EXPLANATORY NOTES

INTRODUCTION

1 The ABS Water Account is one of the physical accounts produced by the ABS as part of an environmental accounting system. 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 that 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 footprints; and
- implications of environmental policy measures across sectors (for example, regulation, charges and incentives).

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

4 When the ABS produced the 1993–94 to 1996–97 and 2000–01 Water Accounts, any readily available data on water resources from various government and non-government organisations was used and aggregated. This 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.

5 To produce the 2004–05 Water Account, a new ABS survey of water providers was developed and supplementary questions were added to several existing ABS surveys. This approach simplified compilation of the account as well as reducing the time required to produce the account. The survey approach will also help to improve the comparability and consistency of data, allowing analysis and evaluation over time. As with previous Water Accounts, data from other sources was also used to fill gaps, and for data consistency and checking. The additional survey activity undertaken by the ABS for 2004–05 did not duplicate existing data collections, but collected comprehensive data on all organisations supplying water in Australia and more detailed information on water use.

ENVIRONMENTAL ACCOUNTING FRAMEWORK

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

RELATIONSHIP BETWEEN ENVIRONMENTAL ACCOUNTS AND NATIONAL ACCOUNTS

7 Water supply and use tables provide a framework to link core components of the National Accounts to physical information. These tables are a component of physical input-output (I-O) tables and allow comparison of physical and monetary information through interactions between the economy and environment. Physical data are presented in supply and use tables while some linkages to economic data are also made.

WATER SUPPLY AND USE

Scope

8 Chapter 2 aggregates all available quantitative data (megalitres) in terms of the supply and use of water within the Australian economy for the financial year 2004–05. Supply and use tables illustrate the economic use of water and include self-extracted, distributed, and regulated discharge (including in-stream use) and effluent reuse.

9 The use of saline 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 Accounts is fresh water only. This is consistent with the international SEEA accounting framework. Some information on saline water use for electricity generation is included in Chapter 6.

Coverage

10 The supply table incorporates comprehensive coverage. Coverage in the use tables includes all major users, with some estimates included for minor users.

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

- individuals and companies that directly extract water from surface water and groundwater sources for their own use (e.g. domestic, industrial, commercial or agricultural use);
- individuals and companies that use water supplied by water providers for domestic, industrial, agricultural 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 370) but other industries also supply a small amount of water; and
- water providers who 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/diffuse discharges;
- the impact of storm water infiltration into the sewerage reticulation system; and
- water that is extracted from the environment as part of oil and gas extraction as this process is under-reported.

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:

- 2004–05 Water Supply Survey
- 2004–05 Agricultural Survey
- 2004–05 Economic Activity Survey (of mining and manufacturing industries; sporting associations; thoroughbred, harness and greyhound racing associations and trainers)
- 2004–05 Electricity Generators Survey of Water Use
- March 2005 Monthly Population Survey

15 State and Territory government agencies and major businesses from which data was used in this publication include:

- In New South Wales, the Department of Natural Resources and the Department of Energy, Utilities and Sustainability. In particular, the *2004–05 NSW Water Supply and Sewerage Performance Monitoring Report* (DEUS 2006).

Data Sources continued

- In Victoria, the Department of Sustainability and Environment. In particular, the *2004–05 State Water Report – A Statement of Victorian Water Resources* , (DSE 2006) and the *2004–05 Victorian Water Review* (Victorian Water Industry Association 2006).
- In Queensland, the Department of Natural Resources and Water. In particular, *2004–05 Annual Reports and Financial Statements of Queensland's Category 2 Water Authorities* (NRW 2006), *2004–05 Annual Water Statistics* (NRW 2006), and *2004–05 Urban Water Service Providers Queensland Report* (NRW 2006).
- In South Australia, the Department of Water, Land and Biodiversity Conservation.
- In Western Australia, the Department of Water, Water Corporation, Water and Rivers Commission and Office of Water Regulation.
- In Tasmania, the Department of Primary Industries, Water and Environment and Hydro Tasmania.
- In the Northern Territory, the Power and Water Authority and the Department of Lands, Planning and Environment.
- In the Australian Capital Territory, ACTEW and Environment ACT.

