	51	45	7	6	28

— nil or rounded to zero (including null cells)

Note: Sums may not necessarily equal totals due to rounding.

10.11 NUMBER AND STORAGE CAPACITY OF LARGE DAMS—2001

	NSW	*Vic.*	*Qld*	*SA*	*WA*	*Tas.*	*NT*	*ACT*	*Aust.*
Number	136	97	99	29	49	86	3	4	503
Volume (ML)	24 814 180	12 271 626	10 498 825	260 848	12 207 839	24 340 348	275 360	123 800	84 792 826

Source: Adapted from ANCOLD 2001, ActewAGL 2004, NCA 2004.

CHAPTER 11 CURRENT AND EMERGING ISSUES

INTRODUCTION

There are a range of issues that will impact on the development of future editions of the water account. In particular, in 1994 the Council of Australian Governments (COAG) developed the Water Reform Framework. The purpose of this framework was to ensure the environmental sustainability of Australia's water use, as well as the economic sustainability of the industries dependent on water. Major parts of the reform agenda included the establishment of clear water property rights, water allocations for the environment, and ensuring that water flowed to the highest value users. This chapter briefly examines the last two of these issues. The first has been recently covered by the Productivity Commission (PC 2003).

ENVIRONMENTAL FLOWS

Water allocated to the environment, or used for environmental purposes, is known as environmental flows. Environmental flows are considered important for the protection of the environment and sustainability of water resources. Extensive development of Australia's water resources since the 1970s through dam construction (see graph 10.8), with water stored and diverted for agricultural and domestic use, has led to reductions in water flows. This has resulted in degradation of the natural water resources, adversely affecting native flora and fauna and natural ecological systems (NLWRA 2001).

It is difficult to accurately measure and compare environmental flows between states and territories due to the different methods of allocating environmental flows, and because not all environmental flows are allocated on a volumetric basis. As a result of these data deficiencies, environmental flows have not been balanced in the water account flow tables. This may change in future editions as better measuring and reporting of environmental flows occurs.

This edition presents releases of water for environmental purposes supplied by water providers in Australia during 2000–01 (see Chapter 3). In 2000–01 the total reported volume of environmental flows supplied by water providers was 459,393 ML. Over half of the water supplied to the environment in 2000–01 was reported in Victoria (253,172 ML). New South Wales and the Australian Capital Territory combined had the next largest volume reported (200,528 ML). There were relatively small volumes supplied for environmental purposes reported by water providers in Queensland, South Australia and Tasmania (4,462 ML, 873 ML and 358 ML respectively), and none in Western Australia and the Northern Territory.

The following paragraphs summarise information on environmental flows for each state and territory. This information has been provided by the relevant agencies in each of the jurisdictions and outlines, where available, how environmental allocations are made and the status of environmental flows. There are different legal and administrative frameworks as well as different natural characteristics across the states and territories, resulting in differences in terminology and reporting.

New South Wales

In New South Wales environmental flows are allocated under three categories. Firstly there is environmental health water, where water is allocated for fundamental environmental health, and must be provided at all times. Secondly, there is supplementary environmental water which is water that has been committed for a specific environmental purpose, but under normal circumstances can be used for other purposes. Finally there are provisions for adaptive environmental water, which is water granted under a licence for specified environmental purposes.

Water Sharing Plans are integral in determining environmental flow allocations and, in New South Wales, are prepared according to the *Water Management Act 2000*. Plans can be developed for any aspect of water management in a specified water management area; for example, the management of drainage and floodplains, water sharing and environmental protection. The plans cover more than environmental flow allocations depending on the needs of the individual water source.

Thirty-six draft Water Sharing Plans were released for public comment in early 2002. Of these, 35 were gazetted by the end of February 2003. It is anticipated that the remaining plan (Hunter regulated river plan) will be gazetted at a later date. The gazetted Water Sharing Plans come into effect on the 1st July 2004 (DIPNR 2004).

Further information on the *Water Management Act 2000* and Water Sharing Plans can be located on the web site of the NSW Department of Infrastructure, Planning and Natural Resources (DIPNR): <*http://www.dlwc.nsw.gov.au/care/water/sharing/index*>.

Victoria

The *Victorian Water Act 1989* prompted the conversion of existing water rights of Victorian authorities into clearly defined, separate legal entitlements known as 'bulk entitlements'. A bulk entitlement (BE) defines the volume of water that an authority may take from a river or storage, the rate at which it may be taken and the reliability of the entitlement. Water for the environment is generally provided by placing conditions on the BE of a consumptive user, for example by requiring a water authority to release a particular environmental flow regime from a storage. In addition, it is possible for a BE to be provided for the environment. This is generally done when allocations are required for wetland watering which need some flexibility of use.

Currently, Victoria is converting previously poorly-defined rights to BEs. During the conversion of these rights, the operation of the system is reviewed through a negotiation process between environmental managers, irrigators, water authorities and other groups, who aim to improve the environmental flow regime where possible. Whilst the BE conversion process is primarily aimed at clarifying the rights of existing users, in 82% of these negotiations some improvements to environmental flow regimes have been achieved (Roberts, C. 2004, personal communication).

Further information can be found on the Victoria's Department of Sustainability and Environment (DSE) website: <*http://www.dse.vic.gov.au*>.

Queensland

In Queensland, Water Resource Plans (WRPs) are required for all individual catchments that have a significant social or ecological value. They are also required for catchments and major aquifer systems where consumption of water poses a risk to the health of the water source. The purpose of WRPs is to ensure that the water source is properly managed — providing a balance between human requirements and the maintenance of

Queensland continued

aquatic systems. The water source is assessed to ensure that any allocation of water is within sustainable limits. Generally WRPs apply to catchment rivers, lakes, dams and springs and also include underground water and overland flow when necessary(Department of Natural Resources and Mines 2002).

Subject to the WRPs, a Resource Operation Plan (ROP) may also be required. Whilst WRPs address the government's objectives for a specified water source, ROPs identify how use of a water resource can be managed whilst also meeting environmental objectives. Initially the ROPs focus on areas within the catchment where water use is greatest and are then expanded to include the entire catchment area whilst also addressing specified issues. These can include water releases from dams, distribution to users, water trading in catchment areas and environmental flows. Following the implementation of a ROP the environmental health and other factors of the water source are monitored to ensure that planning objectives are met.

Currently WRPs have been developed in some coastal areas and south western catchments, generally where there is high demand for water for human consumption or where catchments have particular social or ecological values. Further information on WRPs is located at the Queensland Department of Natural Resources and Mines web site: <*http://www.nrm.qld.gov.au*>.

South Australia

The *State Water Plan 2000* has set the general policy framework for environmental water provisions in South Australia. In general, environmental water provisions are not allocated volumetrically but instead are delivered through licensing arrangements. This takes into account South Australia's water resources, many of which are highly variable. A notable exception is the volumetric allocation for wetlands, along the regulated Murray River. Arrangements for environmental water provisions are addressed through two planning processes: catchment water management plans and water allocation plans.

Catchment water management plans are prepared by catchment water management boards. The plans must identify the water resources and water resource issues within the area of the relevant board, and identify policies and actions to manage the water resources. Included within this scope are statutory requirements to identify:

- the health of water dependent ecosystems
- the water needs of these ecosystems
- arrangements for monitoring the health of these ecosystems
- methods for improving the health of these ecosystems.

There are currently eight catchment water management boards covering most of the State. Six boards have catchment water management plans in operation, and the other two boards are currently preparing plans.

Water allocation plans are prepared for 'prescribed' water resources. There are 16 water allocation plans in operation. Among other things, water allocation plans must:

- assess the water needs of dependent ecosystems located either within or downstream of the prescribed resource
- provide for sustainable allocation and use of the available water, including making environmental water provisions
- set out how water will be allocated to licensed users
- describe how water trading will apply in that area

South Australia continued

- provide for monitoring arrangements.

For more information about the *State Water Plan 2000* see the Department of Water, Land and Biodiversity Conservation web site: <*http://www.dwlbc.sa.gov.au/water/index.html*>.

Western Australia

In Western Australia there are two distinct methods of allocating water in the planning and implementation of environmental water provisions for surface and groundwater systems. The first is allocation *by reservation of purpose*, which is generally applied at the regional and subregional scale. This consists of reserving some resources from development (e.g. wild and scenic rivers or wetland conservation reserves) and assigning others for development, however this is subject to the determination of appropriate rules of permit. The second method is allocation *by the determination of environmental water provisions*, which is implemented at the resource level in regions that have not yet been reserved from development. These two methods allow for the development of the water resource but water use must be regulated within certain limits. The methods incorporate environmental water provisions and contribute to the maintenance of environmental standards by satisfying objectives. This includes the maintenance of wetland levels linked to aquifers or the maintenance of flow regimes downstream of diversions.

Allocation plans can be made for all types of water resources. More information can be found on the Water and Rivers Commission web site: <*http://www.wrc.wa.gov.au/using/Water_allocation.html*>.

Tasmania

The *Tasmanian Water Management Act 1999* was created to regulate the use and management of Tasmania's water resources. The Act provides for the creation of Water Management Plans (WMPs) which assist in the management of specified water resources. WMPs were also designed to meet a region's identified economic, social and environmental requirements. In accordance with the Act, WMPs are to be reviewed at least once every five years following the adoption of an individual plan. The degree of complexity of a WMP will depend mainly on three things: the size of the catchment and the range of uses of the catchment; the extent of interaction or conflict between those uses and with other catchments; and, community expectations.

WMPs are currently being prepared for catchments where there may be conflict between commercial water usage and environmental water requirements. Water management planning and consultation work has commenced, and one plan has been adopted (Great Forester). For information on the categories and planning process see the Tasmanian Department of Primary Industries, Water and Environment web site: <*http://www.dpiwe.tas.gov.au*>.

Northern Territory

The scope of water management in the Northern Territory is defined in *The Northern Territory Water Act 1992*. Under the Act, water is allocated within water control districts as part of the water allocation planning process. The process integrates demand requirements and environmental needs for ground and surface water resources (NCC 2001g). A water allocation plan is established through community consultation, with two specific aims. The first aim, and the priority, is allocating water to the

Northern Territory continued

environment. The second aim involves the allocation of water for consumptive use, within a sustainable yield after environmental allocations have been made.

