



10TH ANNUAL RELEASE

GENERAL PURPOSE WATER ACCOUNTING REPORT

Macquarie Catchment

2018–19



Published by NSW Department of Planning, Industry and Environment

dpie.nsw.gov.au

Title: General Purpose Water Accounting Report | Macquarie Catchment

Year: 2018–19

ISSN: 2652-5003

Department reference number: PUB20/191

More information

This report may be cited as Burrell M., Moss P., Petrovic J., Ali A., Nicholls D., Ching M. (2020) **General Purpose Water Accounting Report 2018–19: Macquarie Catchment**, NSW Department of Planning, Industry and Environment.

Acknowledgements

Produced by the Water Analytics team, NSW Department of Planning, Industry and Environment, NSW Department of Industry

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Abbreviations

Abbreviation	Description
ARCGIS	mapping and spatial analysis platform for designing and managing solutions through the application of geographic knowledge
AWAS 1	Australian Water Accounting Standard 1
AWD	available water determination
BoM	Bureau of Meteorology
CAIRO	computer-aided improvements to river operations
ECA	environmental contingency allowance
GIS	geographic information system
GPWAR	general purpose water accounting report
IQQM	integrated quantity and quality model
MDBA	Murray–Darling Basin Authority
ML	megalitres (1,000,000 litres)
ML/d	megalitres per day
MODFLOW	modular, three-dimensional, finite-difference groundwater flow model
SILO	climatic data provision system run by the Queensland Government for the provision of both measured and modelled data
WASB	Water Accounting Standards Board
WaterNSW	WaterNSW is a New South Wales Government–owned statutory corporation that is responsible for supplying the state’s bulk water needs, and operating the state’s river systems and dams
WSP	water sharing plan

Glossary

Term	Meaning
allocation	the specific volume of water allocated to water allocation accounts in a given season, defined according to rules established in the relevant water plan
allocation assignments	the transfer of water between licence holder allocation accounts as a result of a trade agreement The assignment becomes part of the receiver's current year allocation account water.
allocation account	water account attached to an access licence used to track the balance of account water
available water determination (AWD)	the process by which water is made available for use and shared amongst water users who hold a water access licence It determines the volume of water that is to be added to an individual's licence allocation account.
Australian Water Accounting Standard (AWAS)	a national standard that prescribes the basis for preparing and presenting a general-purpose water accounting report (GPWAR) It sets out requirements for the recognition, quantification, presentation and disclosure of items in a GPWAR.
back-calculation	a calculation approach using a mass balance to determine an unknown variable (used to calculate storage inflows based on balancing the change in storage volume where inflow is the only unknown)
basic rights	the non-licensed right to extract water to meet basic requirements for household purposes (non-commercial uses in and around the house and garden) and for watering of stock It is available for anyone who has access to river frontage on their property.
computer aided improvements to river operations (CAIRO)	a spreadsheet-based water balance model used for optimising river operations (orders and releases)
carryover	the volume or share component that may be reserved by a licence holder for use in the subsequent year
catchment	the areas of land that collect rainfall and contribute to surface water (streams, rivers, wetlands) or to groundwater A catchment is a natural drainage area, bounded by sloping ground, hills or mountains, from which water flows to a low point.
dead storage	the volume in storage that is generally considered unavailable for use (e.g. water level below release valves) due to access and often poor water quality
effective storage	the total volume of storage minus the dead storage component—the volume generally considered as useable
effluent	flow leaving a place or process Sewage effluent refers to the flow leaving a sewage treatment plant. An effluent stream is one which leaves the main river and does not return.
entity	a defined geographical area or zone within the accounting region Transactions and reports are produced for each entity.
end of system	the last defined point in a catchment where water information can be measured and/or reported

Term	Meaning
environmental water	water allocated to support environmental outcomes and other public benefits Environmental water provisions recognise the environmental water requirements and are based on environmental, social and economic considerations, including existing user rights.
evaporation	the process by which water or another liquid becomes a gas Water from land areas, bodies of water, and all other moist surfaces is absorbed into the atmosphere as a vapour.
evapotranspiration	the process by which water is transmitted as a vapour to the atmosphere as the result of evaporation from any surface and transpiration from plants
extraction	the pumping or diverting of water from a river or aquifer by licensed users for a specific purpose (irrigation, stock, domestic, towns, etc.) The volume is measured at the point of extraction or diversion (river pump, diversion works, etc.).
general purpose water accounting report (GPWAR)	a report prepared according to the Australian Water Accounting Standard It comprises a number of components including a contextual statement, a statement of water assets and water liabilities, a statement of change in water assets and water liabilities, a statement of physical water flows, notes and disclosures, and an assurance and accountability statement.
general-security licence	a category of water access licence implemented under the <i>Water Management Act 2000</i> This forms the bulk of the water access licence entitlement volume in NSW and is a low-priority entitlement (i.e. it only receives water once essential and high-security entitlements are met in the available water determination process).
groundwater	water location beneath the ground in soil pore spaces and in the fractures of rock formations
high-security licence	a category of water access licence implemented under the <i>Water Management Act 2000</i> It receives a higher priority than general-security licences but less priority than essential requirements in the available water determination process.
HYDSTRA database	a database used by NSW Department of Planning, Industry and Environment to store continuous, time-series data such as river flow, river height, and water quality
inflows	surface water runoff and deep drainage to groundwater (groundwater recharge) and transfers into the water system (both surface and groundwater) for a defined area
inter-valley trade	trade of licence holder allocation account water via allocation assignment from one catchment to another catchment (or state)
intra-valley trade	trade of licence holder allocation account water via allocation assignment within the same catchment
median	the middle point of a distribution, separating the highest half of a sample from the lowest half
non-physical transaction	an accounting transaction representing a process that is not a component of the water cycle (e.g. an available water determination)
physical transaction	an accounting transaction representing a process of the water cycle (e.g. an extraction)