16 Surveys conducted by industry associations, as well as annual reports of water providers were used. These include:

- *Water Services Association Australia (WSAA) Facts 2005 Australian Urban Water Industry report* (WSAA 2005).
- *Australian National Committee on Irrigation and Drainage (ANCID) Australian Irrigation Water Benchmarking Report for 2004–05* (ANCID 2006).
- Annual/environmental reports for 2004–05 for various water providers (lists of those that provided a water supply or sewerage service were collected from State agencies and industry contacts).
- *MDBC Water Audit Monitoring Report 2004–05 and Special Audit NSW Barwon-Darling/Lower Darling Cap Valley Report of the Independent Audit Group* , MDBC, Canberra (MDBC 2006).

Methods for Calculating Water Supply and Use

17 These notes are intended as a general guide to the method of calculating estimates of water supply and use. For more detail on the methods please contact the Director, Centre of Environment and Energy Statistics (CEES), Australian Bureau of Statistics.

18 Supply and use tables integrate data from a wide range of sources. Some of the water supply and use data are from decentralised sources as most water distribution is managed by local governments or privatised water authorities. The data collected from these sources were collated to a uniform standard and aggregated to a State and Territory level.

19 A complete list of water providers in 2004–05 was compiled from information supplied by State and Territory regulatory departments, industry bodies, and other water providers. All water providers identified were surveyed in the ABS 2004–05 Water Supply Survey.

20 Water providers provided information on:

- Volume of water extracted from the environment and/or the volume of water received from other water providers (this information was used to reconcile total supplies and to avoid double counting of water volumes).
- Volumes of water supplied to particular industries (e.g. agriculture, mining and manufacturing) and for household use. Irrigation/rural water suppliers also reported the amount of water applied to particular crop types. This information was reconciled with water use as reported by water users. It also enabled the calculation of coefficients (e.g. ML/employee) for industries for which there was little or no recent data on water use.

Methods for Calculating Water Supply and Use continued

- The amount of water used by the water supply organisation (including mains flushing and water used on parks and gardens operated by councils that supplied water).
- Volume of water lost from the supply system. 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, and customer meter errors were considered to be a form of use by the customers.
- Volume of water discharged by location and the level of treatment of the water discharged (primary, secondary, or tertiary).
- Volumes of reuse water supplied to particular industries (e.g. agriculture, mining and manufacturing) and for household use. Irrigation/rural water suppliers also reported the amount of reuse water applied to particular crop types. Water reuse volumes were not imputed where water providers did not provide reuse water volumes.
- Distributed water supplied to households and the population served by water supply and sewerage services. Where information was not available for distributed water supplied to households, State level coefficients based on average kilolitre use per person were used.
- The amount of water released for environmental provisions. This only includes those environmental provisions released in accordance with a specific plan prepared in conjunction and/or approved by the appropriate environmental (resource) regulator.

21 For agriculture

- Distributed water use was the amount supplied to the agricultural industry by water providers.
- Total water use by agriculture was sourced from the 2004–05 ABS Agriculture Survey. The amount of distributed water used was subtracted from total water used, the remainder was assumed to be self-extracted water.
- Reuse water usage includes water used from regional reuse schemes.

22 For mining and manufacturing

- Distributed water use was the amount supplied to the mining and manufacturing industries by water providers.
- Self extracted water use and water discharge was sourced from the 2004–05 Economic Activity Survey of Mining and Manufacturing industries, supplemented with information from company websites and annual/environmental reports.
- 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.

23 For electricity and gas

- Distributed, self extracted and in-stream water use, and discharge for electricity generation were sourced from ABS 2004–05 Electricity Generators Survey of Water Use.

24 For cultural, recreational and personal services

- Distributed water use for parks and gardens and sports fields were sourced from the 2004–05 Water Supply Survey.
- Distributed and self-extracted water use for sporting associations (including golf courses and racecourses) were sourced from the ABS 2004–05 Economic Activity Survey.

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

26 Household water use;

Methods for Calculating Water Supply and Use continued

- Distributed water use was the amount supplied to households by water providers.
- Self-extracted water use by households was calculated by applying average State kilolitre use per person coefficients and applying this to the population known not to be served by water providers (estimated by subtracting the population served by water providers from the total population in each State and Territory).