Water allocation plans must be reviewed by the water advisory committees, at least every five years. The water allocation plan for Ti Tree Control District was declared in September 2002 and is currently being implemented by the water advisory committee. Water allocation plans are being developed in three other water control districts centred on Darwin, Katherine and Alice Springs. At the time of the National Competition Policy (NCP) assessments, there were no intentions to develop plans for the remaining two water control districts (NCC 2003). It was found that there were no stressed or over-allocated water resources and it was unlikely that a reduction in water allocations would be required in the foreseeable future. The National Land and Water Resources Audit (NLWRA) assessment of Australia's water resources identified that the surface water diversions within the Northern Territory were within the sustainable yield (NCC 2001g).

Australian Capital Territory

The *Water Resources Act 1998* provides a framework for the sustainable management of the ACTs water resources. The Environmental Flow Guidelines (EFG) and the Water Resources Management Plan (WRMP) are 'disallowable instruments' under the Act. Environmental flows are required to ensure that the stream flow and quality of discharges from all catchments protect the environment, and are allocated as part of the Territory Plan to protect and sustain significant ecosystems, species and other specific environmental values of aquatic ecosystems.

To assist in clarifying management goals and techniques, Canberra's aquatic ecosystems have been classified into four categories: natural ecosystems; modified ecosystems; water supply ecosystems and created ecosystems. For each category, a different approach has been taken when formulating environmental flow guidelines. The EFG, together with the WRMP, divide the major rivers and streams into major river junctions, lakes or reservoirs, and establish the water levels that should be maintained for ACT lakes.

The main purpose of water bodies in ACTs water supply catchments is the provision of water. The Territory Plan identifies the protection of the aquatic habitat as secondary in water supply subcatchments. However, even in such catchments, there is a limit to the allocations provided for, based on sustainability of aquatic ecosystems. For more information on environmental flows in the ACT, see Environmental Flow Guidelines, available at: <*http://www.environment.act.gov.au/files/environmentalflowguidelines.pdf*> and the Water Resources Management Plan at: <*http://www.environment.act.gov.au/files.waterresourcesmgmntplan.pdf*>.

WATER TRADING

This section presents information on the extent of water trading in Australia for the financial year 2000–01. A synopsis of water trading is provided for the states of New South Wales, Victoria, Queensland and South Australia where water markets have been in operation for some time. For each of these states information is provided on the volume and location of trade as well as the price of trade, where available. Water trading is also permitted in Tasmania and legislation for water trading has also been developed in Western Australia. Currently water trading is mostly limited to trading within individual states, but interstate trades are being piloted in a section of the Murray-Darling Basin.

WATER TRADING *continued*

In most states, water entitlements can be traded either permanently or temporarily. When bought permanently, water entitlements, or water rights, are transferred to a new owner, whereas in the temporary market, water entitlements are leased for a specified period of time, usually one year. Temporary transfers are the most commonly used method of trading water in Australia and the market depends primarily on seasonal conditions. The advantages of temporary transfers include the ability to increase and decrease water allotments as needed, associated tax benefits and reduced costs. Buying water entitlements on a permanent basis can be a significant financial investment.

Ideally information relating to water trading would be balanced in the flow tables of the water account including volumes traded between and within river basins and industry type to monitor the impact of water trading. Currently no comprehensive national database with this information exists, though as trading becomes more common, the situation is likely to improve.

New South Wales

Water trading in New South Wales is concentrated in regulated water systems. As with other states, the majority of water trading occurs on a temporary basis. In New South Wales, an environmental assessment of all water transfers to a new property for over five years in duration must be completed. Temporary transfers may only be issued to an existing water licence holder. In New South Wales demand for water has increased due to the development of new industries: mining, cool climate vineyards, cherries and olives (DLWC 1999).

The volume of water permanently and temporarily traded in New South Wales' regulated water systems is shown in table 11.4. The lowest volume of water transferred on the temporary market was 353 ML in the Hunter regulated system, and the highest was 191,826 ML transferred temporarily in the Murrumbidgee. For permanent transfers in New South Wales, the lowest volume traded was 102 ML in the Bega River region, and the highest 16,944 ML permanently traded in the Lachlan.

In 2000–01 the lowest price for temporarily traded water in New South Wales was $2/ML in Macquarie and the highest was $100/ML in Gwydir (table 11.5). Average prices on the temporary market ranged from $15/ML in the Hunter and Lachlan to $69/ML in Gwydir. For water traded on the permanent market the lowest price paid was $230/ML at Hunter and the highest was $1,235/ML in MacIntyre. Average prices for permanent water trades ranged from $305/ML in Hunter to $1,235/ML in MacIntyre.

Victoria

Temporary water trading was introduced in Victoria as an experimental measure in 1987. The *Victorian Water Act 1989* made legislative provisions for permanent trading and the first permanent trades occurred in 1991 (DNRE 2001). Water trading in Victoria consists mainly of trading between farmers and individual holders of water licences. The majority takes place in regulated streams and 90% of all permanent trade is situated in northern Victoria where most water systems are connected to the Murray River. It is estimated that 6% of total water entitlements have already been traded permanently to a new location in the 10 years from 1991 to 2001 and it is estimated that, since 1994, between 3% and 8% of the total volume of water used annually in Victoria has been temporarily traded (DNRE 2001). The expansion of water trading in Victoria has been encouraged by the amendment of legislative provisions in 1994, dry weather conditions in the last four to

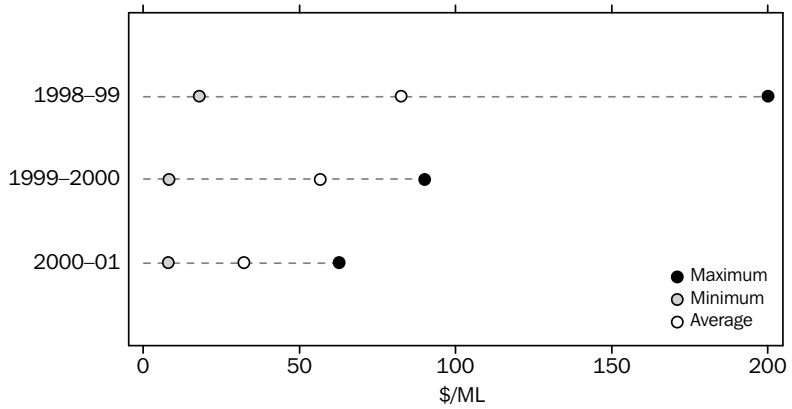
Victoria continued

five years, cap diversions and an increase in farmers' knowledge of the operations of water markets.

Trends in the permanent water market in Victoria show that water is being traded away from sheep and cattle grazing towards dairy farming. Over the past few years more water has been traded for use in horticulture (e.g. avocados, almonds and olives) and pastures with permanent irrigation infrastructure such as rye. In 2000–01 approximately 22,356 ML of water was permanently traded in Victoria (DNRE 2001). Of the water traded into Victoria (as shown in table 11.6), the majority (4,032 ML or 32%) was traded interstate, followed by Sunraysia River Murray with 3,697 ML (28%) and Pyramid-Boort with 2,673 ML (20%). The majority of trade out of Victoria was from Turrumbarry with 4,032 ML (30%), followed by Sunraysia River Murray with 2,747 ML (21%) and Central Goulburn with 1582 ML (12%).

The price of water obtained through temporary trading in Victoria is set through the pool price. The pool price is halfway between the highest seller price and the lowest buyer bid (DNRE 2001). Graph 11.1 shows the minimum, maximum and average pool prices in the Greater Goulburn Zone from 1998–99 to 2000–01. For 1998–99 there were very high prices early in the season, but when more water was allocated throughout the season, prices dropped. In 1999–2000 more water was offered on the market early in the season as people expected higher prices. Again prices fell throughout the season as more water became available. In 2000–01 prices remained stable over the season, although this was attributed to heavy rainfall in spring (DNRE 2001).

11.1 WATER POOL PRICES, Greater Goulburn Zone—1998–2001



Source: Northern Victoria Water Exchange, unpublished data.

Queensland

During 2000–01, a total of 67,926 ML of water was traded in Queensland (table 11.8). Of this volume, 275 ML was permanently traded (0.4% of all water traded) under a pilot scheme conducted in the Mereeba-Dimbulah region of far north Queensland. Although there was perceived to be a high demand for permanent transfers in this area with the opening of a new sugar mill, there were only nine permanent trades conducted under the pilot scheme. Temporary transfers of water represented the bulk of water traded. These transfers are only available for up to a maximum of 12 months and are only allowed in regulated rivers, irrigation areas and certain groundwater areas.

Queensland continued

Most of the water traded temporarily in Queensland was in the central region which accounted for 43% of all trades or 29,043 ML. There was 14,572 ML traded in the South region and 13,857 ML traded in the South West region. In the North region temporary trading comprised 10,179 ML (15% of total trade).

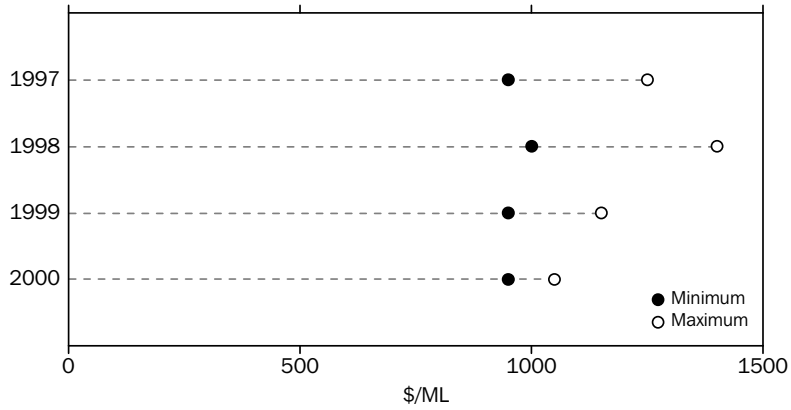
South Australia

In 1983 South Australia became the first state in Australia to introduce temporary water entitlements (Bjornlund & Mackay 1998). All water trading is subject to approval by regulatory authorities and may be refused based on an assessment of the environmental impact. An Irrigation Drainage and Management Plan must be undertaken by the buying party before trading can occur. This is to ensure that the transfer of water will not adversely affect the environment, and in particular to prevent increases in water salinity (Bjornlund 2002, personal communication). Holding licences give people the right to 'hold' a volume of water but no ability to use it. The licence can be converted to a taking licence by undertaking the appropriate assessments. This simplifies the process associated with permanent trade because there are no site impacts to assess resulting in quicker transactions between buyers and sellers.

During 2000–01 a total of 104,663 ML of water was traded in South Australia (table 11.8). This consisted of 50,787 ML transferred temporarily (49%) and 53,876 ML transferred permanently (51%). Trading was concentrated in the Murray River area with 45,846 ML transferred temporarily (90% of all temporary trade) and 40,692 ML traded permanently (76% of all permanent trade).