Term	Meaning
regulated river	<p>a river system where flow is controlled via one or more major man-made structures such as dams and weirs</p> <p>For the purposes of the <i>Water Management Act 2000</i>, a regulated river is one that is declared by the minister to be a regulated river. Within a regulated river system, licence holders can order water against a held entitlement.</p>
share component	<p>an entitlement to water specified on the access licence, expressed as a unit share or, in the case of specific purpose licences (e.g. local water utility, major water utility and domestic and stock), a volume in megalitres</p> <p>The amount of water a licence holder is allocated as a result of an available water determination and the amount they can take in any year is based on their share component.</p>
storage	<p>a state-owned dam, weir or other structure that is used to regulate and manage river flows in the catchment and the water bodies impounded by these structures</p>
storage reserve	<p>proportion of water in a storage reserved in the resource assessment process for future essential or high-security requirements (e.g. town water)</p>
storage volume	<p>the total volume of water held in storage at a specified time</p>
supplementary water	<p>unregulated river flow available for extraction under a supplementary licence</p>
surface water	<p>all water that occurs naturally above ground including rivers, lakes, reservoirs, creeks, wetlands and estuaries</p>
tributary	<p>a smaller river or stream that flows into a larger river or stream</p> <p>Usually several smaller tributaries merge to form a river.</p>
ungauged catchment	<p>a catchment without a flow gauge to accurately record stream flows</p> <p>Modelled estimates must be used to approximate the contribution of ungauged catchments to the main river.</p>
water accounting	<p>the systematic process of identifying, recognising, quantifying, reporting, assuring and publishing information about water, the rights or other claims to that water, and the obligations against that water</p>
water assets	<p>the physical water held in storage, as well as any claims to water that are expected to increase the future water resource (e.g. external water entering the system through inter-valley trading)</p>
water liabilities	<p>claims on the water assets of the water report entity, including water that has been allocated to licence holder accounts or environmental accounts, yet to be taken at the end of the reporting period</p>
water sharing plan	<p>a water management plan that defines the rules for sharing of water within a region under the <i>Water Management Act 2000</i></p>

Director's foreword

This is the 10th annual release of the general-purpose water accounting report (GPWAR) for the Macquarie and Cudgegong Regulated River Water Source. It has been prepared for the accounting period 1 July 2018 to 30 June 2019 (reporting period) under the Australian Water Accounting Standard 1 (WASB, 2012).

The GPWAR provides stakeholders with a consolidated, comparable and publicly accessible set of water accounting information for the water source. The information presented is also used internally for a range of water planning functions and legislative reporting obligations.

Included in the GPWAR are:

- a contextual statement, summarising the climatic conditions, water resources, environmental holdings, water trading market and water resource management in the water source for the reporting period.
- a physical flow diagram, illustrating changes in storage volumes and the associated inflows and outflows.
- water accounting statements presenting the opening and closing balances, and itemised changes to these balances for available water resources (water assets) and licenced allocation accounts (water liabilities).
- disclosure notes (linked to the figures within the water accounting statements) providing detailed information of accounting components including:
 - access licence account balances
 - planned and held environmental water account balances
 - available water determination detailed report
 - temporary trading by licence category
 - supplementary announcements and usage by river reach
 - physical inflows and outflows to the system for the water year.

Where possible quantification of the physical groundwater interactions with the regulated river water source are provided however detailed groundwater accounting information is not included in this GPWAR.

As Director Water Analytics, NSW Department of Planning, Industry and Environment, I hereby declare:

- the information presented in these accounts as a faithful representation of the management and operation of the Macquarie and Cudgegong Regulated River Water Source in the reporting period.
- all data presented in this report provides the best accounting information available at the time of publication.
- NSW Department of Planning, Industry and Environment has to the best of its ability prepared this GPWAR in accordance with the Australian Water Accounting Standard 1.



Danielle Baker

Director Water Analytics

NSW Department of Planning, Industry and Environment

Contextual Statement

The Macquarie catchment covers an area of 74,800 square kilometres within the Murray-Darling Basin. The headwaters of the Macquarie River originate in the Great Dividing Range south of Bathurst, and the river flows in a north-westerly direction for 960 kilometres until it joins the Barwon River near Brewarrina. The major tributaries of the upper Macquarie catchment are the Cudgegong, Talbragar and Little Rivers.

Flows from the lower reaches of the Macquarie River cross into the adjacent Bogan River through a series of regulated effluent creeks that leave the Macquarie River near the town of Warren. The Bogan River rises in the Harvey Ranges near Peak Hill and flows roughly parallel to the Macquarie across the north-western plains before joining the Barwon River downstream of Brewarrina.

Elevations across the catchment range from 1,300 metres above sea level in the mountains south of Bathurst to less than 100 metres above sea level near Brewarrina in the far north of the catchment. Below Dubbo the valley is predominantly flat alluvial plains where elevations are less than 300 metres.

The Macquarie catchment is regulated by two major storages. Burrendong Dam supplies water for irrigation as well as town water and stock and domestic requirements along the Macquarie River and the lower Bogan River. It also stores water for environmental requirements in the lower valley including the Ramsar-listed wetlands in the Macquarie Marshes. Windamere Dam, on the Cudgegong River upstream of Burrendong Dam, provides water for the towns of Mudgee and Gulgong and is operated in conjunction with Burrendong to supply water requirements along the Cudgegong River and the lower Macquarie valley.

The Macquarie catchment formed part of the lands originally occupied by the Wiradjuri, Wailwan and Wongaibon Aboriginal nations. Today the catchment supports around 180,000 people with over half of this population living within the regional cities of Dubbo, Orange and Bathurst (all approximately 30,000 people). Regional towns include Mudgee, Wellington, Narromine, Nyngan and Warren.

The largest agricultural use of water in the valley is for cotton production downstream of Dubbo. Other significant irrigated crops include lucerne, cereals, oilseed, wheat and vegetables. Most of the major cities and towns rely on the rivers in the catchment for their water supply including Bathurst, Orange, and Oberon upstream of Burrendong Dam, and Dubbo, Wellington, and Nyngan on the Macquarie River below Burrendong Dam. Lithgow also receives transfers of water for town water supply from the Fish River Scheme.

More detailed information on the catchment is available in the report 'Water resources and management overview—Macquarie-Bogan catchment' published in 2011 (available at www.industry.nsw.gov.au/water).

