

Data and Methods

The objective of the *Australian water markets report* series is to inform market participants, regulators, policymakers, researchers and other interested parties about Australia’s water market activity. The series documents traded products, trading activity, prices and relevant contextual information that influences supply and demand. The report is not intended to be a contemporary guide to inform market participants on their day-to-day water trading decisions rather, it highlights trends and market activity over the year.

Considering the varied readership for this report, and the inconsistencies in market structure and terminology around Australia, it is important to note the key terminology and reporting conventions used in the report.

Because this report is primarily a statistical publication, it is also important to understand how the data have been sourced and used.

Data sources

The *Australian water markets report* relies on information provided by a number of organisations. Each jurisdiction has at least one department or agency that facilitates operation of its water market. Each jurisdiction also has a statutory register to record entitlement transfers and other dealings. Some independent irrigation infrastructure operators manage wholesale water rights and facilitate trade between members.

For the 2007–08 edition of the *Australian water markets report*, data were provided to the National Water Commission on a voluntary basis. However, for the 2008–09 to 2015–16 editions, the majority of water market information was collected and compiled by the Bureau of Meteorology.

Other data presented in this report have been sourced from:

- Bureau of Meteorology—for seasonal conditions and dam storage volumes
- Australian Government Department of Agriculture and Water—for water access entitlements secured by the Australian Government for the environment
- Australian Government Department of the Environment and Energy—for environmental water managed and traded by the Commonwealth Environmental Water Holder
- Murray–Darling Basin Authority—for environmental water trade in the Murray–Darling Basin (MDB) and detailed information on water access entitlements managed for the environment
- jurisdictional water agencies—for information on market performance and additional information on trades.

Category 6 of the Water Regulations 2008

Under the *Water Act 2007*, the Bureau of Meteorology (BOM) is responsible for collecting and managing Australia’s water information. The Water Regulations 2008 (Cwlth) include schedules for the delivery of various categories of water data to the Bureau of Meteorology. Category 6 of the Regulations covers data on entitlements on issue, water allocations, and entitlement and allocation trading (Table 1). The *Australian water markets report* makes use of subcategories 6a to 6d, with 6a to 6c being collected and combined with information from prior years to form a water trade database.

Table 1 Category 6 data—Water Regulations 2008

Subcategory	Description
6a	Water access rights and irrigation rights
6b	Trades or leases of Australian water access entitlements and irrigation rights
6c	Trades of Australian water allocations
6d	Formal announcements of Australian water allocations
6e	Permits to operate or construct a minor storage
6f	Permits to self-extract water from a bore
6g	Permits to self-extract water from a watercourse

The Water Regulations 2008 detail agencies, or ‘water persons’, that are required to send information to the Bureau of Meteorology. There are currently over 200 such persons, divided into 11 classes.

The Water Regulations 2008 also outline how often information must be sent to the Bureau of Meteorology, by data subcategory and water person class. For subcategory 6a, water persons are required to send data on an annual basis. For subcategories 6b and 6c, data must be sent on a weekly basis. Subcategory 6d is required to be sent when an announcement is made.

Table 2 lists water persons that send subcategory 6a to 6d information to the Bureau of Meteorology.

Table 2 Water persons submitting water trade data

Water person	Supplier code	Jurisdiction	Entitlements on issue (6a)	Entitlement trade (6b)	Allocation trade (6c)
Lead water agencies					
ACT Environment and Sustainable Development Directorate	w00075	ACT	Yes	Yes	Yes
NSW Department of Primary Industries	w00077	NSW	Yes	Yes	No
NT Department of Land Resource Management	w00067	NT	Yes	No	No
Queensland Department of Natural Resources and Mines	w00066	Queensland	Yes	Yes	Yes

Water person	Supplier code	Jurisdiction	Entitlements on issue (6a)	Entitlement trade (6b)	Allocation trade (6c)
SA Department of Environment, Water and Natural Resources	w00078	SA	Yes	Yes	Yes
Tasmanian Department of Primary Industries, Parks, Water and Environment	w00072	Tasmania	Yes	Yes	No
Victorian Department of Environment, Water, Land and Planning	w00074	Victoria	Yes	Yes	Yes
WA Department of Water	w00076	WA	Yes	Yes	No
Rural water utilities and storage operators					
Coleambally Irrigation Co-operative Limited	w00044	NSW	No	Yes	Yes
Murray Irrigation Limited	w00158	NSW	No	Yes	Yes
Murrumbidgee Irrigation Limited	w00163	NSW	No	Yes	Yes
Water NSW	w00224	NSW	No	No	Yes
SunWater	w00227	Queensland	No	No	Yes
Central Irrigation Trust	w00033	SA	No	Yes	Yes
Tasmanian Irrigation Pty Ltd	w00197	Tasmania	No	Yes	Yes
Gascoyne Water Co-operative Ltd	w00101	WA	No	No	Yes
Harvey Water	w00118	WA	No	Yes	Yes

It is important to note that in some jurisdictions agencies have a separation of responsibilities. For example, in New South Wales, the Department of Primary Industries provides information on entitlements on issue and entitlement trade, Water NSW provides information on allocation trades made across irrigation areas and water systems, and irrigation infrastructure operators provide data on allocation trades occurring within irrigation areas.

Allocation announcements and carryover

Although the Regulations contain provisions for collecting allocation announcements and carryover, in many cases these data are in a form that is difficult to use. As a result, much of the allocation announcement data presented in this report have been sourced directly from the relevant agencies:

- [NSW Office of Water—water accounting](#)
- [Victorian Water Register](#)
- [Resource Manager Northern Victoria](#)
- [SA Department of Environment, Water and Natural Resources—water allocations](#)
- [Southern Rural Water—allocation history.](#)

Seasonal conditions

Climate and water information presented in this report (including dam storage volumes, rainfall deciles and streamflows) has been sourced from the Bureau of Meteorology, via either personal communications or its website.

Environmental water

This report presents three types of environmental water data:

- volume of environmental water managed (entitlements held) as at 30 June
- additional water secured for the environment during the financial year
- environmental water transfers (allocation trades) during the financial year.

Managed

Environmental water is managed across a number of agencies. Data were sourced from each agency:

- Commonwealth Environmental Water Office—annual report of the Australian Government Department of the Environment and Energy
- Victorian Environmental Water Holder—annual report
- NSW Office of Environment and Heritage—website and annual reports
- SA Department of Environment, Water and Natural Resources—website and personal communications
- Murray–Darling Basin Authority—annual reports.