As with other states, in particular Victoria, the price of water traded in South Australia has stabilised over time. The prices presented in graph 11.2 apply primarily to the Murray River where the majority of trading takes place. In 1997 the price of one megalitre of water on the permanent market was between $950 and $1,250. In 1998 the price of water on the permanent market rose to its highest levels between $1,000 and$1,400 per ML. During 1999 prices dropped to between $950 and $1,150 with a further reduction in 2000 resulting in prices between $950 and $1,050.

11.2 PRICES FOR PERMANENT WATER TRADING, South Australia—1997–2000



Source: Bjornlund, H. 2002, personal communication.

Interstate water trading

A two-year pilot scheme for permanent interstate water trading involving New South Wales, South Australia and Victoria started in 1998. In that year the first permanent interstate trading resulted in 249 ML of water traded from New South Wales to Victoria (Young et al. 2000). During the pilot scheme, most of the water traded was 'sleeper water', that is, water which was not being used by the current licence holder. The majority of water traded during the pilot scheme went to South Australia where water is scarcer and hence more highly valued.

There is much complexity involved in trading between states due to differences in licensing systems and water rights. For instance in Victoria there are high security licences and once all of these entitlements have been satisfied there is additional 'sales water' available for trade. In New South Wales there are high and general security licences and people may hold unused water across years. In South Australia there is a similar system of high security licences to New South Wales although there are different legislative provisions concerning the holding of water not attached to land (Young et al. 2000). Table 11.9 shows the origin and destination of permanent water trading from 1998–99 to 2000–01, and table 11.10 shows the estimated value of permanent trade during the pilot period.

A total of 15,235 ML of water was traded permanently interstate between 1998–99 and 2000–01. The majority of water was traded from Victoria to South Australia with 7,593 ML (50%), followed by New South Wales to South Australia with 6,681 ML (44%). Only small percentages of trade were recorded from South Australia to Victoria, from New South Wales to Victoria and from South Australia to New South Wales.

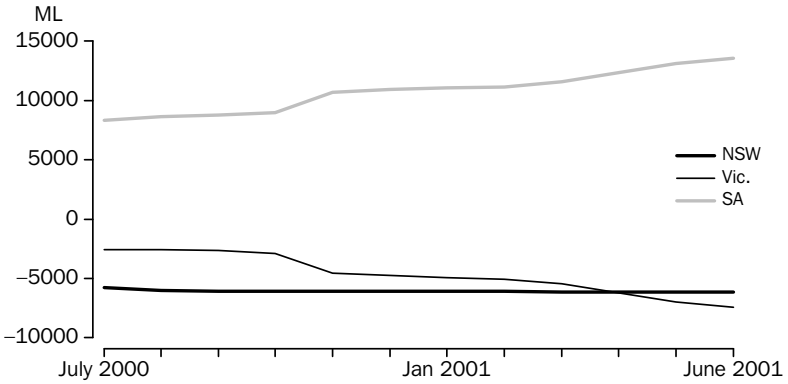
The price of permanent water traded from September 1998 to September 2000 ranged from $1,000/ML to $1,150/ML (Young et al. 2000). There were 24 purchases of water of volumes less than 99 ML estimated to be worth $823,830 and 21 purchases of water between 100 ML and 499 ML estimated at $3,834,600. Six transactions involving purchases of 500 ML or more were worth over $5 million. Overall the estimated value of permanent trading during the pilot scheme was $9,927,330 (table 11.10).

Graph 11.3 shows the net water trade between Victoria, New South Wales and South Australia. During 2000–01 a total of 14,174 ML of water was traded into South Australia during the pilot scheme. During the same period there was a net loss of 6,217 ML water traded from New South Wales and 7,954 ML from Victoria through trading.

Interstate water trading

continued

11.3 PERMANENT NET WATER TRADE, cumulative total—July 2000 to June 2001



Source: Murray-Darling Basin Commission, adapted from unpublished data.

11.4 VOLUME OF WATER TRANSFERS, New South Wales, by regulated system —2000–01

Regulated system	VOLUME TRADED (ML) Temporary	Permanent
NSW Border Rivers	27 008	1 569
Gwydir	54 963	321
Namoi	34 759	885
Hunter	353	6 904
Macquarie	42 738	10 583
Lachlan	64 410	16 944
Murrumbidgee	191 826	3 558
NSW Murray	128 846	3 556
Lower Darling	34 735	—
Bega River	—	102
Total	579 638	44 422

— nil or rounded to zero (including null cells)

Source: Department of Land and Water Conservation, unpublished data.

11.5 PRICE OF WATER TRADE, New South Wales, by prescribed region— 2000–01

Basin	TEMPORARY TRADE ($/ML) Highest price for trade	Lowest price for trade	Average price for trade	PERMANENT TRADE ($/ML) Highest price for trade	Lowest price for trade	Average price for trade
Barwon	—	—	—	—	—	—
Darling	—	—	—	350	350	350
Gwydir	100	42	69	—	—	—
Hunter	22	10	15	350	230	305
Lachlan	33	5	15	—	—	—
MacIntyre	80	40	56	1 235	1 235	1 235
Macquarie	42	2	43	800	425	591
Murray — Upper	38	5	19	—	—	—
Murray — Lower	—	—	—	410	375	397
Murrumbidgee	40	—	24	550	235	441
Namoi	54	20	28	1 200	—	200

— nil or rounded to zero (including null cells)

Source: Murray Irrigation and Water Exchange, unpublished data.

11.6 PERMANENT WATER TRADE, Victoria, by area—2000–01

District/Waterway	Trade into Victoria (ML)	Trade within Victoria (ML)	Trade out of Victoria (ML)	Total trade (ML)(a)	Water entitlements at 30/06/01 (ML)	Trade as a proportion of 2001 entitlements (%)
Traded interstate	4 299	—	—	2 150	—	—
New rights sold	—	—	242	121	—	—
Sunraysia River Murray	3 697	204	2 747	3 426	203 327	1.68
Merbein, Red Cliffs, Robinvale	48	57	181	172	115 946	0.15
First Mildura Irrigation Trust	99	—	—	50	73 133	0.07
Nyah & Tresco	—	157	364	339	19 568	1.73
Murray/Kiewa/Ovens	182	953	955	1 522	159 307	0.96
Torrumbarry	311	702	4 032	2 874	358 744	0.80
Murray Valley	172	322	20	418	259 103	0.16
Pyramid-Boort	2 673	2 840	1 240	4 797	229 835	2.09
Rochester	173	453	1 056	1 068	187 766	0.57
Central Goulburn	173	562	1 582	1 440	391 006	0.37
Shepparton	203	37	282	280	181 406	0.15
Goulburn/Broken Creek/Lodden/Camp Rivers	151	834	419	1 119	159 849	0.70
Campaspe district	160	—	43	102	20 282	0.50
Coliban channels	—	391	—	391	15 106	2.59
Horsham/Wimmera-Mallee	242	86	—	207	33 017	0.63
Werribee & Bacchus Marsh	—	46	—	46	13 037	0.35
Macalister district	14	60	88	111	117 044	0.09
Thomson/Macalister River	88	65	14	116	24 074	0.48
Other Southern Rivers	—	410	—	410	181 262	0.23
Urban, incl. coal fired electricity	610	900	—	1 205	600 000	0.20
Total	**13 295**	**9 079**	**13 265**	**22 356**	—	—
To Sunraysia/out of Goulburn Murray Water(b)	3 745	—	5 795	4 770	—	—

— nil or rounded to zero (including null cells)

(a) Total trade is trade within Victoria, plus the average of trade into and trade out of Victoria.

(b) To Sunraysia/out of Goulburn Murray Water category is a subset of the other districts/waterways and should not be added to the total.

Note: Sums may not necessarily equal totals due to rounding.

Source: Adapted from the Department of Natural Resources and Environment 2001.

11.7 NUMBER AND VOLUME OF WATER TRADES, Queensland, by region—2000–01

	Number of trades (no.)	*Volume of trades (ML)*	*Per cent volume to all trades (%)*
Temporary Trades			
North Region	78	10 179	15.0
Central Region	147	29 043	42.8
South Region	478	14 572	21.5
South West Region	169	13 857	20.4
Total	*872*	*67 651*	*99.7*
Permanent Trades			
Mereeba-Dimbulah	9	275	0.4
TOTAL	**881**	**67 926**	**100.0**

Note: Sums may not necessarily equal totals due to rounding.
Source: Department of Natural Resources and Mines, unpublished data.

11.8 TOTAL WATER TRANSFERS, South Australia, by prescribed region—2000–01

	TEMPORARY TRANSFERS		PERMANENT TRANSFERS		TOTAL TRANSFERS	
	no.	*ML*	*no.*	*ML*	*no.*	*ML*
Angas Bremer	—	—	1	5	1	5
Barossa Valley	4	165	3	31	7	195
Comaum-Caroline	10	1 114	31	1 867	41	2 981
Ladepede Kongorong	1	48	6	932	7	981
Mallee	2	217	3	719	5	936
McLaren Vale	—	—	7	6 723	7	6 723
Northern Adelaide Plains	32	697	25	311	57	1 008
Narracoorte	10	1 424	26	1 708	36	3 132
Padthaway	2	206	2	130	4	336
River Murray	157	45 846	71	40 692	228	86 538
Tatiara	9	1 069	9	758	18	1 827
Total	*227*	*50 787*	*184*	*53 876*	*411*	*104 663*

— nil or rounded to zero (including null cells)
Note: Sums may not necessarily equal totals due to rounding.
Source: Department of Water Resources, unpublished data.

11.9 INTERSTATE PERMANENT WATER TRADING, origin and destination—1998–99 to 2000–01

DESTINATION

	New South Wales		*Victoria*		*South Australia*		*Total*	
Origin	*ML*	*Proportion of total traded (%)*	*ML*	*Proportion of total traded (%)*	*ML*	*Proportion of total traded (%)*	*ML*	*Proportion of total traded (%)*
New South Wales	. .	. .	249	1.6	6 681	43.9	6 930	45.5
Victoria	613	4.0	. .	. .	7 593	49.8	8 205	53.9
South Australia	100	0.7	—	—	. .	. .	100	0.7
Total	**713**	**4.7**	**249**	**1.6**	**14 274**	**93.7**	**15 235**	**100.0**

. . not applicable
— nil or rounded to zero (including null cells)
Note: Sums may not necessarily equal totals due to rounding.

Source: Adapted from Murray-Darling Basin Commission, unpublished data; Young et al. 2000.