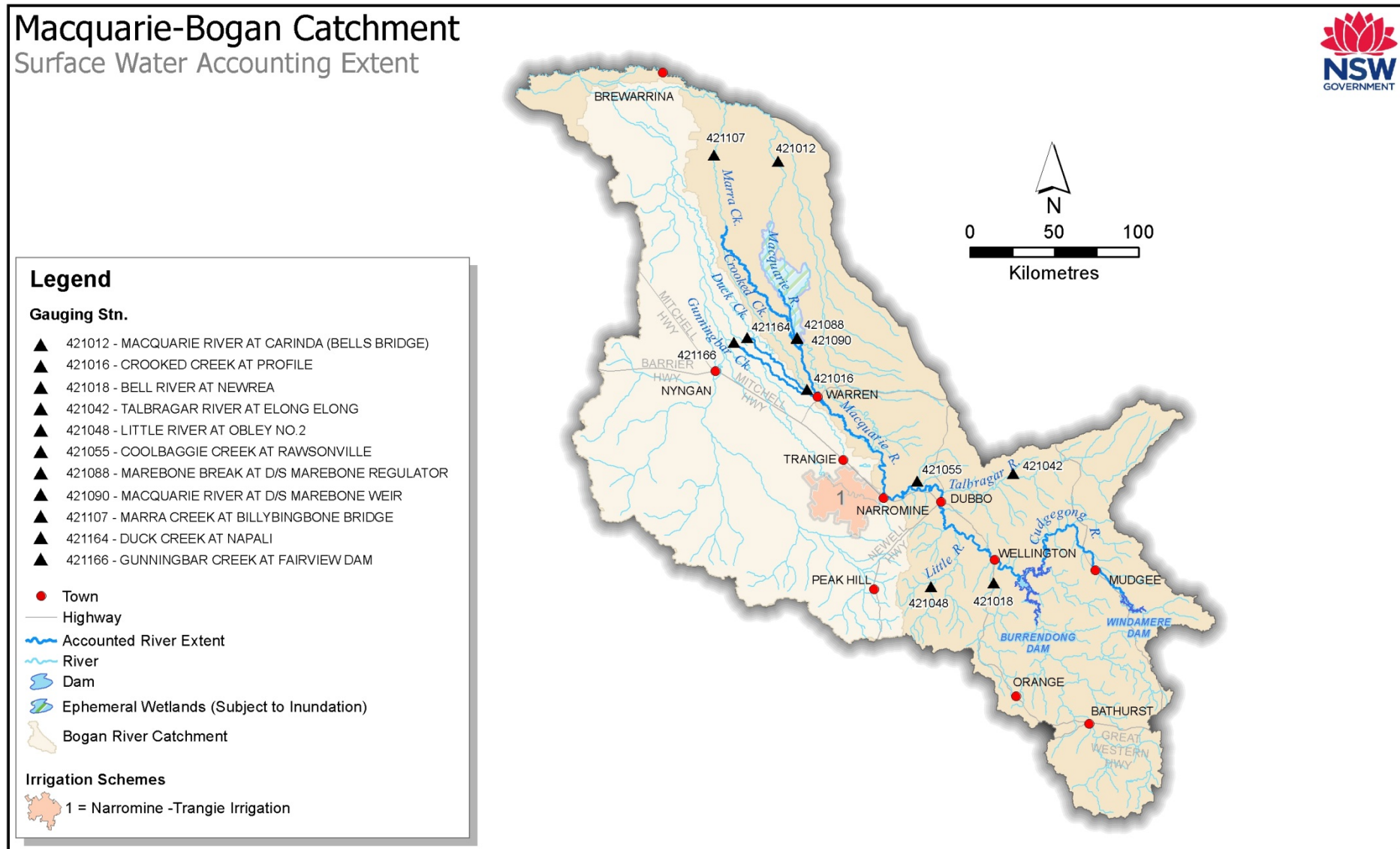
Accounting extent

The accounted river extent is illustrated in Figure 1. It includes the Cudgegong River from Windamere Dam to Burrendong Dam, the Macquarie River from downstream Burrendong Dam to the Macquarie River at Oxley Station, Crooked Creek, Duck Creek, Marra Creek and Gunningbar Creek. Water delivered to the Macquarie Marshes has been accounted as an effluent/outflow from the main river. All water licences managed by the Water Sharing Plan for the Macquarie and Cudgegong Regulated Rivers Water Source are considered.

The Bogan catchment is excluded from detailed accounting in this GPWAR aside from any water that can be identified as leaving the regulated Macquarie River for replenishment and town water purposes in the Bogan River.

While physical groundwater volumes that interact with the regulated river are included in GPWAR statements wherever the volume can be estimated (and any interactions not directly estimated form part of the unaccounted difference) all other groundwater aquifer flows and groundwater management are excluded from the GPWAR.

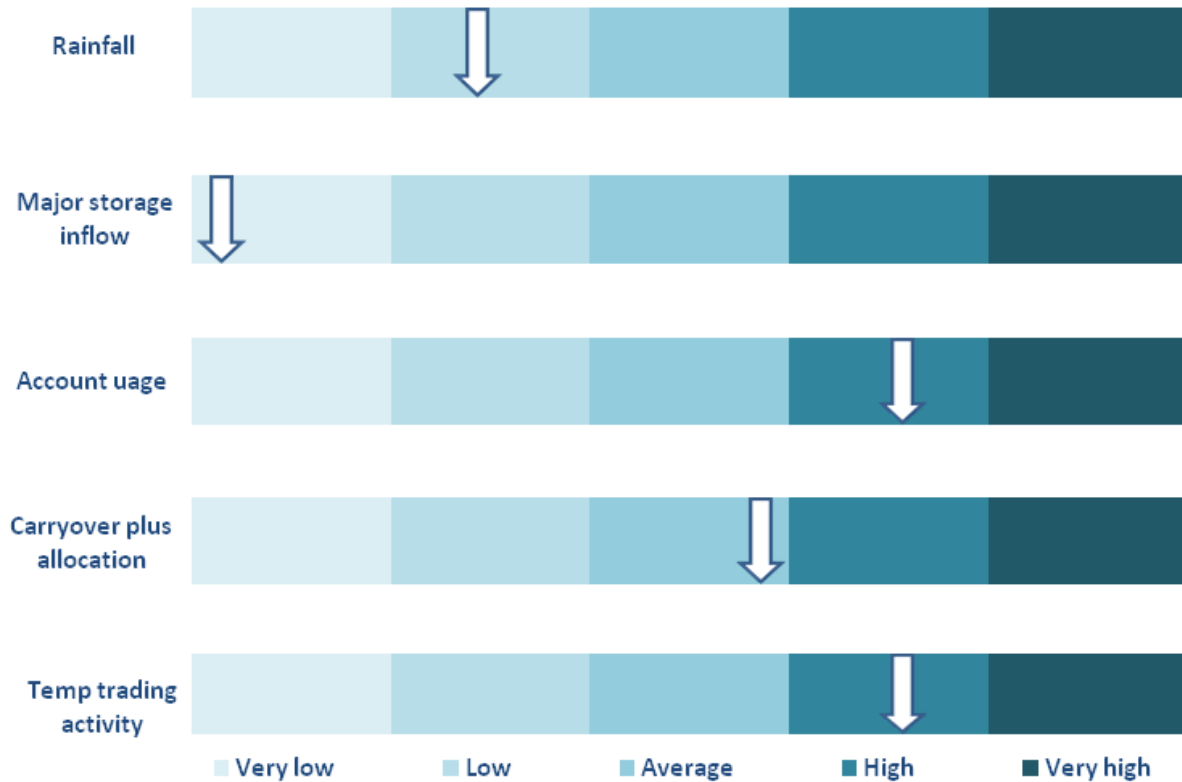
Figure 1: Surface water geographical extent of the accounts



Snapshot

The key indicators for 2018-19 relative to other years under water sharing plan management conditions are presented in Figure 2. While climatic conditions significantly deteriorated into extremely dry, allocations were still above average resulting in high usage relative to historical years.