Secured

Each year the Australian Government and state governments may secure additional water entitlements for the environment. In the past these have been primarily sourced by purchasing water from irrigators through entitlement markets. However, recent focus has been on efficiency gains from investing in improved water infrastructure.

Two relevant purchasing terms are securing of entitlements (when the money is paid) and registering of entitlements (when the deeds are transferred). An entitlement can be secured in one year but registered in the next.

The *Australian water markets report* focuses on when entitlements were secured. Data are sourced from:

- the Australian Government Department of Agriculture and Water Resources, which provides information on the volume of entitlement secured (and registered) by water system and reliability
- [Victorian Environmental Water Holder annual reports](#)
- [NSW Office of Environment and Heritage annual reports.](#)

Transfers

Information on environmental trades and transfers has been sourced from:

- Commonwealth Environmental Water Office, which provided detailed information on every trade or transfer it conducted, including the trade identifier, origin and destination water system, reason for trade and volume. This was integrated into the water trade database
- Murray–Darling Basin Authority, which generated a yearly report on allocation trade in the southern MDB that was verified by jurisdiction bodies.

Market performance

Through the Council of Australian Governments, New South Wales, Victoria, Queensland, South Australia and the Australian Capital Territory have agreed on performance standards for how quickly 90 per cent of water market trades should be resolved in the MDB. Entitlement trade performance standards focus on the number of days between a trade application and approval, and between approval and registration. Allocation trade performance standards focus on the number of days between application and approval of intrastate and interstate trades. ‘Stop the clock’ provisions mean delays are not counted if additional information is required from the applicant.

Because agencies are required to monitor and publish their own performance, the main sources for these performance statistics are:

- New South Wales—[Water Register website](#)
- Victoria—[Victorian water trading annual report](#)
- Queensland—[Business Queensland website](#) (entitlement and unsupplemented allocation trade) and [SunWater](#) (supplemented allocation trade)
- South Australia—[WaterConnect website](#).

Reporting conventions and terminology

Reporting period

The *Australian water markets report 2015–16* provides data for the 2015–16 water year (from 1 July 2015 to 30 June 2016). For context, it also provides historical information from 2007–08 to 2015–16 and information on events that influenced markets up to the end of June 2016.

Regional coverage

The Australian water market consists of many separate markets of varying size, activity and interconnectivity, and each state and territory has water resources with tradeable products. Therefore, the report is structured as a review of the major water markets, particularly those within the MDB.

In this edition, additional emphasis has been placed on providing information for markets outside the MDB with sufficient trade and for which sufficient data are available. In many cases, focus is placed on geographically defined water systems that contain markets for multiple traded products across multiple trading zones. This approach has been used to provide contextual information for the area, such as potential supply and demand factors driving market behaviour. Ideally analysis would focus individually on each market as a system of connected trading zones for a specific product but, for tractability, a higher level focus is required and some aggregation is necessary.

In some sections of the report, data are presented for the southern MDB, the northern MDB and the rest of Australia. Water systems defined to be within the MDB are:

- Southern MDB
 - Avoca
 - Broken
 - Campaspe
 - Eastern Mt Lofty
 - Goulburn
 - Loddon
 - Lower Darling
 - Mallee
 - Marne Saunders
 - Murrumbidgee
 - NSW Murray
 - Ovens
 - SA Murray
 - Victorian Murray
 - Wimmera–Avon
- Northern MDB
 - Barwon–Darling
 - Condamine–Balonne
 - Gwydir
 - Lachlan
 - Macquarie–Castlereagh
 - Moonie
 - NSW Border Rivers
 - NSW Far West
 - Namoi
 - Qld Border Rivers
 - Warrego–Paroo–Bulloo–Nebine.

All other water systems are treated as being outside the MDB.

Water sources

Surface water is the main water source for trading activity in Australia so it is the main focus of the *Australian water markets report* series. Groundwater trading occurs in certain areas of Australia and is reported where data are available. Water system boundaries have been tailored for surface water but groundwater trade is incorporated where possible. Because groundwater resource boundaries can significantly differ from surface water boundaries, this approach is less

than perfect. Other human-made water sources (such as desalination and recycling) may be involved in Australia’s water markets in future years.

Definitions of water trades

For this report, a water trade is defined as one of the following transactions:

- a transfer of an entitlement from one legal entity to another, with or without a change in location—commonly referred to as ‘permanent trade’.
- an assignment (or transfer) of water allocation from one authorised water user to another or between water accounts held by the same water user, with or without a change in location—commonly referred to as a ‘temporary trade’.

Permanent trade

Transfers made as part of land sales are included in the report as water trades.

Transfers of ownership between related parties, often involving zero prices, are included in the trade data and are not reported separately because existing water registers cannot adequately single out such trades. Reported volumes and numbers of trades include these transfers unless otherwise stated. However, price estimation has been designed to exclude these transfers (see Price Information).

Transfers accompanied by a change in location from one water source, delivery system or trading zone to another are included in the report.

Dealings that vary the location of an entitlement without an accompanying transfer of ownership are not included in the report.

Temporary trade

It could be argued that movement of water between accounts held by the same legal entity should not be counted as a water trade. However, registers and information systems maintained by states and territories typically do not identify such dealings separately from transactions between two independent parties.

This edition of the report does not report entitlement ‘leases’—that is, temporary transfers of entitlements between legal entities. Significant variation in lease periods means that each of these trades lies somewhere in a spectrum between an allocation and an entitlement trade, with markets being somewhat ill-defined. In addition, numbers and volumes of these trades are relatively small (407 transactions totalling 42 GL across the whole of Australia in 2015–16), with few products maintaining more than 10 transactions per year.

Water market terminology

Australian jurisdictions have adopted various terms to describe statutory water rights and dealings. Different terms may be used between jurisdictions for the same market product or dealing. To avoid confusion, this report uses the following terms defined by the National Water Initiative (COAG 2004):

- water access entitlement—a perpetual or ongoing entitlement to exclusive access to a share of water from a specified consumptive pool as defined in the relevant water plan. Generally referred to in this report as water entitlements
- water allocation—the specific volume of water allocated to water access entitlements in a given season, defined according to rules established in the relevant water plan.

How each jurisdiction’s terms align with these generic definitions is presented in Table 3.

Table 3 Water terminology used in each jurisdiction, 30 June 2015

Jurisdiction	Water access entitlement equivalent	Water allocation equivalent
Australian Capital Territory	Water access entitlement	Water allocation
New South Wales	Water access licence	Water allocation
Northern Territory	Water licence	Water licence
Queensland	Water allocation	Seasonal water assignment
South Australia	Water licence (bundled), water access entitlement (unbundled)	Water allocation
Tasmania	Water licence	Water allocation
Victoria	Water share (unbundled), take and use licence (bundled)	Water allocation
Western Australia	Water licence	Water allocation ^a

^a Applies only to irrigation corporations Harvey Water and Gascoyne Water.