11.10 ESTIMATED VALUE OF WATER TRADED(a)(b)—1998–99 to 1999–2000

Size of purchase (ML)	*No. of purchases*	*Estimated value ($)*
0 to 99	24	823 830
100 to 499	21	3 834 600
500 to 999	3	2 118 900
1000	3	3 150 000
Total	**51**	**9 927 330**

(a) Based on average price data from survey of purchasers (n=23, average price of $1.05/KL)
(b) For New South Wales, Victoria and South Australia only.

Source: Young et al. 2000.

EXPLANATORY NOTES

INTRODUCTION

1 The water account is one of the physical accounts produced by the ABS as part of an environmental accounting program. It consists of supply and use tables (collectively referred to as flow tables) as well as information on water stocks and other related issues. The aim of the water account is to integrate data from different sources into a consolidated information set making it possible to link physical data on water to economic data, such as those in Australia's national accounts.

2 Environmental accounts can facilitate a range of issues that include:

- a broader assessment of the consequences of economic growth
- the contribution of sectors to particular environmental problems
- sectoral implications of environmental policy measures (e.g. regulation, charges and incentives).

3 One use of environmental accounts is that by linking together physical data and economic data in a consistent framework it is possible to undertake scenario modelling. Issues that could be modelled include assessing the efficiencies in different sectors of the economy and the environment, and resource implications of structural change.

4 In compiling the water account, the ABS has accessed readily available data on water resources from various government and non-government organisations and aggregated these data. The project did not duplicate existing data collection activities, but tied together industry, regional and state and territory data into a single system showing the supply and use of water within the Australian economy.

ENVIRONMENTAL ACCOUNTING FRAMEWORK

5 The water account was developed using the System of Integrated Environmental and Economic Accounting (SEEA). SEEA was first published by the United Nations (UN) in 1993 (UN 1993a) and was revised recently (UN 2003). SEEA is a complement to the System of National Accounts (SNA) 1993 (UN 1993b). Environmental accounts extend the boundaries of the SNA framework to include environmental resources, which occur outside the production and asset boundaries typically measured in the SNA.

6 Measures of water stocks/assets utilising the framework used in the *Water Resources Assessment 2000* (NLWRA 2001) are presented in Chapter 10. Currently three environmental assets are included on the National Balance Sheet — timber, land and subsoil assets (see Chapter 25, *Environment by Numbers: Selected Articles on Australia's Environment* (cat. no. 4617.0)) (ABS 2003b). These environmental assets provide important raw materials to the economy (e.g. timber for housing, minerals for manufacturing) and can be valued. Environmental asset accounts include the amount (volume and/or value) of resources available and changes within a given time period due to both human and natural causes (e.g. growing and harvesting of tree plantations and forest fires). Other environmental assets, including water, could be theoretically added to the National Balance Sheet but currently it is not possible owing to some data limitations and unresolved conceptual issues.

RELATIONSHIP BETWEEN ENVIRONMENTAL ACCOUNTS AND NATIONAL ACCOUNTS

7 Supply and use tables provide the framework to link core components of the national accounts to physical information. Physical data are presented in supply and use tables in Chapter 2, some linkages to economic data are also made. Links to economic data are also presented in other chapters.

WATER SUPPLY AND USE — CHAPTERS 2–9

Scope

8 Chapter 2 aggregates all available quantitative data (volumetric) in terms of the supply and use of water within the Australian economy for the financial year 2000–01. Supply and use tables illustrate the economic use of water and include self-extracted, mains, and regulated discharge (including in-stream use) and reuse water by various industries. Chapters 3–9 provide a more detailed assessment of different industries' water use.

9 The use of salt water (including water from estuaries) for power generation and other industrial uses, although measurable and reported, is not included in the supply and use tables. This is because the scope of the water account includes freshwater and desalination reported by water providers.

Coverage

10 Comprehensive coverage for the supply table was obtained. For the use tables coverage included the majority of users, with an estimation of minor users undertaken.

11 Coverage for both supply and use tables includes the following:

- individuals and companies that directly extract water from surface water and groundwater for their own use (e.g. domestic, industrial, commercial or rural use)
- individuals and companies that use water supplied by water providers for domestic, industrial, or other uses
- water providers who extract water from surface water and groundwater sources, and supply it on to customers for use (e.g. domestic, industrial, or other use). The majority of water providers are categorised in WATER SUPPLY, SEWERAGE AND DRAINAGE SERVICES industry (ANZSIC group 370) but others, and notably local governments, also provide water
- water providers who may also provide reuse water to their customers; other large organisations who treat water and make it available for subsequent reuse; other large organisations who discharge water directly to the environment (e.g. power stations, mines); and major in-stream water users, for example aquaculture and hydro-electricity generation, where this information was available.

12 Items not covered by the supply and use tables include:

- the reuse of water on-farm or on-site
- non-point or diffuse discharges
- the impact of stormwater infiltration into the sewerage reticulation system.

Data sources

13 Data have come from a range of ABS surveys as well as state, territory and local government agencies, water authorities and industry organisations.

14 The main ABS surveys used were:

- 2000–01 Agricultural Census
- 2000–01 Environment Management Survey (of mining and manufacturing industries)
- 2000–01 Water Supply Survey (of water providers not covered by water industry association surveys, mentioned below)
- March 2001 Monthly Population Survey
- Data requests of selected industries, namely: ELECTRICITY AND GAS SUPPLY; PAPER, PRINTING AND PUBLISHING; and WOOD AND WOOD PRODUCTS.

15 Other ABS data sources were used, including statistics from the ABS Census of Population and Housing (1996 and 2001), Labour Force Surveys as well as publications such as *Zoos, Parks and Gardens Industry, Australia, 1996–97* (cat. no. 8699.0) (ABS 1998).

16 State and territory government agencies supplying data were:

- In New South Wales, the Environment Protection Agency, Department of Land and Water Conservation and New South Wales Agriculture. In particular, the 2000–01 *NSW Water Supply and Sewerage Performance Comparisons* (DLWC, 2002) was used.

Data sources continued

- In Victoria, the Department of Natural Resources and Environment.
- In Queensland, the Department of Natural Resources and Mines and the Environment Protection Agency (EPA). In particular the EPA survey of water providers and recycled water users (unpublished data) was used.
- In South Australia, SA Water and the Department of Environment, Heritage, and Aboriginal Affairs.
- In Western Australia, the Water and Rivers Commission and Office of Water Regulation.
- In Tasmania, the Department of Primary Industries, Water and Environment.
- In the Northern Territory, the Department of Lands, Planning and Environment.
- In the Australian Capital Territory, Environment ACT.

(Note that some agencies have undergone restructures and name changes since 2000–01.)

17 Surveys conducted by industry associations as well as annual reports of water providers were used. They include:

- *WSAA Facts —Australian Urban Water Industry* report (WSAA 2002).
- *AWA Performance Monitoring Report 2000–01—Australian Non Major Urban Water Utilities* (AWA 2002).
- *ANCID Australian Irrigation Water Benchmarking Report for 2000–01* (ANCID 2002).
- Annual and/or environmental reports for 2000–01 for various water providers (lists of those that provided a water supply or sewerage service were collected from state and territory agencies and industry contacts).

Methods for Calculating Water Supply and Use

18 These notes are intended as a general guide to the methods used in calculating estimates of water supply and use. For more detail on these method please contact the Director, Environment and Energy Statistics, Australian Bureau of Statistics.

19 Supply and use tables integrate data from a wide range of sources. The majority of the water supply and use data collected either directly or indirectly by the ABS tended to be from decentralised sources in most states and territories. This is because a majority of the distribution is managed by either local governments or privatised water authorities. The data that were collected have been collated to a uniform standard and aggregated to a state and territory level.

20 For water supply, a complete list of water providers in 2000–01 was compiled from information supplied by state and territory regulatory departments, industry bodies, and other water providers. There were 479 water providers identified during 2000–01, and 410 were contacted by the ABS for information.

21 Through either direct survey by the ABS or via industry associations, water providers supplied information on:

- Volume of water extracted from the environment and/or the volume of water received from another water provider (this information was used to reconcile total supplies and avoided the double counting of water volumes).
- Volume of water supplied to particular industries (e.g. AGRICULTURE, MINING, MANUFACTURING) and for household use. Irrigation/rural water providers also reported irrigated area by crop types. This information was reconciled with water use as reported by water users. It also enabled the calculation of coefficients (e.g. ML per employee) for industries for which there was little or no recent data on water use.
- Losses and water discharges by location. Where losses could be split between customer meter errors and system water losses, the system water losses were considered to be a form of use by the water providers. Customer meter errors were not attributed to water providers, but rather as a form of use by their customers.

Methods for Calculating Water Supply and Use continued

- Specific locations of water extraction (and the majority were able to readily provide this information). These results are not presented due to confidentiality reasons.
- Volume of reuse water supplied to particular industries (e.g. AGRICULTURE, MINING, MANUFACTURING). The most significant customer details including names, addresses and volumes used were also collected from these water providers. Reuse customer details were used to code them to a particular industry (using ANZSIC classification) and volumes of reuse water used assigned accordingly. Remaining 'unassigned' volumes were then distributed using the characteristics of the assigned reuse water for each state and territory. 'Unassigned' reuse water made up only 1% of total reuse water nationally. For Queensland, these data were augmented by an unpublished Queensland EPA state-wide survey of water service providers and recycled water users. For all other states and territories, these data were supplimented using reuse water customer details in each state and territory. Water reuse volumes have not been imputed where a water provider did not provide reuse water volumes for any reason.
- Mains water supplied to households as well as the population served. Where information was not available for mains supplied to households, state and territory level coefficients based on average kilolitre use per person, were used.

22 For AGRICULTURE:

- Mains water use was the amount supplied to the agricultural industry by water providers.
- Self-extracted water use by agriculture was determined by applying regional water application rates (ML/ha) to the area of irrigated crops. This information was obtained from water supplier surveys and state and territory or industry contacts. The amount of mains water used was subtracted and the remainder assumed to be self-extracted water use.
- In New South Wales, running long-term average application rates used to convert irrigated hectares to ML by the New South Wales Department of Land and Water Conservation, were used. These may not necessarily reflect actual water applied to certain crops in some areas of the state in 2000–01.
- Reuse water usage includes water used from regional reuse schemes.

23 For MINING and MANUFACTURING:

- Mains water use was the amount supplied to the mining and manufacturing industries by water providers.
- Self-extracted water use and water discharge was determined by an ABS survey of these industries (the 2000–01 Environment Management Survey) with additional surveying of WOOD AND PAPER PRODUCTS and PAPER, PRINTING AND PUBLISHING industries.
- Mine dewatering was assumed to be self-extraction by the mining industry in all states. The water is usually utilised on-site or subsequently discharged.