Figure 2: 2018-19 Summary indicators



Climate

- At Bathurst (upper catchment), 639 millimetres of rainfall was recorded for the reporting period (Table 1).
- Comparatively this volume of rainfall is
 - 102% of the long-term historical median for rainfall at this location.
 - 58% of the highest rainfall on record at this location.
 - The highest monthly rainfall occurred in November 2018 (89 millimetres) and January 2019 (155 millimetres) (Figure 3 and Figure 4).
- At Warren (lower catchment), 249 millimetres of rainfall was recorded for the reporting period (Table 2).
- Comparatively this volume of rainfall is
 - 53% of the long-term historical median for rainfall at this location.
 - 24% of the highest rainfall on record at this location.
 - The highest monthly rainfall occurred in October 2018 (39 millimetres) and November 2018 (50 millimetres) and (Figure 3 and Figure 4).

A spatial representation of rainfall was derived from interpolation between available rainfall measurements and is provided in Figure 5 (total annual rainfall for the reporting period) and Figure

6 (long-term average annual rainfall). The data indicates that rainfall was below average across the majority of the catchment area, and approximately average in a localised area around Bathurst.

Figure 3: Monthly rainfall data and historical median at Bathurst and Warren

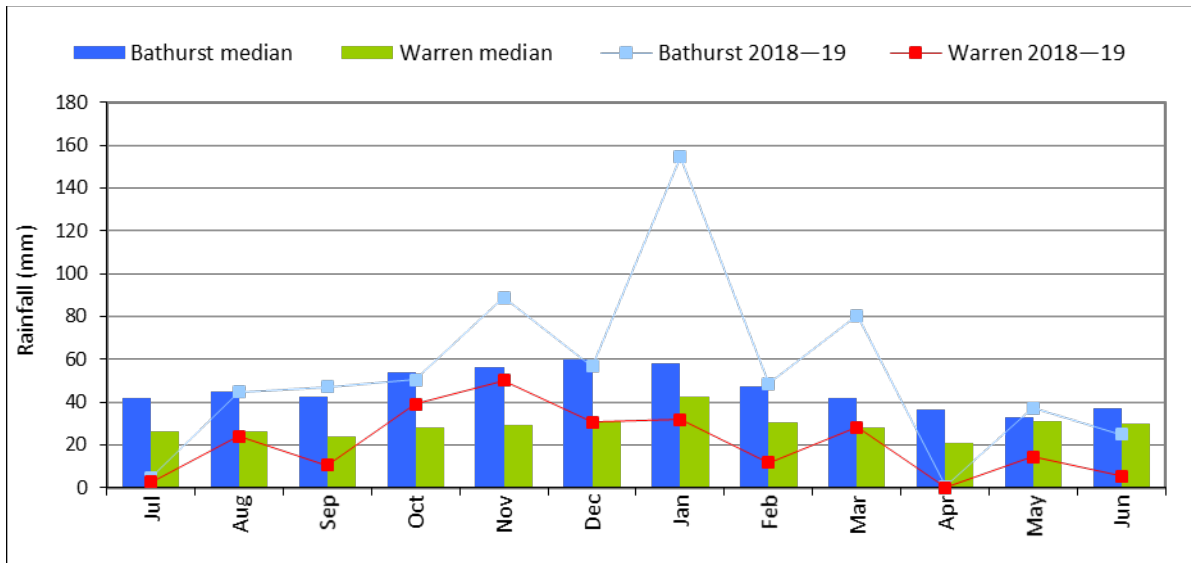


Figure 4: Monthly rainfall historical median deviations at Bathurst and Warren

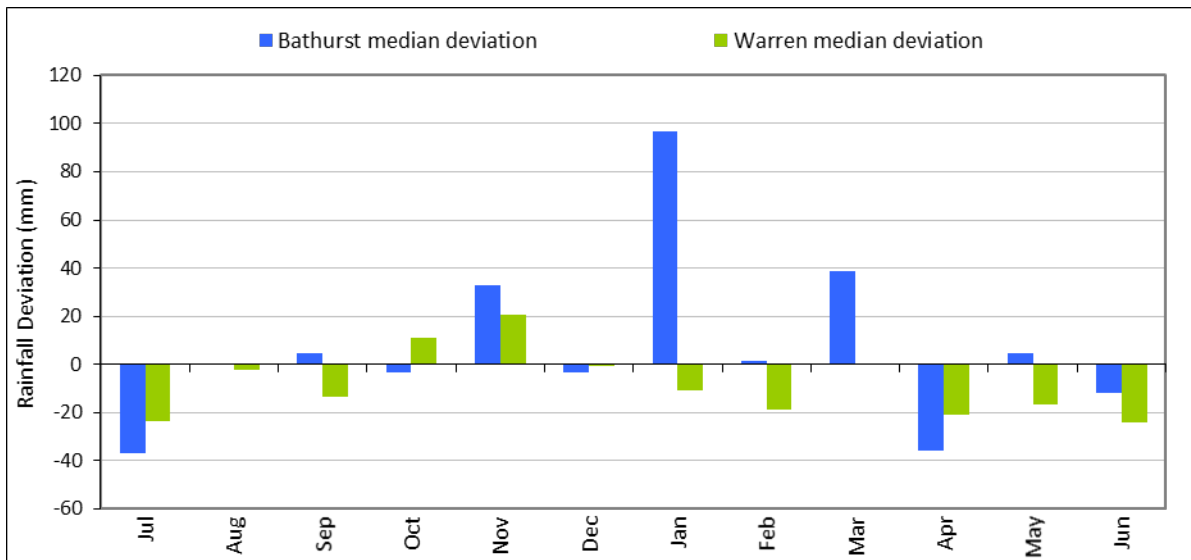


Table 1: 2018–19 monthly rainfall and historic monthly rainfall statistics at Bathurst¹