Note: This is not an exhaustive list of all entitlements on issue in each jurisdiction.

Source: NWC 2013

Many jurisdictions have more than one reliability class of water access entitlement. Typically, jurisdictions maintain at least two classes; available water is allocated first to higher reliability entitlements and then to lower reliability entitlements. As a result, higher reliability entitlements tend to receive higher allocation volumes, on average (for a given nominal entitlement volume).

Jurisdictions use various terms to describe their water entitlement classes. Table 4 lists common reliability classes for each jurisdiction.

Table 4 Common water access entitlement reliabilities

Jurisdiction	Reliability
New South Wales	General security, high security, supplementary, local water utility, major utility, domestic and stock, conveyance, unregulated river, aquifer
Northern Territory	High, low, medium
Queensland	High-A priority, high-A1 priority, high-A2 priority, high class A, high class B, high class C, high priority, medium-A priority, medium-A1

	priority, medium-A2 priority, medium-A3 priority, medium priority, risk-A priority, risk-B priority, risk priority
South Australia	Class 1 (stock and domestic purposes), class 2 (urban water use for country towns), class 3a (irrigation excluding Qualco/Sunlands), class 3b (irrigation in Qualco/Sunlands), class 4 (recreation), class 5 (industrial), class 6 (urban water use for Metro Adelaide), class 7 & 8 (environment), class 9 (wetlands)
Tasmania	Surety 1, surety 3, surety 5, surety 6, surety 7, surety 8
Victoria	High reliability, low reliability, spill, seasonal, drainage or stormwater, Wimmera–Mallee pipeline

To allow easier comparison of water access entitlements across jurisdictions (particularly in the MDB), in some parts of this report entitlements are classified as ‘higher reliability’ and ‘lower reliability’. Higher reliability entitlements are primarily New South Wales high security, Victorian high reliability, Queensland high priority and all South Australian water access entitlements. Lower reliability entitlements are primarily New South Wales general security, Victorian low reliability and Queensland medium priority water access entitlements.

Water access entitlements are not generally comparable across water systems and reliability types. Allocation of water for each entitlement is driven by the local hydrology and water sharing plan rules. Large differences exist in long-term average allocation levels or yields for water entitlements across Australia. Yields from water entitlements in different systems can differ significantly, even if they belong to the same reliability class.

This report focuses on nominal water access entitlement volumes. These represent the maximum volume of water allocation the entitlements provide.

ABARES has sought to ensure that the statistics in this report match those published by state and territory government water agencies but there may be differences driven by different cleaning methods, system classifications, data sources, or reported statistics.

Trading volume and net change

Two measures of market activity are defined and reported:

- Total volume of entitlement transfers or water allocation trades for a particular jurisdiction, zone or water source is calculated as the total volume of trades within the jurisdiction, zone or water source plus the volume of outbound trades. To remove double-counting from the measure of total volume, inbound trades are not included, as an outbound trade from one jurisdiction, zone or water source is an inbound trade to another.
- The net change in entitlement volume or water allocation holdings for a particular trading zone, water source or jurisdiction is calculated as the difference between inbound trades and outbound trades.

For some water systems, entitlement data appeared to be duplicated. Trade volumes were reported at a system level with duplicate trades removed, as identified by trades on the same registration date for the same entitlement identifier and traded volume.

Price information

Availability and quality of price information for trades of entitlements and water allocations vary, depending on the depth of the particular market and the reliability of available data. Prices for entitlements are generally more variable because the volume and number of trades in entitlements is smaller than for water allocations.

Historically, most jurisdictions did not have a statutory requirement for buyers and sellers to disclose prices, and no jurisdiction had a mechanism to verify the price data provided. From 1 July 2014, implementation of the Murray–Darling Basin Plan 2012 water trading rules requires that prices be disclosed for trades within the MDB. However, many systems still contain very few reported prices.

Zero consideration trades (trades with an agreed price of \$0 per megalitre) are valid in a range of situations. The most common scenarios are gifts between family members, transfers between related entities, and transfers between rights held by the same entity. For example, environmental water allocations are commonly transferred between environmental water holders to meet environmental watering needs. Similarly, if an irrigator operates two geographically separated properties, each with its own water access entitlement and water allocation, and wishes to transfer a water allocation from one property to another, this would be registered with the government water agency as a zero dollar trade.

Although zero consideration trades may be genuine, they usually do not represent an economic transaction driven by the underlying value of the traded good, and it is therefore preferable to remove these trades before reporting price information. Before calculating the price statistics presented in this report, price data were cleaned to remove trades with zero prices and other outliers that were unlikely to be genuine. Allocation and entitlement price data for 2015–16 were cleaned by:

- 1) excluding transactions where the price was reported as less than or equal to \$1 per megalitre, or greater than \$5,000 per megalitre.
- 2) further excluding outliers by employing a Cook's distance method (Cook 1977). The influence of each transaction on the mean price for a specific water system and traded product was measured as its Cook's distance, using a regression of the data against a constant. Transactions with a Cook's distance greater than 4 divided by the number of observations for that system and product were excluded from price calculations.

Transactions that were not excluded by this process were deemed to represent genuine trades.

Previous editions of the report employed a two-standard-deviation approach in place of step 2, in which prices outside of two standard deviations from the average were excluded. The approach was changed because it was observed that prices are usually not normally or symmetrically distributed. This resulted in a systematic bias for excluding large outliers but retaining small outliers. However, it was subsequently identified that the Cook's distance approach is very similar and does not address these problems. Further research is underway to identify better methods for cleaning trades and estimating robust market prices.

For some NSW regions with limited trade activity, entitlement transfers (commonly referred to as 71M trades, referencing the relevant section of the Water Management Act 2000) were excluded from price analysis as they included large numbers of outliers that were not captured by the Cook's approach. These trades include transactions where water is sold in conjunction with land and for which prices do not adequately represent the value of the water.

Estimating the total value of entitlements on issue

Estimates of the market value of entitlements on issue presented in the [National overview](#) were derived using the entitlement types shown in Table 5.