24 For ELECTRICITY AND GAS SUPPLY:

- Mains water use was the amount supplied to the ELECTRICITY AND GAS SUPPLY industries by water providers.
- Self-extracted and in-stream water use, and discharge were determined by an ABS survey of these industries.

25 For other industry sectors estimates of water use were derived using information supplied by water providers, limited data collected by the ABS and the development of coefficients.

26 AQUACULTURE (ANZSIC 0420) was not in scope of the 2001 Agricultural Census. Water use estimates for the AQUACULTURE industry were developed using water use coefficients (i.e. ML per employee developed from water provider customer information, data from the 1993–94 and 1996–97 water account, and ABS employment data). These estimates were balanced with information from licensing databases and water providers.

Methods for Calculating Water Supply and Use continued

AQUACULTURE industry water use is considered to be in-stream water use for the purpose of the water account, and therefore net water consumption by this industry is calculated differently to other industries (the same as ELECTRICITY AND GAS SUPPLY industry).

27 PARKS AND GARDENS (ANZSIC 9239). Water use figures for this industry were derived using ML per employee data. These estimates were balanced with information from licensing databases and water providers.

28 ZOOLOGICAL AND BOTANIC GARDENS (ANZSIC 9231). Estimates of water use were calculated by developing a ML per employee coefficient from data contained in the publication *Zoos, Parks and Gardens Industry, Australia, 1996–97* (cat. no. 8699.0) (ABS 1998). As no businesses in this ANZSIC were reported in water supplier customer information, all water used by this industry was assumed to be self-extracted.

29 Household water use;

- Mains water use was the amount supplied to households by water providers.
- Self-extracted water use by households was calculated by applying average state and territory kilolitre use per person coefficients and applying this to the population known not to be served by water providers (which was determined by subtracting the population served by water providers from the total population in each state or territory).

Data quality and reliability

30 Data sources for the water account originate from a range of sources with a variable degree of consistency and reliability. Data suppliers were requested to provide an indication of the reliability of the data provided, although comprehensive data were not obtained from all respondents.

31 All water supply, mains use and reuse information was collected by the ABS or industry surveys and the estimates can be used with a high degree of confidence.

32 Data on self-extracted water use were compiled from a range of sources and the degree of confidence that can be attached to these estimates varies by sector.

- For WATER SUPPLY, SEWERAGE AND DRAINAGE SERVICES, ELECTRICITY AND GAS SUPPLY, MINING and MANUFACTURING industries estimates were based on ABS surveys and can be used with a high degree of confidence.
- For agriculture, ABS data from the 2001 Agricultural Census were used in conjunction with information on regional water application rates for different crops. As such, these estimates can be used with a moderate degree of confidence.
- For other industries a limited amount of survey data was available and estimates were mostly based on coefficients of water use. These estimates can be used with a moderate degree of confidence.
- For households, self-extracted water use was based on coefficients of water use and can be used with a moderate degree of confidence.

GROSS VALUE OF IRRIGATED AGRICULTURAL PRODUCTION — CHAPTER 5

Data sources

33 The gross value of irrigated agricultural production was estimated using data from the ABS 2001 Agricultural Census as well as other ABS collections and administrative data used to calculate the value of agricultural commodities produced (see *Agricultural Commodities, Australia, 2000–01* (cat. no. 7121.0) (ABS 2002c) and *Value of Principal Agricultural Commodities Produced, Australia, Preliminary, 2000–01* (cat. no. 7501.0)) (ABS 2001f).

Method of calculation

34 The ABS 2001 Agricultural Census collected information on the production of over 120 commodities, and collected the area of irrigated land in eight categories: pastures, rice, other cereals, vegetables, grapes, fruit (including nuts), sugar, and other crops. The ABS also collects and publishes data on the value of principal agricultural commodities produced (ABS 2001f). By using these primary data sources, estimates of the value of irrigated agricultural production were made. These estimates have built on the method used in the first water account and are comparable with those estimates.

Method of calculation continued

35 Different methods were used for different commodities, with the method used dependent on the nature of the commodity and the availability of data. For rice, 100% of the gross value of agricultural production was attributed to irrigation. For cotton, the volume of the production from irrigated land was collected directly via the ABS 2001 Agricultural Census. This volume was then applied to the 'farm gate' price for cotton in the respective states.

36 For the remaining commodities, two general methods were used to determine the value of irrigated agricultural production.

- Method 1. The area of the commodity that was irrigated was divided by the total area of the commodity (i.e. irrigated plus non-irrigated area) and multiplied by the total value of the commodity produced. This method has an underestimation bias as it is likely that commodities grown on irrigated land will be more productive (e.g. tonne/ha) than the same commodity grown on non-irrigated land.
- Method 2. The percentage of agricultural establishments (i.e. farms) that are irrigated within particular ANZSICs was determined and this percentage applied to the total gross value of the particular commodities produced by that ANZSIC. This method is likely to overestimate the value of irrigated production as not all production on all irrigated farms is from irrigated land. Therefore some dryland production will be included in the estimates.

37 The simple average of these methods was used to determine the value of irrigated production for vegetables, fruit (including nuts), grapes, other pastures and sugar. The second method was used to determine the value of milk production from dairy pastures because survey data conducted by the Victorian Dairy Industry Authority (2000), and Armstrong et al. (1998) indicated that where a dairy farm was irrigated, nearly all milk production can be attributed to irrigation.

38 Method 1 was used to determine the value of other cereals as investigations of the data revealed that irrigated area made up only a small fraction of the production area on most farms. As such, attributing all production from irrigated farms to irrigation was likely to lead to a large overestimate of irrigation production. For other crops, a combination of methods was used. All of the value of nurseries was attributed to irrigation, whereas the value of 'all other crops (n.e.i.)' was attributed using the percentage of 'other crop and plant growing (n.e.c.)' that was irrigated.

STOCK TABLES — CHAPTER 10

Data sources

39 Most of the data presented in Chapter 10 is drawn from the *Australian Water Resource Assessment 2000* (NLWRA 2001). The NLWRA (2001) consolidated data from a variety of sources which are referenced in that publication. The ABS updated these data for Western Australia and the Northern Territory as well as confirming that the data for other jurisdictions were the latest available. Because the data are based on long term measures of water availability, the Bureau of Meteorology has advised that data from the NLWRA (2001) fairly represents the long-term water availability in 2000.

40 Information on the storage capacity of large dams was from the ANCOLD Register of Large Dams (ANCOLD 2001).

ABBREVIATIONS

'000	thousand
$m	million dollars
ABS	Australian Bureau of Statistics
ACT	Australian Capital Territory
AGPS	Australian Government Publishing Service
ANCID	Australian National Committee on Irrigation and Drainage
ANCOLD	Australian National Committee on Large Dams
ANZSIC	Australian and New Zealand Standard Industrial Classification
Aust.	Australia
AWA	Australian Water Association
AWRC	Australian Water Resources Council
BE	bulk entitlement
BoM	Bureau of Meteorology
COAG	Council of Australian Governments
DIPNR	Department of Infrastructure, Planning and Natural Resources
DLWC	Department of Land and Water Conservation
DNRE	Department of Natural Resources and Environment
DSE	Department of Sustainability and Environment
EFG	Environmental Flow Guidelines
EMS	Environmental Management Survey
EPA	Environmental Protection Agency
GCCC	Gold Coast City Council
GL	gigalitre
GMA	groundwater management area
ha	hectare
I-O	input-output
IGVA	industry gross value added
IOCC	Input-Output Commodity Code
IOIG	Input-Output Industry Group
kL	kilolitre
L	litre
mg	milligram
mm	millimetre
MAR	mean annual run-off
ML	megalitre
n.e.c.	not elsewhere classified
n.e.i.	not elsewhere included
no.	number
NCC	National Competition Council
NCP	National Competition Policy
NLWRA	National Land and Water Resources Audit

NSW	New South Wales
NT	Northern Territory
PC	Productivity Commission
Qld	Queensland
ROP	resource operation plan
SA	South Australia
SECITARC	Senate Environment, Communications, Information Technology and the Arts Reference Committee
SEEA	System of Integrated Environmental and Economic Accounting
SNA	System of National Accounts
SWMA	surface water management area
Tas.	Tasmania
UN	United Nations
Vic.	Victoria
WA	Western Australia
WMP	water management plan
WRMP	Water Resources Management Plan
WRP	water resource plan
WSAA	Water Services Association of Australia
yr	year

APPENDIX 1 CLIMATE CONDITIONS

GENERAL CLIMATE CONDITIONS

Nationally, data from the Bureau of Meteorology indicates that average annual rainfall was greater during 2000–01 (see A1.1) than that experienced during 1996–97. The La Niña climate pattern redeveloped over the second half of 2000, lessening during autumn 2001. In accordance with this pattern, many areas of Australia had a wet year, particularly in the north of the continent.

The year 2000 was the second wettest year since 1900, with average annual rainfall of 714 mm, but most of this rainfall occurred in north-west and central Australia. In contrast, southern Victoria and Tasmania experienced a dry year, punctuated by wet intervals which were insufficient to end a long-running spell of rainfall deficiencies since 1996.

The second half of 2000 was generally warmer and drier than normal as La Niña waned. Drought conditions developed along east Australia, with rainfall deficiencies in south-east Queensland and north-east New South Wales.