Bathurst	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Annual
2018-19	4.8	44.6	47.2	50.4	88.9	56.6	154.5	48.6	80.3	0.6	37.2	25.0	638.7
Historical mean	48.3	49.4	46.9	59.0	61.2	66.2	68.4	57.7	52.1	41.4	41.1	44.0	635.8
Historical median	41.7	44.6	42.4	53.8	56.0	59.8	57.9	47.2	41.6	36.5	32.6	36.8	627.4
Historical low	3.7	1.4	3.8	2.3	0.8	0.0	1.4	0.0	0.0	0.5	1.0	0.8	375.3
Historical high	154.7	163.2	130.9	215.8	195.7	218.5	223.7	235.5	205.3	166.0	115.0	193.1	1100.0
Year of high	1921–22	1985–86	2015–16	1998–99	1960–61	2009–10	1977–78	1970–71	1925–26	1989–90	1994–95	1915–16	1949–50

Table 2: 2018–19 monthly rainfall and historic monthly rainfall statistics at Warren¹

Warren	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Annual
2018-19	2.8	24.0	10.4	39.1	50.1	30.7	31.8	11.6	28.2	0.0	14.5	5.5	248.7
Historical mean	33.7	33.5	30.7	39.8	38.5	42.1	57.2	49.2	43.6	37.6	37.9	39.2	482.1
Historical median	26.5	26.5	23.6	28.1	29.6	31.0	42.7	30.5	27.9	21.0	31.2	29.8	469.3
Historical low	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	181.9
Historical high	130.8	144.5	145.0	173.8	205.1	237.0	241.9	363.0	223.2	302.5	174.0	174.3	1028.4
Year of high	1896–97	1997–98	2015–16	1949–50	1949–50	2009–10	1994–95	1954–55	1955–56	1904–05	1982–83	1924–25	1955–56

¹ Long-term statistics are from the Bureau of Meteorology—climate data online, using the climatic stations '63005—Bathurst Agricultural Station' and '51054—Warren (Frawley Street)'. Historic record statistics are 1908 to 2019 for Bathurst and 1889 to 2019 for Warren.

Figure 5: Macquarie annual rainfall for 2018–19

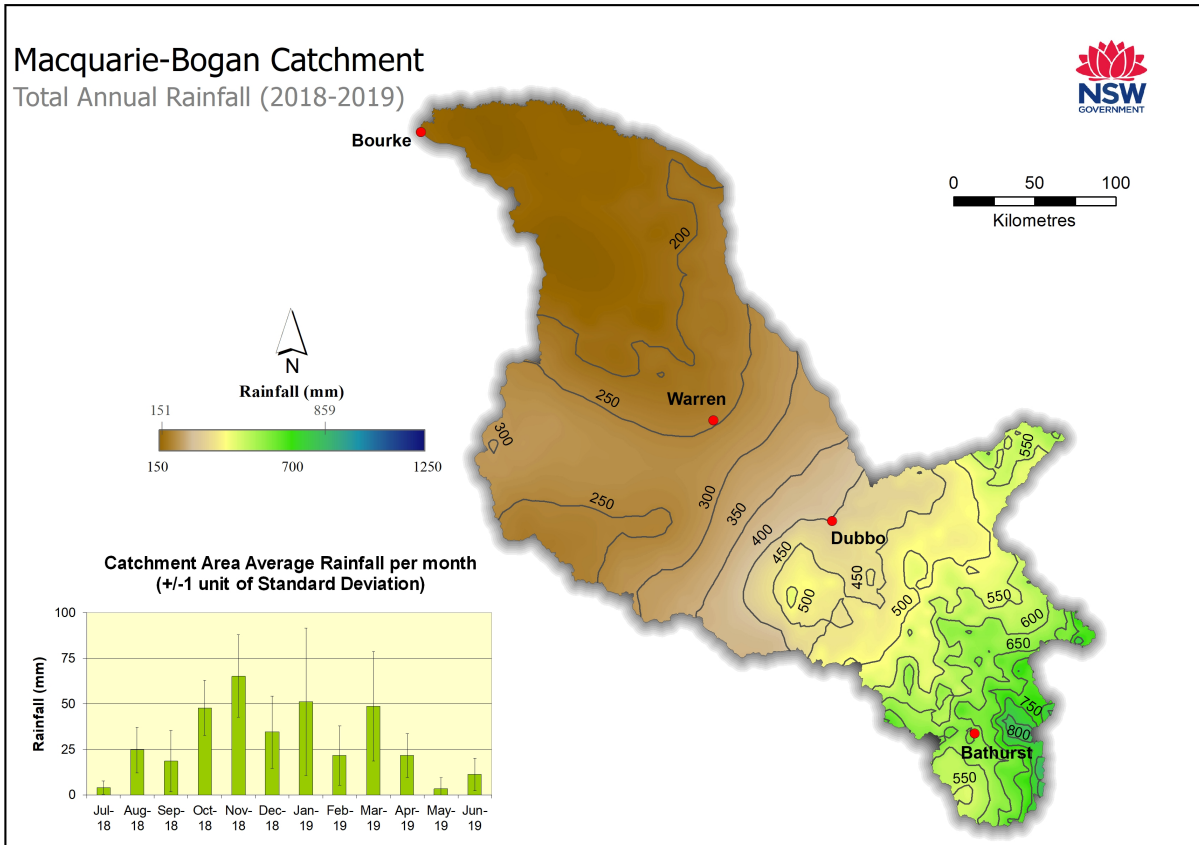
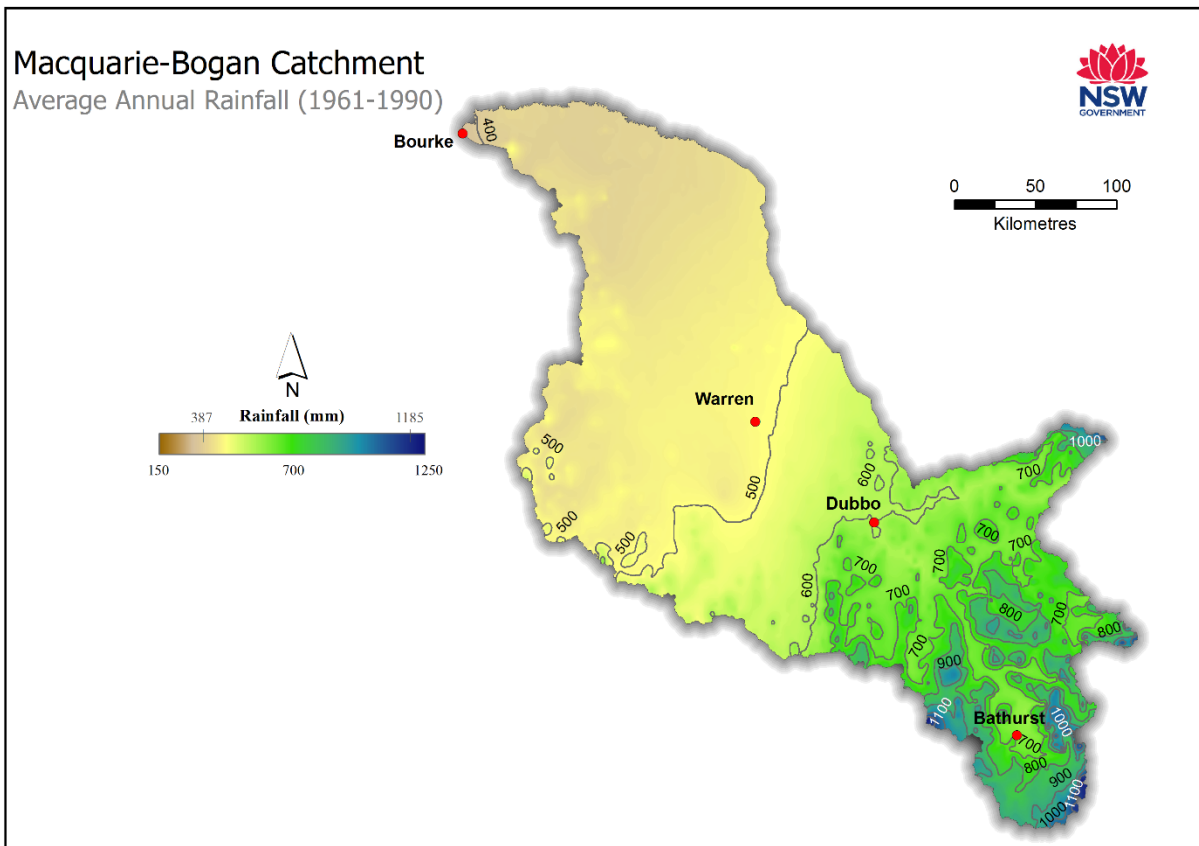