Table 5 Water systems included in the estimate of value of entitlements on issue

Water system	Resource	Regulated or unregulated	Reliability
Barron	Surface water	Regulated	Medium
Broken	Surface water	Regulated	Low
Broken	Surface water	Regulated	High
Burnett	Groundwater	Regulated	Medium
Burnett	Groundwater	Unregulated	Medium
Burnett	Surface water	Regulated	Medium
Campaspe	Surface water	Regulated	High
Campaspe	Surface water	Regulated	Low
Goulburn	Surface water	Regulated	High
Goulburn	Surface water	Regulated	Low
Gwydir	Surface water	Regulated	General
Gwydir	Surface water	Regulated	Supplementary
Hunter	Surface water	Regulated	General
Hunter	Surface water	Regulated	Supplementary
Hunter	Surface water	Unregulated	Other
Lachlan	Surface water	Regulated	General
Lachlan	Surface water	Regulated	High
Lachlan	Surface water	Unregulated	Other
Loddon	Surface water	Regulated	High
Macquarie–Castlereagh	Surface water	Regulated	General
Macquarie–Castlereagh	Surface water	Regulated	Supplementary
Murrumbidgee	Groundwater	Unregulated	Supplementary
Murrumbidgee	Surface water	Regulated	General
Murrumbidgee	Surface water	Regulated	High

Murrumbidgee	Surface water	Regulated	Supplementary
Murrumbidgee	Surface water	Unregulated	Other
Namoi	Groundwater	Unregulated	General
Namoi	Groundwater	Unregulated	Supplementary
Namoi	Surface water	Regulated	General
Namoi	Surface water	Regulated	Supplementary
Namoi	Surface water	Unregulated	Other
NSW Murray	Groundwater	Unregulated	Supplementary
NSW Murray	Surface water	Regulated	General
NSW Murray	Surface water	Regulated	High
NSW Murray	Surface water	Regulated	Supplementary
NSW Murray	Surface water	Unregulated	Other
Ovens	Surface water	Regulated	High
Ovens	Surface water	Regulated	Other
Ovens	Surface water	Unregulated	Other
Qld Fitzroy	Groundwater	Regulated	Medium
Qld Fitzroy	Groundwater	Unregulated	Medium
Qld Fitzroy	Surface water	Regulated	Medium
SA Murray	Surface water	Regulated	General
SA Murray	Surface water	Regulated	High
SA Murray	Surface water	Regulated	Other
Thomson–Macalister	Surface water	Regulated	High
Thomson–Macalister	Surface water	Regulated	Low
Victorian Murray	Surface water	Regulated	High
Victorian Murray	Surface water	Regulated	Low
Werribee	Surface water	Regulated	Low

Average prices of water entitlements in the Murray–Darling Basin

Average prices in the southern and northern MDB presented in the [National overview](#) were derived using the entitlement types shown in Table 6. These represent all entitlement classes for which a price series from 2007–08 to 2015–16 could be reliably estimated. In general, each class required five trades per year with genuine reported prices.

Table 6 Water systems included in the estimate of average entitlement prices

Water system	Reliability
Broken	High
Campaspe	High
Campaspe	Low
Goulburn	High
Goulburn	Low
Gwydir	General
Lachlan	General
Macquarie–Castlereagh	General
Murrumbidgee	General
Murrumbidgee	High
Murrumbidgee	Supplementary
Namoi	General
NSW Murray	General
NSW Murray	High
NSW Murray	Supplementary
Ovens	High
SA Murray	High
Victorian Murray	High
Victorian Murray	Low

Water Trade Database

To facilitate analysis of water trade data between years, each edition of this report has maintained a trade database that compiles information on entitlements on issue (6a), entitlement trades (6b) and allocation trades (6c).

For this report, a new database was constructed from the 2015–16 category 6a–6c data provided by the Bureau of Meteorology and the previous 2014–15 water markets database (ABARES 2016). Changes from the 2014–15 edition include refinements to water system and reliability classifications.

Significant efforts have been made to clean data before it is incorporated into the database, and when data are used to create volume and price estimates. The following sections highlight issues with the raw data and cleaning methods used. The methods described are those used for the

2014–15 and 2015–16 data, which are very similar to those used for 2013–14. Data for previous years have mostly been taken ‘as is’, noting that similar cleaning steps would have been performed for those years.

The Bureau of Meteorology now maintains a publically available database and performs similar cleaning steps. Those data are planned for use for future editions of the report.

Data issues and qualifications

Care has been taken to overcome potential issues with the category 6 water data (see Table 1). One major issue relates to consistency—water persons are required to send information they hold in electronic format in a data management system but these data are not required to be complete, consistent with data provided by other persons, or consistent with data previously provided. As a result:

- a number of useful data fields are incomplete for many records
- inconsistencies arise between data sources, particularly in naming conventions. This is especially pronounced when different providers are responsible for different subcategories of data in the same jurisdiction. In addition, each data provider may use different interpretations for data variables
- even for a specific water person, naming conventions can change over time, making it difficult to compare data with previous years
- similarly, water system, trading zone, and plan area data have generally improved in recent years, with many persons providing information at a more detailed and refined scale. However, this introduces difficulties in comparing consistent water system boundaries across years.

Potential issues also arise when multiple water persons provide the same information to the Bureau of Meteorology. This can occur when a jurisdiction has multiple water persons, or when interstate transactions are recorded on both the incoming and outgoing state registers. In many jurisdictions, irrigation infrastructure operators hold bulk entitlements and issue underlying entitlements to irrigators. Both the bulk entitlement and the underlying entitlements may be reported separately by the jurisdiction agency and the irrigation infrastructure operator, effectively double-counting the volume on issue.

Finally, potential issues arise because of the frequency with which data are collected, with persons required to send trading data on a weekly basis. Because information is provided for trades in progress, some corrections are required when a trade falls through. Some persons revise previous trades through bulk ‘balancing’ trades for negative volumes. Others just reclassify the trade as ‘incomplete’, ‘refused’ or similar.

Price data are routinely incomplete. See the ‘Reporting Conventions and Terminology—Price Information’ section for more detail.

Data cleaning and transformation—trade

The Bureau of Meteorology provided data on entitlement trade (subcategory 6b) and allocation trade (subcategory 6c) for 2015–16 as two spreadsheets containing the data fields listed in Table 7.

More detailed descriptions of the intended meaning and purpose of each variable are can be found in the metadata and contextual information requirements (BOM 2015), and accompanying explanatory notes. However, detailed element lists for category 6 data (Table 1) only came into

effect on 28 July 2015. Data submitted prior to this may be subject to individual interpretation by each data provider.