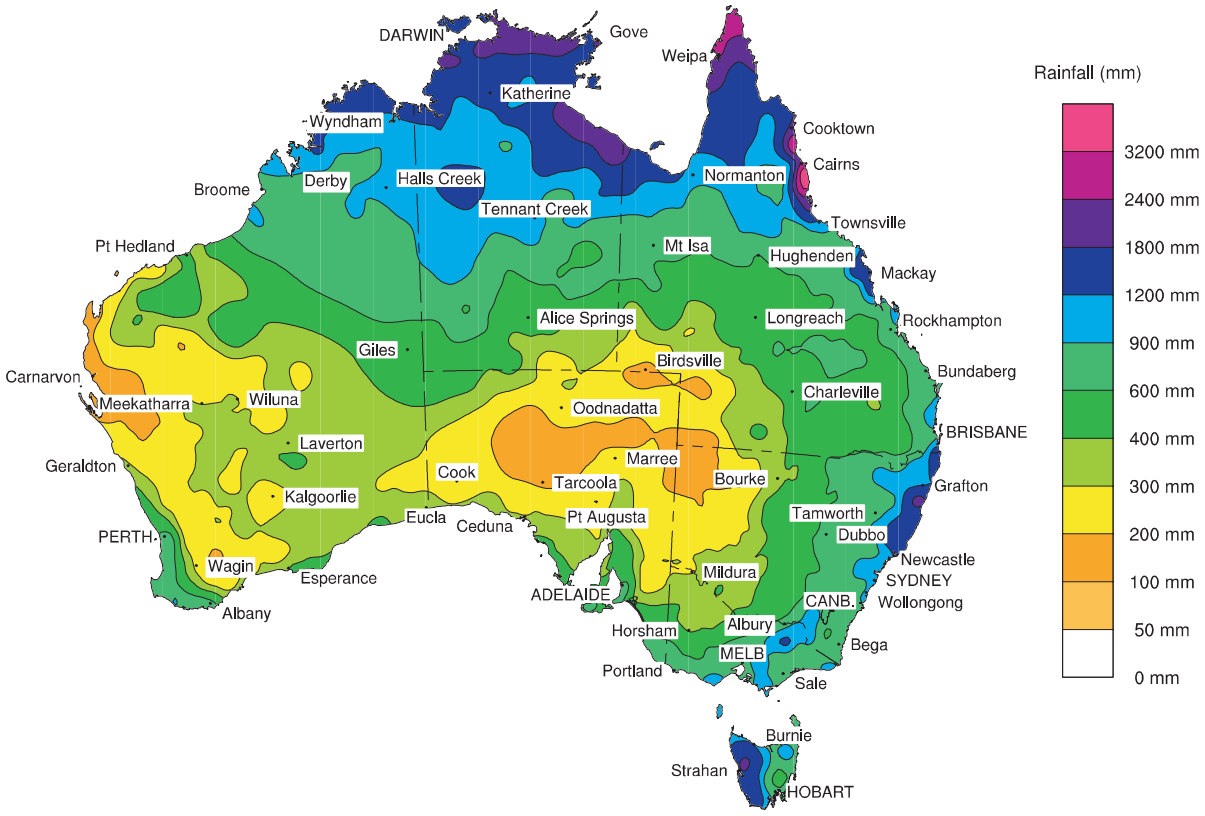
Over summer, restrengthening of La Niña resulted in a return to cool, wet conditions over most of the country. Heavy monsoonal rain fell in north-west Queensland and the Northern Territory. But by April, rainfall was below average apart from some heavy falls in northern South Australia. These dry conditions continued into the winter of 2001.

The major patterns across Australia over the 2000–01 financial year in comparison with the climate of 1996–97 are as follows:

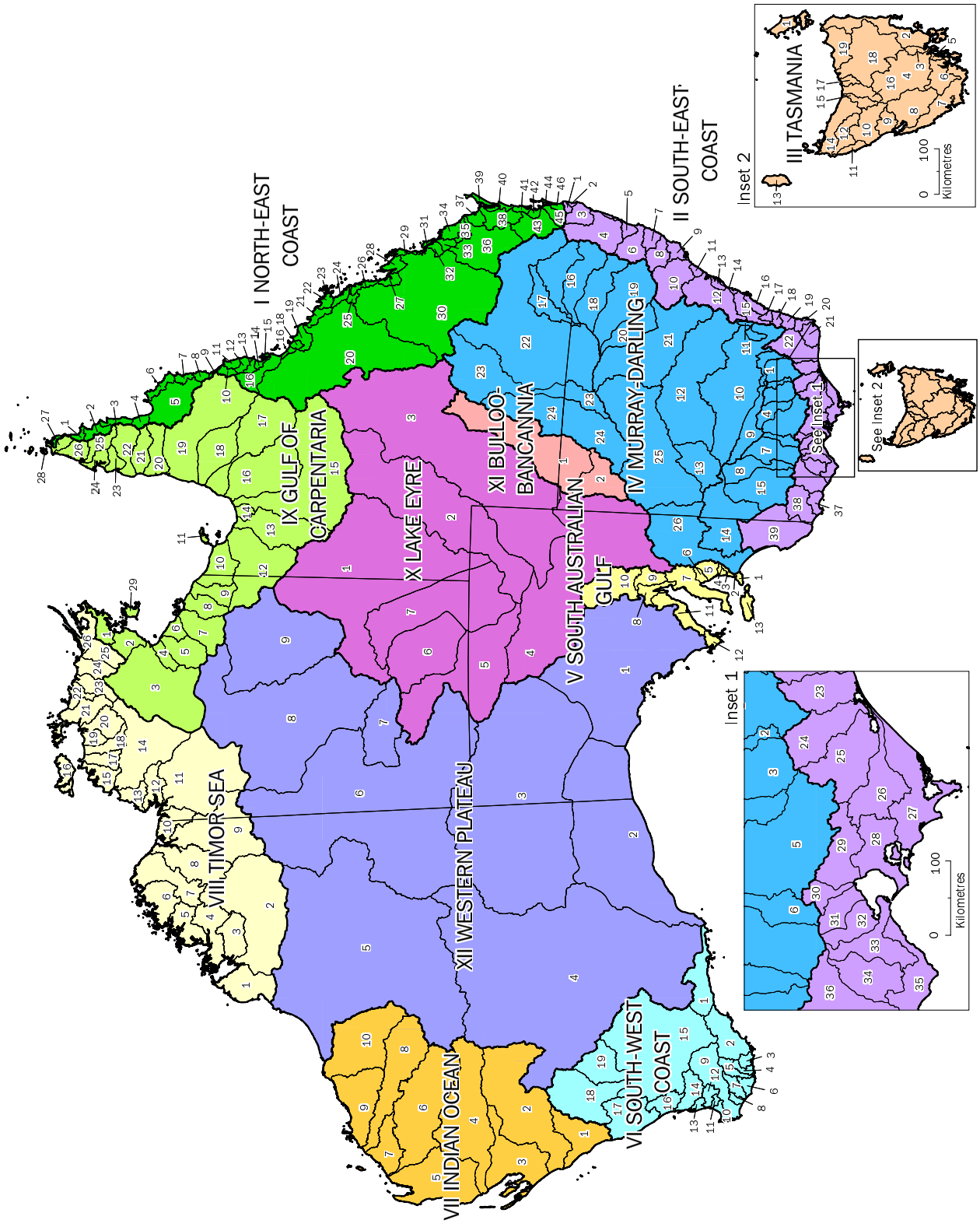
- dry winter and summer in New South Wales, with higher average annual rainfall than 1996–97, but due to a few heavy rainfall events
- dry year in Victoria, continuing the long-running dry spell since 1996
- dry winter in Queensland, but heavy monsoonal rain over summer contributing to higher average annual rainfall than 1996–97
- generally a similar average annual rainfall in South Australia compared to 1996–97, but drier winter and summer, although heavy rainfall events were experienced in autumn
- drier winter than 1996–97 in Western Australia, with winter wet season starting late and finishing early, but generally similar average annual rainfall
- dry year in Tasmania, with decreased summer rainfall
- higher average annual rainfall in the Northern Territory compared to 1996–97 due to heavy monsoonal rains over summer, but winter was drier.

Source: Bureau of Meteorology 2001.

A1.1 AUSTRALIAN RAINFALL ANALYSIS, (mm)—1 July 2000 to 30 June 2001



Source: Bureau of Meteorology 2004.


I NORTH-EAST COAST
II SOUTH-EAST COAST
III TASMANIA
IV MURRAY-DARLING
V SOUTH AUSTRALIAN GULF
VI SOUTH-WEST COAST
VII INDIAN OCEAN
VIII TIMOR SEA
IX GULF OF CARPENTARIA
X LAKE EYRE
XI BULLOO-BANCANNIA
XII WESTERN PLATEAU
Inset 1
Inset 2
See Inset 1
See Inset 2
0 100 Kilometres
0 100 Kilometres

I North-East

1 Jacky Jacky Creek
2 Olive–Pascoe Rivers
3 Lockhart River
4 Stewart River
5 Normanby River
6 Jeannie River
7 Endeavour River
8 Daintree River
9 Mossman River
10 Barron River
11 Mulgrave–Russell Rivers
12 Johnstone River
13 Tully River
14 Murray River (Qld)
15 Hinchinbrook Island
16 Herbert River
17 Black River
18 Ross River
19 Haughton River
20 Burdekin River
21 Don River
22 Proserpine River
23 Whitsunday Island
24 O'Connell River
25 Pioneer River
26 Plane Creek
27 Styx River
28 Shoalhaven Creek
29 Water Park Creek
30 Fitzroy River (Qld)
31 Curtis Island
32 Calliope River
33 Boyne River
34 Baffle Creek
35 Kolan River
36 Burnett River
37 Burrum River
38 Mary River (Qld)
39 Fraser Island
40 Noosa River
41 Maroochy River
42 Pine River
43 Brisbane River
44 Stradbroke Island
45 Logan–Albert Rivers
46 South Coast

II South-East

1 Tweed River
2 Brunswick River
3 Richmond River
4 Clarence River
5 Bellinger River
6 Macleay River
7 Hastings River
8 Manning River
9 Karuah River
10 Hunter River
11 Macquarie–Tuggerah Lakes
12 Hawkesbury River
13 Sydney Coast–Georges River
14 Wollongong Coast
15 Shoalhaven River
16 Clyde River–Jervis Bay
17 Moruya River
18 Tuross River
19 Bega River
20 Towamba River
21 East Gippsland
22 Snowy River
23 Tambo River
24 Mitchell River (Vic.)
25 Thomson River
26 Latrobe River
27 South Gippsland
28 Bunyip River
29 Yarra River
30 Maribyrnong River
31 Werribee River
32 Moorabool River
33 Barwon River
34 Lake Corangamite
35 Otway coast
36 Hopkins River
37 Portland Coast
38 Glenelg River
39 Millicent Coast

III Tasmania

1 Flinders–Cape Barren Islands
2 East Coast
3 Coal River
4 Derwent River
5 Kingston Coast
6 Huon River
7 South-West Coast
8 Gordon River
9 King–Henty Rivers
10 Pieman River
11 Sandy Cape Coast
12 Arthur River
13 King Island
14 Smithton–Burnie Coast
15 Forth River
16 Mersey River
17 Rubicon River
18 Tamar River
19 Piper–Ringarooma Rivers

IV Murray-Darling

1 Upper Murray River
2 Kiewa River
3 Ovens River
4 Broken River
5 Goulburn River
6 Campaspe River
7 Loddon River
8 Avoca River
9 Murray–Riverina
10 Murrumbidgee River
11 Lake George
12 Lachlan River
13 Benanee
14 Mallee
15 Wimmera–Avon Rivers
16 Border Rivers
17 Moonie River
18 Gwydir River
19 Namoi River
20 Castlereagh River
21 Macquarie–Bogan Rivers
22 Condamine–Culgoa Rivers
23 Warrega River
24 Paroo River
25 Darling River
26 Lower Murray River