Figure 6: Average annual rainfall in the Macquarie catchment (1961–90)



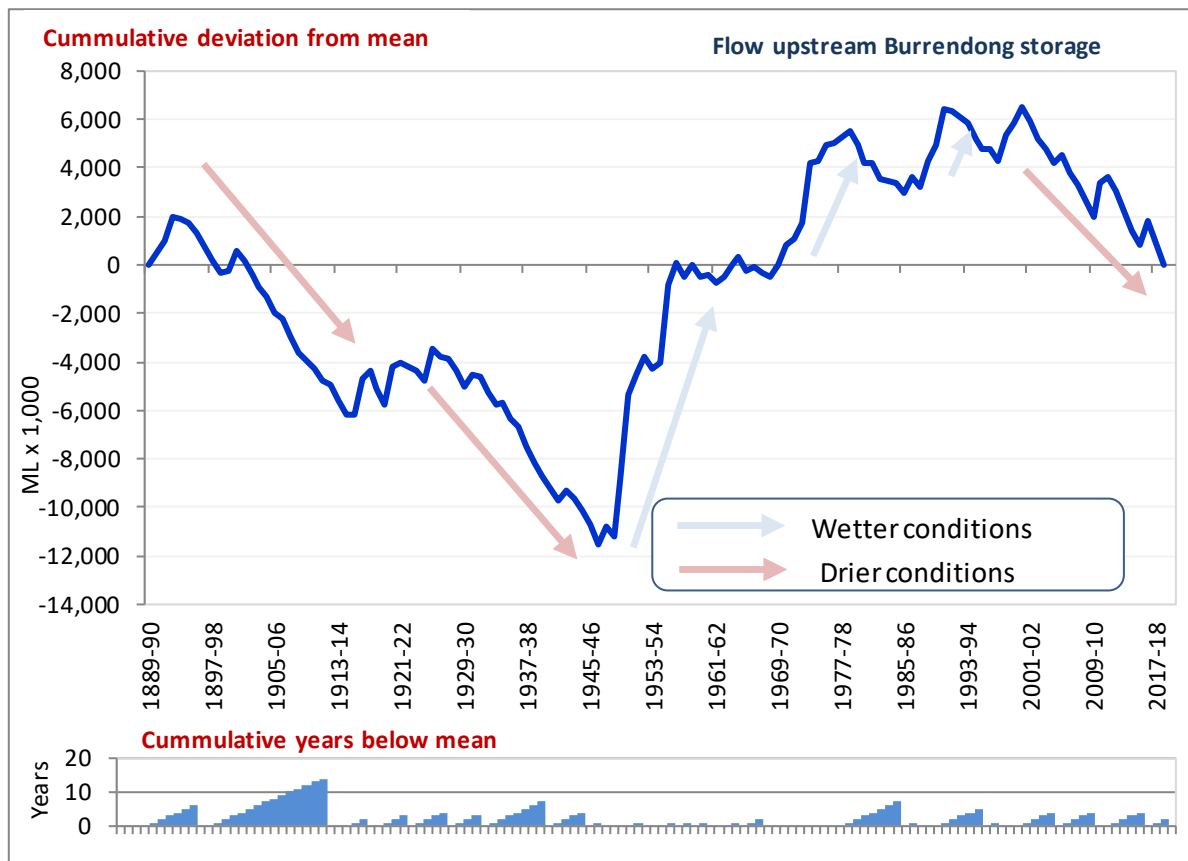
Dam inflows and volume

Long-term trends

Historically, the long-term average annual inflow² at the Burrendong storage site has varied significantly cycling through prolonged periods of wet and dry flow regimes. Broadly, the data (Figure 7) illustrates predominately:

- dry conditions 1900 to 1950
- wet conditions 1950 to 1980
- dry conditions 1980 to present.

Figure 7: Long-term annual flow upstream of Burrendong Dam cumulative deviation from mean



Windamere

Inflow

For the reporting period, the total inflow to Windamere Dam was 7,905 megalitres (Figure 8), which is:

- 15% of the long-term average annual inflow (53,494 megalitres)
- very low relative to the long-term data set, exceeding 5% of years in the dataset (1890–91 to 2018–19)
- the second consecutive year of below average inflow.

The maximum mean daily inflow rate for the reporting period was 1,282 megalitres, occurring on 10 January 2019 (Figure 9).

² Inflows are back-calculated storage inflow for the period from storage construction and gauged or rainfall runoff modelled flow for the period prior to this

Storage volume

Windamere storage volume:

- commenced the reporting period at 150,655 megalitres or 41% of full supply capacity (Figure 10)
- ended the reporting period at 120,315 megalitres or 33% of full supply, a decrease of 8% for the water year
- the maximum volume during the reporting period was 150,655 megalitres, occurring on 1 July 2018.