Table 7 Original data fields—subcategories 6b and 6c

Variable	Description
Allocation Trade Identifier	Unique code for each allocation trade, as defined by the water person.
Critical needs purchase	Whether the trade was a critical needs purchase.
Data Extract Period End	Ending date of Bureau of Meteorology data extraction.
Data Extract Period Start	Starting date of Bureau of Meteorology data extraction.
Date Application is Lodged	Date when the trade application was lodged.
Date of Application	Date provided on the trade application.
Date of Approval	Date the trade was approved by the water person.
Date of Lodgement at Register	Date the trade approval was lodged by the water person at the relevant water register.
Date of Registration	Date the trade was officially registered by the water person.
Destination State	State or jurisdiction to which the trade was destined.
Destination Trading Zone	Trading zone to which the trade was destined (a water resource plan area comprises multiple trading zones).
Destination Water Resource Plan Area	Water resource plan area to which the trade was destined (a water system comprises multiple water resource plan areas).
Destination Water System	Water system to which the trade was destined (a state comprises multiple water systems).
Entitlement Trade Identifier	Unique code for each entitlement trade, as defined by the water person.
Environmental Trade	Whether the trade was for the environment.

Variable	Description
Is Property Trade Sale	Whether the trade (and potentially the trade value) includes a property sale.
Lease Duration	Number of time units of lease.
Lease Duration Unit	If entitlement trade is a lease, the unit of time of the lease (for example, years).
MDB subregion	Whether trade occurred in the Southern MDB, Northern MDB, or elsewhere.
MDB/non-MDB	Whether trade occurred in the Murray–Darling Basin.
Net Price	Total trade value excluding trade fee.
Origin State	State or jurisdiction from where trade originated.
Origin Trading Zone	Trading zone from where the trade originated, as defined by the water person (a water resource plan area comprises multiple trading zones).
Origin Water Resource Plan Area	Water resource plan area from where the trade originated, as defined by the water person (a water system comprises multiple water resource plan areas).
Origin Water System	Water system from where the trade originated, as defined by the water person (a state comprises multiple water systems).
Price/ML	Traded price in dollars per megalitre.
Quantity	Volume traded.
Regulated	Whether traded water resource is regulated by dams or other water infrastructure.
Reliability	Type of reliability, as defined by the water person.
Resource Type	Type of resource, as defined by the water person.
Supplier Code	The unique organisation ID assigned by the Bureau of Meteorology to any organisation that provides water information.
Trade involves a change in ownership	Whether the trade included a change in ownership.
Trade Status	Approval status of the trade.
Trade Type	Type of entitlement trade, as defined by the water person.

Variable	Description
Unit of Measure	Unit of measure—including ML (megalitres), ha (hectares) and HaIE (hectare irrigation equivalents, exclusively used in South Australia).
Water Access Entitlement Identifier	Unique code of entitlement being traded, as defined by the water person.
Water Access Entitlement Type	Type of entitlement traded, as defined by the water person.

To address the issues discussed in the previous section, a number of cleaning and transformation steps were applied to the raw data tables before they were appended to the Water Trade Database, as described in this section.

Unsuccessful trades

For previous editions the raw category 6 data contained a number of trades that were either still in progress by the end of the year or were unsuccessful. These trades were filtered from the dataset by their specific trade status. For this edition no such trades were included in the raw data.

Interstate trades

Interstate trades are registered on both the origin and destination state registers, and have previously been double-counted in the raw category 6 data. To correct for this, interstate trades (identified as those with a different origin state and destination state) were previously filtered based on the water register that reported the trade; Table 8 lists the criteria used for keeping or removing an observation. For this edition this process had already been applied to the raw data.

Table 8 Subsetting rules for interstate trade

Supplier code	Origin state	Destination state	Keep
w00224	NSW	Qld	Yes
w00224	NSW	SA	Yes
w00074	NSW	Victoria	Yes
w00224	SA	NSW	Yes
w00074	SA	Victoria	Yes
w00074	Victoria	NSW	Yes
w00074	Victoria	SA	Yes
w00078	NSW	SA	No
w00224	NSW	Victoria	No
w00078	SA	NSW	No
w00078	SA	Victoria	No
w00224	Victoria	NSW	No
w00078	Victoria	SA	No

Water system labels

A major transformation of the original data was a relabelling of reported water systems. The intention was to maintain consistency with previous data and to disaggregate the NSW Barwon–Darling region into system labels consistent with the Murray–Darling Basin Plan.

Data on reported water systems and trading zones were compared with geographic spatial extents for water systems created for the 2012–13 edition of the report. For New South Wales and South Australia, trading zone information was used, where available, to reclassify water systems. All other data were mapped based on the original reported water system.

Given the large number of trading zones and water system labels, mapping tables are not provided here. However, they can be inferred from the published data tables, which include both the original and final water system labels.

For some areas outside the southern MDB, systems may have been incorrectly assigned. This risk has been mitigated to some extent by delivering data tables to providers to verify aggregate statistics by water system and jurisdiction.

The Bureau of Meteorology recently completed a similar and more comprehensive labelling exercise that considered water systems, trading zones and water sharing plan areas. Their mappings have been applied to the category 6 data published on their new [Water Information Dashboard](#). We aim to make use of this data for future reports.

Reliability labels

Similar to water systems, entitlement reliability classes were relabelled in an attempt to match data across each subcategory. This is summarised in Table 9.

Table 9 Reliability reclassification

New label	Original label
Aquifer	Aquifer, Other (Aquifer), Other (Aquifer (General Security)), Other (Aquifer [High Security])
Conveyance	Conveyance, Other (Regulated River (Conveyance)), Other (Murrumbidgee Irrigation (Conveyance)), Other (Coleambally Irrigation (Conveyance))
Domestic and Stock	Domestic and Stock, Stock And Domestic Allowance, Stock and Domestic, Other (Domestic And Stock)
General	C3a, C3b, C4, General
General A	General A, General-A
General B	General B, General-B
High	C1, C5, C9, High - 50% Minimum, High, High Priority, C7, Very High
High A	High Class A, High-A, High-A Priority
High A1	High-A1 Priority, High A1
High A2	High-A2 Priority, High A2
High B	High B, High-B Priority, High Class B, High- B, High-B
High C	High C, High Class C
Local water utility	Local water utility, Other (Major Utility), Major Utility, Other (Local Water Utility), Major utility
Low	Low
Medium	Medium, Medium Priority

Medium A	Medium-A, Medium A, Medium-A Priority
Medium A1	Medium-A1 Priority, Medium A1
Medium A2	Medium-A2 Priority, Medium A2
Medium A3	Medium-A3 Priority, Medium A3
Other	Other, Other (Salinity And Water Table Management), Drainage or stormwater, Wimmera-Mallee pipeline product, Seasonal, Risk-B Priority, Risk-A Priority, Riska, Risk Priority, Risk Class B, Risk Class A, Risk, Provision, W-M pipeline product, W-M pipeline, Wimmera-Mallee Pipeline Product, Wimmera-Mallee Pipe Product- Water Allow, Water Allowance, Total, Spill, Private Right, Priority 1, Priority, Power Generation, Commercial Aquaculture, 95% reliability
Unregulated	Other (Unregulated River (B Class)), Other (Unregulated River), Other (Unregulated River [Special Additional High Flow]), Other (Unregulated River (Regulated Supply)), Other (Unregulated River (C Class)), Other (Unregulated River (A Class))
Risk B	Risk B
Supplementary	Other (Supplementary Water (Lowbidgee)), Other (Supplementary Water), Supplementary
1	1
3	3
4	4
5	5
6	6
7	7
8	8

For consistency with prior years, reliabilities for South Australian entitlements were reclassified according to their water right type (Table 10).