V South Australian Gulf

1 Fleurieu Peninsular
2 Myponga River
3 Onkaparinga River
4 Torrens River
5 Gawler River
6 Wakefield River
7 Broughton River
8 Mambray Coast
9 Willochra Creek
10 Lake Torrens
11 Spencer Gulf
12 Eyre Peninsular
13 Kangaroo Island

VI South-west Coast

1 Esperance Coast
2 Albany Coast
3 Denmark River
4 Kent River
5 Frankland River
6 Shannon River
7 Warren River
8 Donnelly River
9 Blackwood River
10 Busselton Coast
11 Preston River
12 Collie River
13 Harvey River
14 Murray River (WA)
15 Avon River
16 Swan Coast
17 Moore–Hill Rivers
18 Yarra Yarra Lakes
19 Ninghan

VII Indian Ocean

1 Greenough River
2 Murchison River
3 Wooramel River
4 Gascoyne River
5 Lyndon–Minilya Rivers
6 Ashburton River
7 Onslow Coast
8 Fortescue River
9 Port Hedland Coast
10 De Grey River

VIII Timor Sea

1 Cape Leveque Coast
2 Fitzroy River (WA)
3 Lennard River
4 Isdell River
5 Prince Regent River
6 King Edward River
7 Drysdale River
8 Pentecost River
9 Ord River
10 Keep River
11 Victoria River
12 Fitzmaurice River
13 Moyle River
14 Daly River
15 Finniss River
16 Bathurst and Melville Island
17 Adelaide River
18 Mary River (WA)
19 Wildman River
20 South Alligator River
21 East Alligator River
22 Goomadeer River
23 Liverpool River
24 Blyth River
25 Goyder River
26 Buckingham River

IX Gulf of Carpentaria

1 Koolatong River
2 Walker River
3 Roper River
4 Towns River
5 Limmen Bight River
6 Rosie River
7 McArthur River
8 Robinson River
9 Calvert River
10 Settlement Creek
11 Mornington Island
12 Nicholson River
13 Leichhardt River
14 Morning Inlet
15 Flinders River
16 Norman River
17 Gilbert River
18 Staaten River
19 Mitchell River (WA)
20 Coleman River
21 Holroyd River
22 Archer River
23 Watson River
24 Embley River
25 Wenlock River
26 Ducie River
27 Jardine River
28 Torres Strait Islands
29 Groote Eylandt

X Lake Eyre

1 Georgina River
2 Diamantina River
3 Cooper River
4 Lake Frome
5 Finke River
6 Todd River
7 Hay River

XI Bulloo-Bacannia

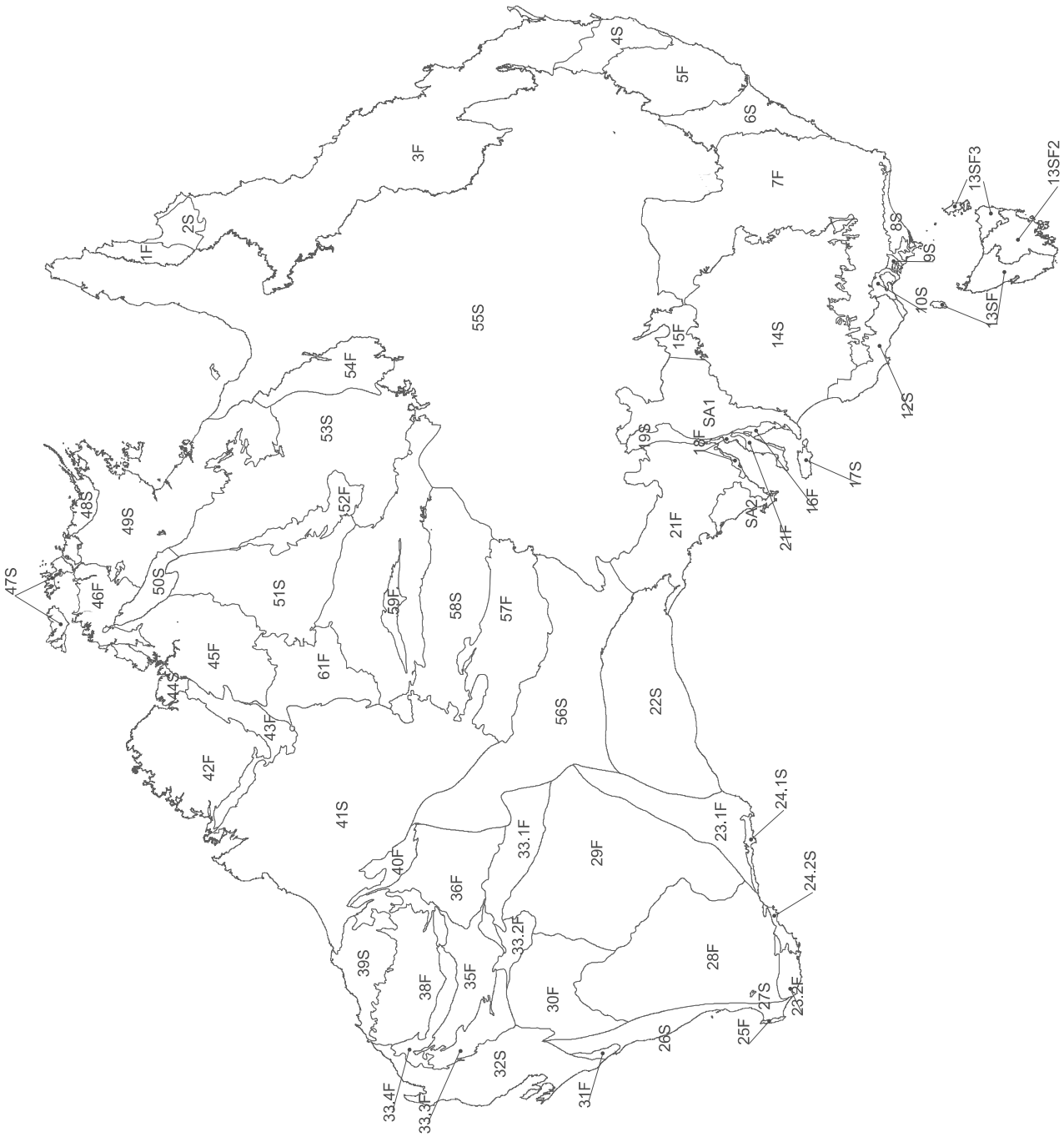
1 Bulloo River
2 Lake Bancannia

XII Western Plateau

1 Gairdner
2 Nullarbor
3 Warburton
4 Salt Lake
5 Sandy Desert
6 Mackay
7 Burt
8 Wiso
9 Barkly

Source: Geoscience Australia — 1997.

APPENDIX 3 AUSTRALIA'S GROUNDWATER PROVINCES



1F	Coen	23.1F	Albany–Fraser 1	41S	Canning
2S	Laura	23.2F	Albany–Fraser 2	42F	Kimberley
3F	Tasman	24.1S	Bremer 1	43F	Halls Creek
4S	Clarence–Moreton	24.2S	Bremer 2	44S	Bonaparte
5F	New England	25F	Leeuwin	45F	Ord–Victoria
6S	Sydney	26S	Perth	46F	Pine Creek
7F	Lachlan	27S	Collie	47S	Melville
8S	Gippsland	28F	Yilgarn–Southwest	48S	Arafura
9S	Western Port	29F	Yilgarn–Goldfields	49S	McArthur
10S	Port Phillip	30F	Yilgarn–Murchison	50S	Daly River
11S	Otway Highlands	31F	Northampton	51S	Wiso
12S	Otway	32S	Carnarvon	52F	Tennant Creek
13SF1	Tasmania 1	33.1F	Capricorn 1	53S	Georgina
13SF2	Tasmania 2	33.2F	Capricorn 2	54F	Mt Isa–Cloncurry
13SF3	Tasmania 3	33.3F	Capricorn 3	55S	Great Artesian
14S	Murray	33.4F	Capricorn 4	56S	Officer
15F	Olary	34F	Marymia	57F	Musgrave
16F	Mt Lofty–Flinders Ranges	35F	Banemall	58S	Amadeus
17S	St Vincent	36F	Calyie–McFadden	59F	Arunta
18F	Yorke Peninsular	37F	Sylvania	60S	Ngalia
19S	Pirie–Torrens	38F	Hamersley	61F	Tanami
21F	Gawler	39S	Pilbara	SA1	Adelaide Geosyncline
22S	Eucla	40F	Paterson	SA2	Eyre Peninsula

Source: NLWRA 2001.

A4.1 CORRESPONDENCE, Water Account Industry Groupings with ANZSIC

	ANZSIC			
Water Account Industry Groupings	*Division*	*Subdivision*	*Group*	*Class*
Agriculture	A	01	011 to 016	0111 to 0169
Livestock, pasture, grains & other agriculture	A	01	011 to 012	0111 to 0112, 0123 to 0125
	A	01	014 to 015	0141 to 0142, 0151 to 0159
	A	01	012, 016	All except Rice component of Class 0121, 0122, 0169
Dairy farming	A	01	013	0130
Vegetables	A	01	011	0113
Sugar	A	01	016	0161
Fruit	A	01	011	0115 to 0119
Grapes	A	01	011	0114
Cotton	A	01	016	0162
Rice	A	01	012	Rice component only of Class 0121, 0122, 0169
Services to agriculture; hunting & trapping	A	02	021 to 022	0211 to 0220
Forestry & fishing	A	03 to 04	030 to 042	0301 to 0420
Mining(a)	B	11 to 15	110 to 152	1101 to 1520
Coal mining	B	11	110	1101 to 1102
Oil & gas extraction	B	12	120	1200
Metal ore mining	B	13	131	1311 to 1317, 1319
Other mining	B	14	141 to 142	1411, 1419 to 1420
Manufacturing	C	21 to 29	211 to 291	2111 to 2949
Food, beverage & tobacco	C	21	211 to 219	2111 to 2190
Textile clothing, footwear & leather	C	22	221 to 226	2211 to 2262
Wood & paper products	C	23	231 to 233	2311 to 2339
Printing, publishing & recorded media	C	24	241 to 243	2411 to 2430
Petroleum, coal, chemical & associated products	C	25	251 to 256	2510 to 2566
Non-metallic mineral products	C	26	261 to 264	2610 to 2640
Metal products	C	27	271 to 276	2711 to 2769
Machinery & equipment	C	28	281 to 286	2811 to 2869
Other manufacturing	C	29	291 to 294	2911 to 2949
Electricity & gas supply	D	36	361 to 362	3610 to 3620
Water supply, sewerage & drainage services	D	37	370	3701 to 3702
Construction	E	41 to 42	411 to 425	4111 to 4259
Wholesale & retail trade	F,G	45 to 53	451 to 532	4511 to 5329
Accommodation, cafes & restaurants	H	57	571 to 574	5710 to 5740
Transport & storage	I	61 to 67	611 to 670	6110 to 6709
Finance, property & business services	J,K,L	71 to 78	711 to 786	7111 to 7869
Government administration	M	81 to 82	811 to 820	8113 to 8200
Education	N	84	841 to 844	8410 to 8440
Health & community services	O	86 to 87	861 to 872	8611 to 8729
Cultural, recreational & personal services	(b)P, Q	91 to 96	911 to 963	9111 to 9634
Household(c)	. .	. .	. .	. .
Environment(c)	. .	. .	. .	. .