Figure 8: Long-term inflows to Windamere Dam against mean and reporting year inflow

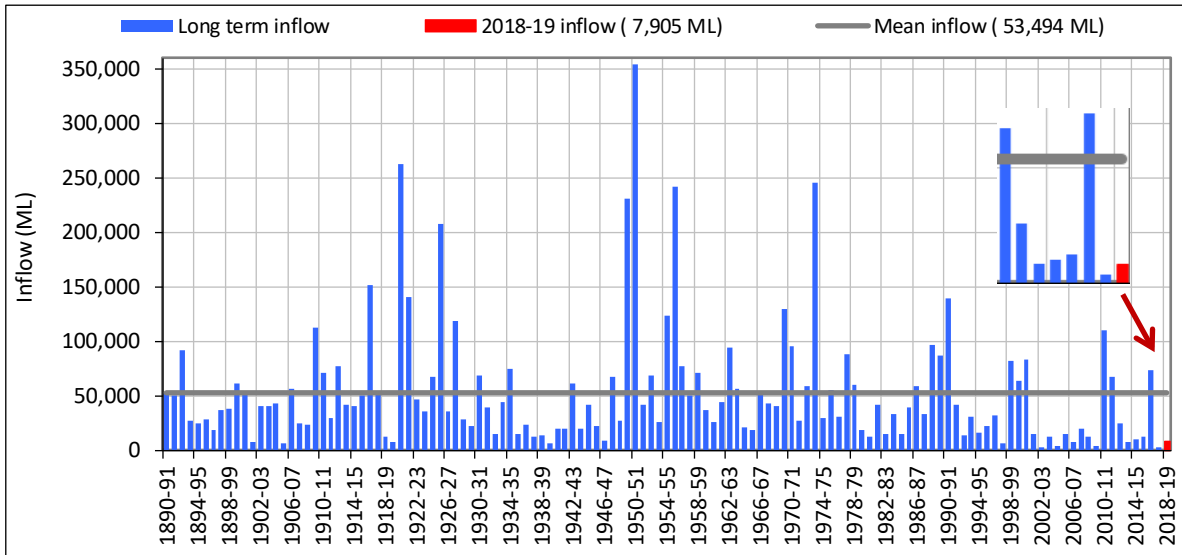


Figure 9: Daily inflows and rainfall at Windamere Dam 2018–19

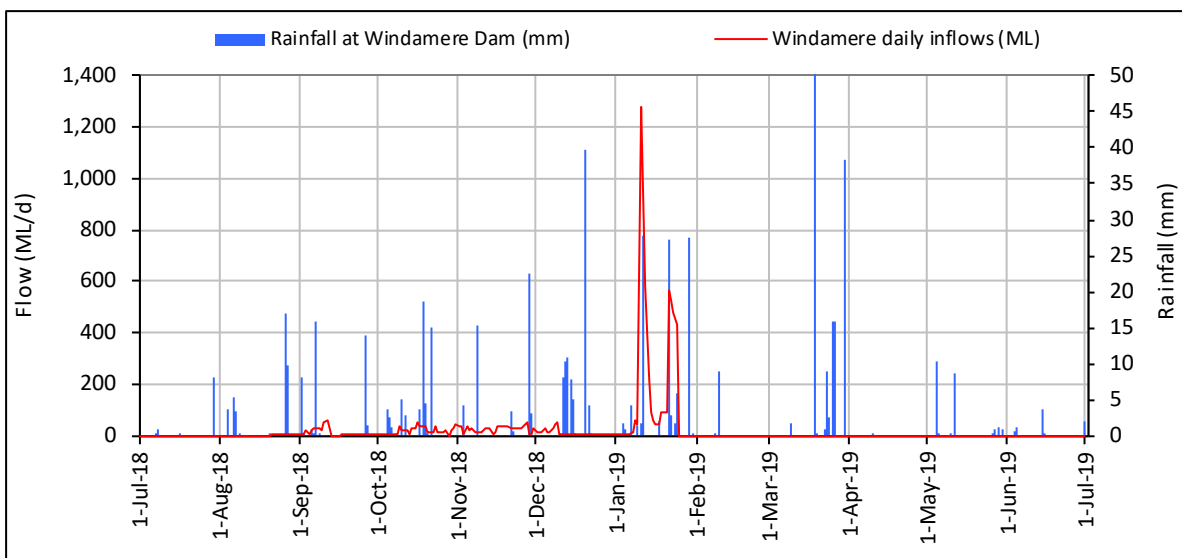
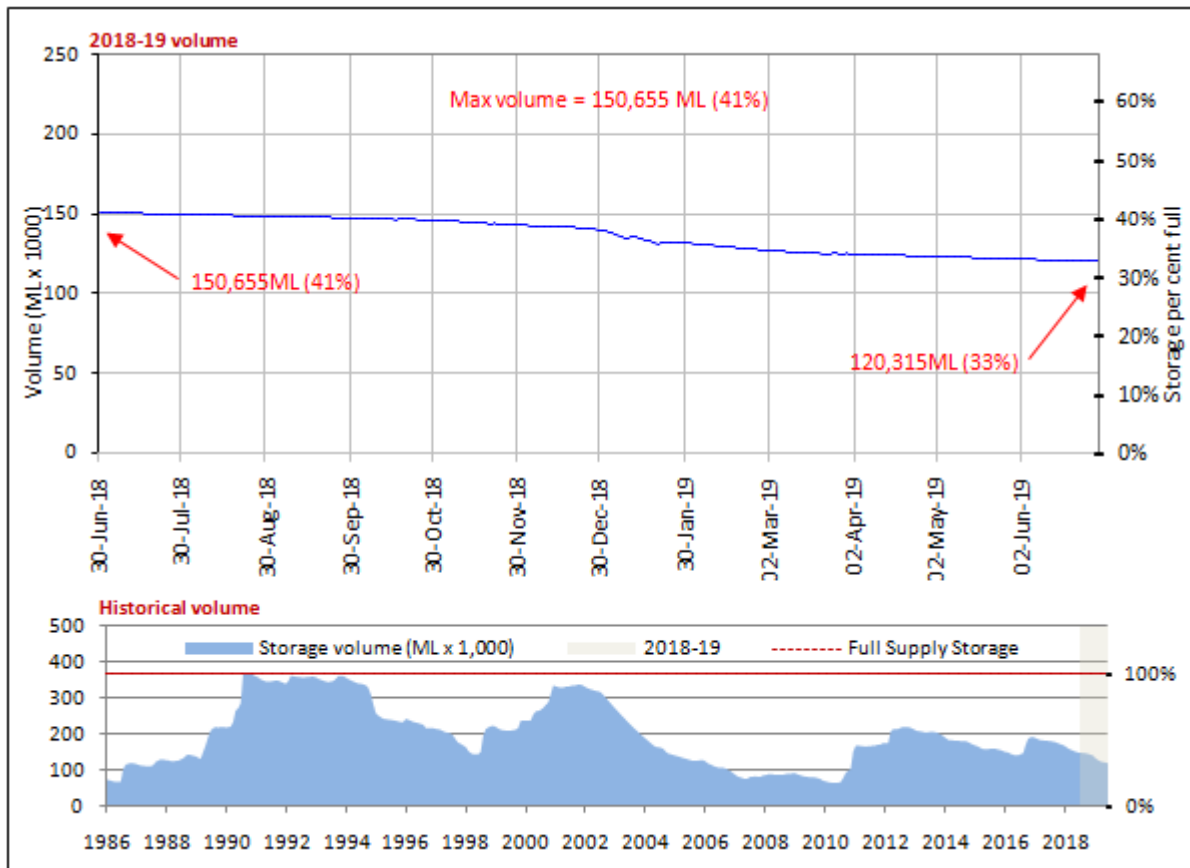