Table 10 Reliability classification for South Australian entitlements

Water right type	Assigned reliability
Water Access Entitlement Class 1	Domestic and stock
Water Access Entitlement Class 2	Local water utility
Water Access Entitlement Class 3a	High
Water Access Entitlement Class 3b	High
Water Access Entitlement Class 4	Other
Water Access Entitlement Class 5	Other
Water Access Entitlement Class 6	Local water utility
Water Access Entitlement Class 7	Other
Water Access Entitlement Class 8	Other
Water Access Entitlement Class 9	Other
Water Licence	High
Water Licence Holding	High
Water Licence Taking	High

Recent advice from the SA Department of Environment, Water and Natural Resources suggests that classes 1, 4 and 5 should also be labelled as high reliability, with classes 1 and 5 serving the

environment and critical human water needs, and classes 3a, 3b and 4 forming the general consumptive pool. This will be incorporated into future editions of the report.

Resource classification

Two variables—Resource Type and Regulated—were generated from information provided in the original Resource Type variable, as shown in Table 11. The new Resource Type variable identifies whether the water is sourced from groundwater or surface water. The Regulated variable specifies whether flows are controlled through the use of infrastructure to store and release water.

Table 11 Resource classification by supplier

Supplier code	State	Original Resource Type	Resource Type	Regulated / Unregulated
w00075	ACT	Groundwater	Groundwater	Unregulated
w00075	ACT	Groundwater and surface water	Surface water	Unregulated
w00075	ACT	Surface water	Surface water	Unregulated
w00077	NSW	Groundwater	Groundwater	Unregulated
w00224	NSW	Groundwater	Groundwater	Unregulated
w00074	NSW	Regulated	Surface water	Regulated
w00044	NSW	Regulated River	Surface water	Regulated
w00077	NSW	Regulated River	Surface water	Regulated
w00158	NSW	Regulated river	Surface water	Regulated
w00163	NSW	Regulated River	Surface water	Regulated
w00224	NSW	Regulated River	Surface water	Regulated
w00078	NSW	Regulated Surface Water	Surface water	Regulated
w00077	NSW	Unregulated River	Surface water	Unregulated
w00067	NT	Groundwater	Groundwater	Unregulated
w00067	NT	Surface Water	Surface water	Unregulated
w00066	Qld	Supplemented Ground Water	Groundwater	Unregulated
w00227	Qld	Supplemented Ground Water	Groundwater	Unregulated
w00066	Qld	Supplemented Surface Water	Surface water	Regulated
w00227	Qld	Supplemented Surface Water	Surface water	Regulated
w00066	Qld	Unsupplemented Ground Water	Groundwater	Unregulated
w00066	Qld	Unsupplemented Surface Water	Surface water	Unregulated
w00074	SA	Regulated	Surface water	Regulated
w00224	SA	Regulated River	Surface water	Regulated
w00033	SA	Regulated surface water	Surface water	Regulated
w00078	SA	Regulated Surface Water	Surface water	Regulated
w00078	SA	Surface Water	Surface water	Unregulated
w00078	SA	Underground Water	Groundwater	Unregulated
w00072	Tasmania	GROUNDWATER	Groundwater	Unregulated
w00072	Tasmania	Groundwater	Groundwater	Unregulated
w00197	Tasmania	Supplemented surface water	Surface water	Regulated
w00072	Tasmania	Surface water	Surface water	Unregulated

w00074	Victoria	Drainage or stormwater	Surface water	Unregulated
w00074	Victoria	Groundwater	Groundwater	Unregulated
w00074	Victoria	Managed aquifer recharge (MAR)	Groundwater	Unregulated
w00074	Victoria	Regulated	Surface water	Regulated
w00224	Victoria	Regulated River	Surface water	Regulated
w00078	Victoria	Regulated Surface Water	Surface water	Regulated
w00074	Victoria	Unregulated waterway, spring or run-off	Surface water	Unregulated
w00076	WA	Groundwater	Groundwater	Unregulated
w00101	WA	Groundwater	Groundwater	Unregulated
w00076	WA	Surface Water	Surface water	Unregulated
w00118	WA	Surface water	Surface water	Regulated

Additional data fields

To facilitate analysis and maintain consistency with prior data, a number of variables were created from the existing data:

- **Trade Type**
 - set to 'Allocation' for all 6c trades, 'Lease' for 6b trades with a value in the Lease Duration variable, and 'Entitlement' for all other 6b trades
- **Trade Subtype**
 - a renaming of the original Trade Type variable. Relevant for entitlement trades but blank for allocation trades
- **Price**
 - a renaming of Net Price
- **Price per ML**
 - this variable recalculates the price per megalitre for a trade. If Price or Quantity are zero, the Price per ML is zero or NA. Otherwise, the Price per ML is the quotient of Price (total value) and Quantity
- **Origin Water System Raw**
 - a renaming of the original Origin Water System variable
- **Destination Water System Raw**
 - a renaming of the original Destination Water System variable
- **Reliability Raw**
 - a renaming of the original Reliability variable
- **MDB**
 - identifies whether the final origin water system for the trade resides within the Murray–Darling Basin, as per Reporting Conventions—Regional Coverage
- **Connected MDB**
 - this new variable identifies those water systems within the southern connected Murray–Darling Basin, where allocations can be traded across water systems and states. This

variable will be YES for surface water allocation trade that originated from the following water systems: NSW Murray, Murrumbidgee, Lower Darling, Campaspe, Loddon, Goulburn, Bullarook, Broken, Victorian Murray and SA Murray

- **Calendar Year**

- calendar year during which the trade took place. Derived from the registration date if available, otherwise from the approval date or application date

- **Month**

- month the trade took place. Derived from the registration date if available, otherwise from the approval date or application date

- **Financial Year**

- financial year during which the trade took place. Derived from the registration date if available, otherwise from the approval date or application date

Additional cleaning

Additional cleaning was performed on the final database to correct problems identified for specific subsets of data. These include:

- reclassifying supplementary water from regulated to unregulated
- price corrections.