. . not applicable

(a) Services to mining (ANZSIC 1511 to 1514, 1520) included in Mining total.

(b) Excluding Private households employing staff (ANZSIC 9700).

(c) Household and Environment do not correspond with ANZSIC industry classifications.

GLOSSARY

ANZSIC	AUSTRALIAN AND NEW ZEALAND STANDARD INDUSTRIAL CLASSIFICATION (ANZSIC) provides a classification of businesses by type of activity. The classfication has four levels from division (1 digit code which is the broadest), subdivision (2 digit code), group (3 digit code) and class (4 digit code which is the finest level of classification).
Aquifer	A geologic formation which is capable of holding water and through which water can percolate. Aquifers are capable of yielding quantities of groundwater for economic activities.
Asset (economic)	An entity functioning as a store of value: i) over which ownership rights are enforced by institutional units, individually or collectively; and ii) from which economic benefits may be derived by its owner by holding it, or using it, over a period of time. The economic benefits consist of primary incomes derived from the use of the asset and the value, including possible holding gains/losses, that could be realised by disposing of the asset or terminating it.
Bulk entitlements	A specified volume of water that can be extracted from a waterway by water authorities.
Catchment	The area of land determined by topographic features within which rainfall will contribute to run-off at a particular point. The catchment for a major river and its tributaries is usually referred to as a basin.
Desalination	Desalination is a process where salt is removed from water with a high salt content (usually seawater but sometimes other brackish water) to make it suitable for use (usually for consumption, but sometimes for industrial purposes).
Developed Yield	Average annual volume of surface water that can be diverted for use with existing infrastructure. Developed yield represents the portion of the divertable yield that is currently available for use (from NLWRA 2001).
Diversion	Volume of water diverted from a stream or aquifer on a sustained basis to supply water for rural, urban and industrial usage. Includes diversions undertaken by a water authority, private company or a group of individuals authorised to act as a water supply authority.
Divertible Yield	Average annual volume of surface water that can be diverted utilising both existing infrastructure and potential infrastructure under the ultimate level of development, taking no account of environmental water requirements (from NLWRA 2001).
Economic activity	An activity or process involving or resulting in a financial transaction.
Economic allocated volume	The volume of water that is diverted from the mean annual run-off for economic activities on a sustained basis. (See Developed Yield).
Environmental account	An information system and framework that links the economic activities and uses of a resource to changes in the natural resource base, thus linking resource use with the System of National Accounts.
Environmental flows	Water allocated to the environment or for environmental purposes.
Evapotranspiration	Loss of water from evaporation and by plant transpiration.

Flow accounts	General term used in environmental accounting for a framework which presents information on the physical flows of resources throughout the economy. Flow accounts published for water include supply and use tables.
Gigalitre	One thousand million litres.
Gross value	Refers to the gross value of commodities produced. It is the value placed on recorded production at the wholesale prices realised in the market place.
Groundwater	Water occurring below the ground's surface.
Groundwater assets	Average volume of water extracted from the groundwater system each year on a sustainable basis. In ARWC (1987a) it is measured as Total Divertible Resource and in the future it will be measured as sustainable yield.
Groundwater management areas (GMA)	Zones within groundwater provinces that are either independent or mutually dependent aquifer systems, the zones are geographically independent and are locations where management may be needed to control groundwater extraction.
Groundwater province	Areas where there is a broad uniformity of hydrogeological and geological conditions with reasonably uniform water-bearing characteristics. The provinces are split into zones of predominantly sedimentary or fractured rocks.
Industry gross product (IGP)	A measure of the unduplicated gross product of an industry, defined as gross output minus intermediate inputs, plus indirect taxes less subsidies.
Industry gross value added (IGVA)	Represents the value added by an industry to the intermediate inputs used by the industry.
Input-output	A compilation method which provides a description of the inter-industry flows of goods and services within the economy, and the structure and interrelationship of industries.
In-stream use	The use of freshwater *in situ* (e.g. within a river or stream). Can include recreation, tourism, scientific and cultural uses, ecosystem maintenance, hydro-electricity and commercial activities, and dilution of waste. The volume of water required for most in-stream uses cannot be quantified, with the exception of hydro-electricity generation.
Irrigation scheduling	The process of making decisions about when to irrigate and how much water to apply to an irrigated crop to maximise net returns.
Kilolitre	One thousand litres.
Licensed allocations	The maximum volume of water available to the holder of the licence to extract water.
Mains Water	Mains water is water supplied to a user often through a non-natural network (piped or open channel), and where an economic transaction has occurred for the exchange of this water. The majority of mains water tends to be supplied by the water supply component of WATER SUPPLY, SEWERAGE AND DRAINAGE SERVICES (ANZSIC group 3701). The water supply component consists of units mainly engaged in storage, purification or distribution of water by pipeline or carrier. It also includes the operation of irrigation systems that supply water to a farm and the supply of steam and hot water.
Mean Annual Run-off (MAR)	The definition of mean annual run-off (MAR) is dependent on the run-off regime for each river basin. However, generally it is the maximum average annual flow observed in the river basin (AWRC 1987a).
Megalitre	One million litres.
Mine dewatering	A process whereby run-off and rainfall is collected at mining sites and the water is usually reused for mining processes.
National Accounts	A systematic summary of national economic activity (both flows and balances). At a detailed level they show a statistical picture of the structure of the economy.
Non-point source discharge	Water discharged to the environment that is spread out over a wide area, e.g. agriculture discharges are where water is not discharged from a single point.

Point source discharge	A stationary source of water discharged to the environment, e.g. sewerage outfall point.
Pool price	The median price in a list of what buyers and sellers are willing to pay for water. It is halfway between the highest seller price and the lowest buyer bid (DNRE 2001).
Regulated discharge	Water discharged after use where that discharge does not match the natural flow regime of the receiving water body. For example, wastewater discharged into a river, ocean or land outfall by a sewerage service provider is considered a regulated discharge. Water discharged from a household is not considered to be a regulated discharge because it is usually discharged into a sewerage system.
Return flow	Volume of water returned (after use for economic purposes) to a stream or water body, that is available for subsequent withdrawal.
Reuse water	There are multiple interpretations of the term 'reuse water'. In the water account, reuse water refers to wastewater that may have been treated to some extent and used again without first being discharged to the environment. It excludes water reused on-site, for example on-farm water reuse, or water constantly being recycled within a manufacturing plant.
River basin	The area drained by a stream and its tributaries where surface run-off collects. In an area of uncoordinated drainage, drainage patterns define a basin.
Run-off	The amount of rainfall which actually reaches a storage or stream.
Salinity	Presence of salts in soil or water.
SEEA	SEEA is the System for Integrated Economic and Environmental Accounting. It is a framework used to develop environmental accounts by integrating environmental information into an accounting framework. The SEEA publication provides the conceptual basis for developing a framework to describe the interrelationship between the natural environment and the economy.
Self-extracted water	Water extracted directly from the environment for use (including rivers, lakes, groundwater and other water bodies). Some of this water is then distributed via a water provider to others.
Self supplied water	See self-extracted water.
Stock tables	Stock tables for water depict the annual average surface and groundwater resources available in Australia for economic and environmental use. These are based on long term averages of the resources available. Measurements of water assets are made at two points in time which represent the opening and closing stocks. If possible, this should include a component breakdown into allocated resources (for economic and environmental use) and unallocated resources. The definitions used may vary due to state and territory practices and can include the potential sustainable yields/bulk entitlements/allocations.
System of National Accounts (SNA)	The System of National Accounts (SNA) is an international framework which can be used to develop a comprehensive, consistent and flexible set of macro-economic accounts.
Sewage	(see wastewater)
Sewerage	Infrastructure used to remove sewage (wastewater).
Sustainable Yield (under sustainable flow regime)	The limit on potentially divertable surface water that is allowed to be diverted from a resource after taking account of environmental volumes and making provision for environmental water needs (from NLWRA 2001).
Surface water	Water flowing or held in streams, rivers and other wetlands in the landscape.
Surface water allocations	The amount of water declared by the governing body to be available to a water user.
Surface water assets	The average volume of water that could be diverted from a basin each year on a sustained basis.

Total Divertible Resource	Defined as the average annual volume of water, using current technology that can be removed from developed or potential groundwater sources on a sustained basis without causing adverse effects or long term depletion of storages. See Groundwater assets definition.
Total water use	Total water use is equal to mains water use plus self-extracted water use plus reuse water use.
Wastewater	Any water which has been used at least once and cannot be used again without being treated.
Water allocation	Allocation refers to the volume of water allocated for use either within or external to the surface water management area by way of licensing arrangements and formal entitlements to water (from NLWRA 2001).
Water assets	Include the value of the water, the value of the licences and entitlements as well as the water supply and storage infrastructure.
Water Consumption	Water consumption is equal to mains water use plus self-extracted water use plus reuse water use minus mains water supplied to other users minus in-stream use (where applicable).
Water entitlement	An individual's ongoing right to access water.
Water harvesting	Collecting and using water from a catchment's surface.
Water quality	The physical, chemical and biological measures of water.
Water right(s)	A formally established, or legal, authority to take water from a water body and to retain the benefits of its use. Rights may be attenuated in a number of ways and are referred to in different jurisdictions as licenses, concessions, permits, access entitlements or allocations (Productivity Commission 2003).
Water stocks	Surface and groundwater resources available in Australia for economic and environmental use (see Stock tables).
Water trading	The process of buying and selling water entitlements, where entitlements can include water supplied as part of a licence, allocation or other entitlement.
Water use	See Total water use.

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