Data Quality and Reliability

27 Data for the Water Account are from a range of sources with variable degrees of consistency and reliability. Data suppliers were asked to indicate the reliability of the data provided, however comprehensive data was not obtained from all respondents.

28 All water supply, distributed water use and reuse water information was collected by the ABS. This information can be used with a high degree of confidence.

29 Data on self-extracted use was compiled from a range of sources. The degree of confidence that can be attached to these estimates is variable.

- Water supply and electricity and gas estimates were based on the ABS 2004–05 Water Supply Survey and the 2004–05 Electricity Generators Survey of Water Use and can be used with a high degree of confidence.
- Mining and manufacturing industries estimates were based on ABS surveys and can be used with a moderate degree of confidence.
- Agriculture industry estimates were based on the ABS 2004–05 Agriculture Survey, and can be used with a moderate degree of confidence.
- Only a limited amount of survey data was available for other industries, estimates were mostly based on coefficients of water use. These estimates can be used with a low 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 AGRICULTURAL PRODUCTION - CHAPTER 5

Data Sources

30 The gross value of irrigated agricultural production was estimated using data from the ABS 2004–05 Agricultural Survey as well as other ABS collections and administrative data used to calculate the value of agricultural commodities produced (see *Agricultural Commodities, 2004–05, Australia* ABS cat. no. 7121.0 and *Value of Principal Agricultural Commodities Produced, 2004–05, Australia, Preliminary*, ABS cat. no. 7501.0).

Method of Calculation

31 The ABS 2004–05 Agricultural Survey collected information on production of agricultural commodities and the area of irrigated land used for several crop and pasture types. The ABS also collects and publishes data on the value of agricultural commodities produced (see ABS cat. no. 7121.0). By using these primary data sources, estimates of the value of irrigated agricultural production were made. This method has built on the method used in the first and second Water Accounts and estimates are comparable with those estimates.

32 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 2004–05 Agricultural Survey. This volume was then applied to the value of cotton in the respective States.

33 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 under-estimating bias as it is likely that commodities grown on irrigated land will be more productive (e.g. t/ha) than the same commodity grown on non-irrigated land.

Method of Calculation continued

- Method 2. The percentage of agricultural establishments (farms) that 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 over-estimate the value of irrigated production as not all production on all irrigated farms is from irrigated land.

34 The simple average of these methods was used to estimate the value of irrigated production for vegetables, fruit (including nuts), grapes, other pastures and sugar. The second method was used to estimate the value of milk production from dairy pastures as data from the Victorian Dairy Industry Survey of 1999 and Armstrong, et al. (1998) indicated that where a dairy farm was irrigated, nearly all milk production can be attributed to irrigation.

35 Method 1 was used to estimate the value of other cereals as investigations of the data revealed that the 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 over-estimate of irrigation production. A combination of methods was used for other crops.

Data Quality and Reliability

36 Calculation of the gross value of irrigated production is based on several assumptions so these estimates should be used and interpreted cautiously.

WATER ACCESS ENTITLEMENTS, ALLOCATIONS AND TRADING - CHAPTER 8

Data Sources

37 Data presented in this chapter are drawn from the ABS publication *Water Access Entitlements, Allocations and Trading 2004–05, Australia*, ABS Cat no. 4610.0.55.003.

38 State and Territory agencies were asked to provide data on water access entitlements, allocations and trading to the ABS from their administrative systems.

39 Data were sought from the agencies responsible for administering water access entitlements, allocations and trading in each State and Territory. The main data providers were:

- Department of Natural Resources, New South Wales
- Department of Sustainability and Environment, Victoria
- Department of Natural Resources and Water, Queensland
- Department of Water, Land and Biodiversity Conservation, South Australia
- Department of Water, Western Australia
- Department of Primary Industries and Water, Tasmania
- Department of Natural Resources, Environment and the Arts, Northern Territory
- Environment ACT, Australian Capital Territory

Data Quality and Reliability

40 Because of differences in terminology, legislative arrangements and administrative systems, the data need to be interpreted with caution, particularly when making comparisons between jurisdictions. Please refer to the publication *Water Access Entitlements, Allocations and Trading 2004–05, Australia* (ABS 2006d) for further information.