Supplementary water

Supplementary water is essentially unregulated water, as take occurs only during uncontrolled flood events. Supplementary water in regulated systems was previously classified as regulated water and has been corrected for this edition.

Price corrections

Price per megalitre for supplier w00033 appeared to be recorded incorrectly as the total value of the transaction. This was corrected by relabelling the total price as the price per megalitre and recalculating the total price. Supplier information was not available for 2013–14 and earlier; trades for this supplier were identified as those with an Origin State equal to 'SA' and a four-digit Trade Identifier.

Total prices reported in the 2013–14 database for 2007–08 to 2012–13 were actually price per megalitre, except for South Australia entries in 2012–13 and Queensland entitlement entries in 2008–09. These have been corrected.

Analysis of price data supports the conclusion that the interpretation of price as either total transaction value or price per unit has been largely inconsistent, even for data from a single provider within a water year.

For example, prices reported for the majority of trades in the Goulburn system between 4 June and 11 June 2008 were fairly consistent at around \$500 per megalitre. However, six trades were excessively low and were surprisingly reported to the second decimal place. Accounting for slight rounding errors, multiplying the price by volume for these trades gives a value of exactly 500 for every trade.

A possible explanation is presented in Table 12, with problems occurring when prices are either incorrectly reported by a seller or incorrectly interpreted by the party recording the trade.

Table 12 Effect of price reporting and interpretation on recorded prices

Price reported as:	Price interpreted as:	Total price recorded	Price per ML recorded
Total price (\$)	Total price (\$)	Total price (\$)	Price per ML (\$/ML)
Total price (\$)	Price per ML (\$/ML)	Total price times quantity (\$ * ML)	Total price (\$)
Price per ML (\$/ML)	Total price (\$)	Price per ML (\$/ML)	Price per ML ² (\$/ML ²)
Price per ML (\$/ML)	Price per ML (\$/ML)	Total price (\$)	Price per ML (\$/ML)

Other sources of measurement error include transpositions of digits and decimal places.

An objective procedure was run to attempt to correct these issues, but was deemed to have a low accuracy. Instead, prices were manually inspected within each trading zone for a specific product type to identify and correct transactions most likely to be measurement errors. These corrections can be identified by comparing the Price per ML field against the Price per ML Raw.

Data cleaning and transformation—entitlements on issue

Data on entitlements on issue (category 6a) for the 2015–16 year were received from the Bureau of Meteorology in a spreadsheet containing the data fields listed in Table 13.

As with the trade data, more detailed descriptions of the intended meaning and purpose of each variable are available in the metadata and contextual information requirements (BOM 2015) and accompanying explanatory notes. However, detailed element lists for category 6 data only came into effect on 28 July 2015. Data submitted before that may be subject to individual interpretation by each data provider.

Table 13 Original data fields—subcategory 6a

Variable	Description
Date of Issue	Date the entitlement was issued.
Is New Entitlement	Whether the entitlement is a new issue.
Quantity	Quantity of unit of measure associated with the entitlement.
Reliability	Type of reliability, as defined by the water person.
Reporting as at Date	Date for which the report on entitlements on issue was generated by the Bureau of Meteorology.
Resource Type	Type of resource, as defined by the water person.
State	State or jurisdiction where the entitlement is located.
Supplier Code	The unique organisation ID assigned by the Bureau of Meteorology to any organisation that provides water information.

Variable	Description
Tradeable Interstate	Either YES or NO on whether the entitlement and its allocation can be traded interstate.
Tradeable Intraregion	Either YES or NO on whether the entitlement and its allocation can be traded within the same water system.
Tradeable Intrastate	Either YES or NO on whether the entitlement and its allocation can be traded to other water systems in the same state.
Trading Zone	Trading zone where the entitlement is located, as defined by the water person.
Unit of Measure	Area or volumetric unit of measure associated with the entitlement.
Water Access Entitlement Identifier	Unique code of entitlement on issue, as defined by the water person.
Water Resource Plan Area	Water resource plan area where the entitlement is located, as defined by the water person.
Water Right Type	Type of entitlement, as defined by the water person.
Water System	Water system where the entitlement is located.

Cleaning and transformation of data on entitlements on issue followed similar steps as for the trade data, but were less extensive. Major transformations involved relabelling water systems and reliability classes, as detailed in the ‘Water system labels’ and ‘Reliability labels’ sections.

Similarly, new variables—Resource Type and Regulated—were created from the original Resource Type variable, as detailed in the ‘Resource classification’ section.

A Financial Year variable was created and populated with the value ‘2015–16’.

Final data fields

A complete list of the final variables stored in the Water Trade Database tables is presented in Tables 14 and 15. If the variable has been modified or generated, this is noted (with further detail provided in the previous sections). Otherwise, the variable has been renamed from the original label to meet the restrictions of the database application.

Table 14 Entitlement and allocation trade data table variables—Water Trade Database

Variable	Description
APPLICATION_DATE	Date provided on the trade application.

Variable	Description
APPROVAL_DATE	Date the trade was approved by the water person. Most applicable for allocation trades, because in many jurisdictions allocation rights are transferred on this date.
CALENDAR_YEAR	Calendar year during which the trade took place. Derived from the registration date, if available, otherwise from the approval date or application date.
CHANGE_OF_OWNERSHIP	Whether the trade included a change in ownership, as reported by the water person.
CONNECTED_MDB	Generated variable to designate whether the origin water system is part of the southern connected Murray–Darling Basin.
CRITICAL_NEEDS_PURCHASE	Whether the trade was a critical needs purchase, as reported by the water person. Largely incomplete.
DESTINATION_STATE	State to which the trade was destined.
DESTINATION_TRADING_ZONE	Trading zone to which the trade was destined.
DESTINATION_WATER_SYSTEM	A relabelling of the water system to where the trade was destined to achieve consistency between years.
DESTINATION_WATER_SYSTEM_RAW	Original label for the water system to where the trade was destined, as designated by the water person (2014–15) or as labelled in the original database (2013–14 and earlier).
ENTITLEMENT_TYPE	Entitlement type, as defined by the water person (2014–15) or as labelled in the original database (2013–14 and earlier).
ENVIRONMENTAL_TRADE	Whether the trade was for the environment, as reported by the water person. Data for this variable is largely incomplete.
FINANCIAL_MONTH	Financial month the trade took place. Derived from the registration date, if available, otherwise from the approval date or application date.
FINANCIAL_YEAR	Financial year during which the trade took place. Derived from the registration date, if available, otherwise from the approval date or application date.
LEASE_DURATION	Number of time units of the lease.
LEASE_DURATION_UNIT	If the entitlement trade is a lease, the unit of time of the lease (for example, years).

Variable	Description
LODGEMENT_DATE	Date the trade approval was lodged by the water person at the relevant water register.
MDB	Generated variable to designate whether the origin water system is part of the Murray–Darling Basin.
MONTH_	Calendar month the trade took place. Derived from the registration date, if available, otherwise from the approval date or application date.
ORIGIN_STATE	State from where trade originated.
ORIGIN_TRADING_ZONE	Trading zone from where the trade originated.
ORIGIN_WATER_SYSTEM	A relabelling of the water system from where the trade originated to achieve consistency between years.
ORIGIN_WATER_SYSTEM_RAW	Original label for the water system from which the trade originated, as designated by the water person (2014–15) or as labelled in the original database (2013–14 and earlier).
PRICE	The total value of the trade, derived from PRICE_RAW but with price corrections. Note that missing entries before 2014–15 are reported as zero prices. Missing entries for 2014–15 and 2015–16 are reported as null.
PRICE_ML	Price divided by quantity. See price caveats (Price Information and Additional Cleaning) for more detail on transformations and use of price data.
PRICE_ML_RAW	The original reported price per megalitre for the trade.
PRICE_RAW	The original reported total price for the trade.
REGISTRATION_DATE	Date the trade was officially registered by the water person. Most common date provided for entitlement trades, but often 1–2 months behind the application or approval date.
REGULATED	A relabelling of whether the water source is regulated or unregulated. Generated from the raw resource type per supplier code and origin state.
REGULATED_RAW	Whether water resource is regulated, as originally submitted by water person.
RELIABILITY	A relabelling of reliability classes to achieve some consistency between years and jurisdictions.

Variable	Description
RELIABILITY_RAW	Entitlement reliability class, as defined by the water person (2014–15) or as labelled in the original database (2013–14 and earlier).
RESOURCE_TYPE	A manual relabelling of the raw resource type to either surface water or groundwater by supplier code and origin state.
RESOURCE_TYPE_RAW	Resource type as originally submitted by water person.
SUPPLIER_CODE	Identifier for the water person providing the data point.
TRADE_IDENTIFIER	Unique code for the trade, as assigned by the water person.
TRADE_INVOLVES_PROPERTY_SALE	Whether the trade (and therefore the trade value) includes a property sale, as reported by the water person. Data for this variable is largely incomplete.
TRADE_STATUS	Status of trade as identified by water person.
TRADE_SUBTYPE	Additional detail on the type of entitlement traded, as provided by the water person.
TRADE_TYPE	Either entitlement, lease or allocation, generated from the data subcategory and lease duration field.
U_ID	A new variable created as a unique identifier for the transaction.
UOM	The unit of measure for the quantity of trade. Either megalitres (ML), hectares (HA) or hectare irrigation equivalents (HaIE).
VOLUME_	Quantity of trade (note that this include trades in megalitres [ML], hectares [ha] and hectare irrigation equivalents [HaIE]).

Table 15 Entitlements on issue data table variables – Water Trade Database

Variable	Description
DATE_OF_ISSUE	Date that the entitlement was originally issued by the water person (or its predecessors).
ENTITLEMENT_TYPE	Description of the entitlement on issue, as defined by the water person.
FINANCIAL_YEAR	Financial year for which the entry was reported.

Variable	Description
IS_NEW_ENTITLEMENT	States whether the entitlement has been newly issued, as designated by the water person.
MDB	Generated variable to designate whether the water system is part of the Murray–Darling Basin.
MDB_REGION	Generated variable to designate whether the water system is part of a Murray–Darling Basin subregion.
PLAN_AREA	Water resource plan area where the entitlement is issued, as defined by the water person or as listed in the original database.
REGULATED	A relabelling for whether the water source is regulated or unregulated. Generated from the raw resource type per supplier code and origin state.
REGULATED_RAW	Whether water resource is regulated, as originally submitted by water person.
RELIABILITY	A relabelling of reliability classes to achieve some consistency between years and jurisdictions.
RELIABILITY_RAW	Entitlement reliability class, as defined by the water person (2014–15 and 2015–16) or as labelled in the original database (2013–14 and earlier).
RESOURCE_TYPE	A manual relabelling of the raw resource type to either surface water or groundwater by supplier code and origin state.
RESOURCE_TYPE_RAW	Resource type as originally submitted by water person.
STATE_	State where the entitlement is issued.
SUPPLIER_CODE	Identifier for the water person providing the data.
TRADEABLE_INTERSTATE	Whether ownership of the entitlement or allocations to the entitlement can be traded interstate.
TRADEABLE_INTRAREGION	Whether ownership of the entitlement or allocations to the entitlement can be traded within the water system.
TRADEABLE_INTRASTATE	Whether ownership of the entitlement or allocations to the entitlement can be traded outside the water system but within the state.
TRADING_ZONE	Trading zone where the entitlement is issued, as defined by the water person or as listed in the original database.

Variable	Description
U_ID	A new variable created as a unique identifier for the entry.
UOM	The unit of measure for the share of the consumptive pool defined in the entitlement.
VOLUME_	The volume or quantity associated with the entitlement. Note that some entitlements are not defined in terms of quantities.
WATER_SYSTEM	A relabelling of the water system where the entitlement is issued to achieve consistency between years.
WATER_SYSTEM_RAW	Original label for the water system where the entitlement is issued, as designated by the water person (2014–15) or as labelled in the original database (2013–14 and earlier).

References

ABARES 2016, [Water Trade Database 2014–15](#), Australian Bureau of Agricultural and Resource Economics and Sciences, Canberra, December.

BOM 2015, [Water Regulations 2008 – metadata and contextual information requirements](#), Bureau of Meteorology, Canberra.

COAG 2004, *Intergovernmental agreement on a National Water Initiative between the Commonwealth of Australia, and the governments of New South Wales, Victoria, Queensland, South Australia, the Australian Capital Territory and the Northern Territory*, Council of Australian Governments, Commonwealth of Australia, Canberra.

Cook, R. Dennis 2017, [Detection of Influential Observation in Linear Regression](#), *Technometrics*, vol. 19, no. 1, pp 15-18.

NWC 2013, *Australian water markets report 2012–13*, National Water Commission, Canberra.