STOCK TABLES - CHAPTER 9

Data Sources

41 The data presented in chapter 9 were drawn from a variety of sources.

42 The rainfall and run-off data for 2004–05 were supplied by the BRS. The data were generated for the Australian Water Availability Project, a project involving the BRS, the CSIRO and the Bureau of Meteorology. These agencies are working together to develop an on-line, operational system for monitoring soil moisture, run-off and other components of water balance, based on the method developed by Welsh et al. (2006). A steady-state catchment water balance model was used to generate the run-off data presented in this account. For more information please contact the BRS.

43 Information on the storage capacity of large dams was from the ANCOLD Register of Large Dams. Data from the register were confronted against dam owners' administrative data and adjusted accordingly.

Data Sources continued

44 Information on the volume in storage in large dams was sourced from publicly available information, supplemented by a direct collection of data by the ABS. For large dams for which there was no information available, the ABS derived an estimate using a standard statistical imputation process. The imputed data contributed less than 10% of the Australian total.

Data Quality and Reliability

45 The data on rainfall and run-off are the results of complex models based on data collected by a range of agencies. Because of the complexity of the model and possible errors associated with the data used in the model, these estimates should may be used with a moderate degree of confidence.

46 The data on large dam capacity and dam storage levels are based on publicly available information and direct collection by the ABS. Imputed storage volumes accounted for less than 10% of Australia's total dam storage. These estimates may be used with a high degree of confidence.

NEXT EDITION

47 At this stage the next Water Account is scheduled to be produced in May 2011 in respect of 2008–09. This would continue the current four-yearly cycle of the publication. On-going developments in the concepts, data sources and methods used for water accounting along with additional resources, may enable the Water Account to be produced more frequently or ahead of schedule.

ABBREVIATIONS

'000	thousand
$m	million dollars
ABS	Australian Bureau of Statistics
ACT	Australian Capital Territory
ANCID	Australian National Committee on Irrigation and Drainage
ANCOLD	Australian National Committee on Large Dams
ANZSIC	Australian and New Zealand Standard Industrial Classification
ASR	aquifer storage and recovery
ATSE	Australian Academy of Technological Sciences and Engineering
Aust.	Australia
AWA	Australian Water Association
AWR 2005	Australian Water Resources 2005
AWRC	Australian Water Resources Council
BE	bulk entitlement
BoM	Bureau of Meteorology
BRS	Bureau of Rural Sciences
COAG	Council of Australian Governments
CSIRO	Commonwealth Scientific and Industrial Research Organisation
DEUS	New South Wales Government Department of Energy, Utilities and Sustainability
DIPNR	New South Wales Government Department of Infrastructure, Planning and Natural Resources
DSE	Victorian Government Department of Sustainability and Environment
DWR	South Australian Department of Water Resources
EFG	Environmental Flow Guidelines
EPA	Environmental Protection Agency
GA	Geoscience Australia
GCCC	Gold Coast City Council
GL	gigalitre
GWh	gigawatt hour
ha	hectare
I-O	input-output
IGVA	industry gross value added
kL	kilolitre
km²	square kilometre
kWh	kilowatt hour
L	litre
mg	milligram
mm	millimetre
MAR	mean annual run-off
MDBC	Murray-Darling Basin Commission
ML	megalitre

nec	not elsewhere classified
no.	number
NCC	National Competition Council
NCP	National Competition Policy
NLWRA	National Land and Water Resources Audit
NPI	National Pollutant Inventory
NRW	Queensland Department of Natural Resources and Water
NSW	New South Wales
NT	Northern Territory
NWC	National Water Commission
NWI	National Water Initiative
PC	Productivity Commission
PIRSA	Primary Industries and Resources South Australia
Qld	Queensland
SA	South Australia
SEEA	System of Integrated Environmental and Economic Accounting
SEEAW	System of Environmental-Economic Accounting for Water
SNA	System of National Accounts
SOI	Southern Oscillation Index
SWMA	surface water management area
Tas.	Tasmania
UN	United Nations
Vic.	Victoria
WA	Western Australia
WSAA	Water Services Association of Australia
yr	year