Figure 10: Windamere Dam 2018–19 behaviour (volume and percentage)



Burrendong

Inflow

For the reporting period, the total inflow to Burrendong Dam was 79,330 megalitres (Figure 11) which is:

- 8% of the long-term average annual inflow (981,549 megalitres)
- very low relative to the long-term data set exceeding 1% of years in the dataset (1890–91 to 2018–19)
- the second year of below average inflow following above average inflow in the previous reporting period.

The maximum mean daily inflow rate for the reporting period was 3,569 megalitres, occurring on 30 January 2019 (Figure 12).

Storage volume

Burrendong storage volume:

- commenced the reporting period at 446,414 megalitres or 27% of full supply capacity (Figure 13)
- ended the reporting period at 94,277 megalitres or 6% of full supply, a decrease of 21% for the water year
- the maximum volume during the reporting period was 446,414 megalitres, occurring on 1 July 2018

Figure 11: Long-term inflows to Burrendong Dam against mean and reporting year inflow

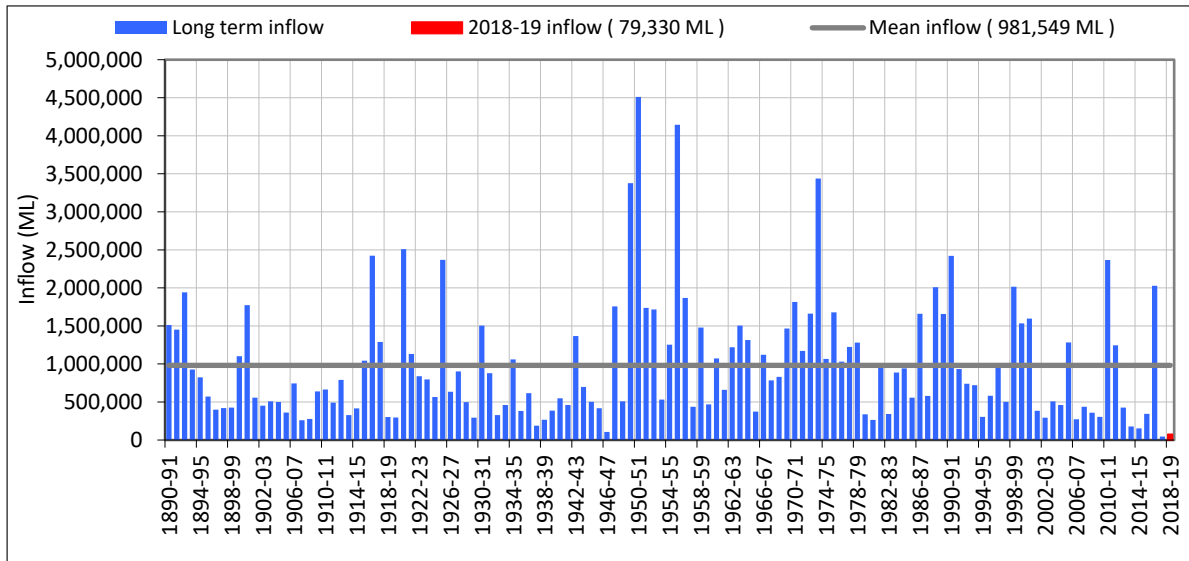


Figure 12: Daily inflows and rainfall at Burrendong 2018-19

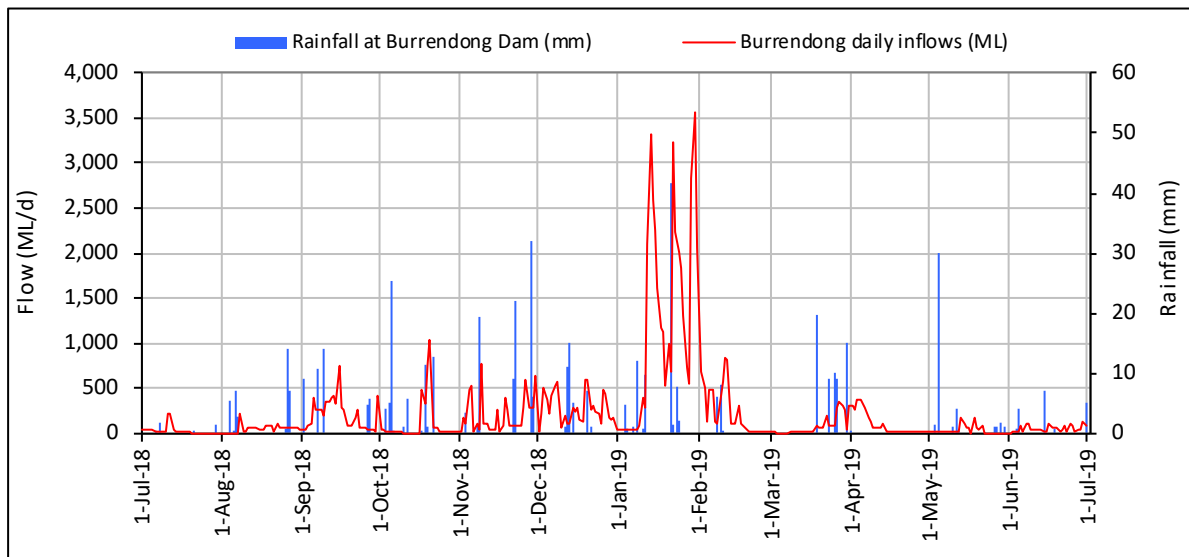
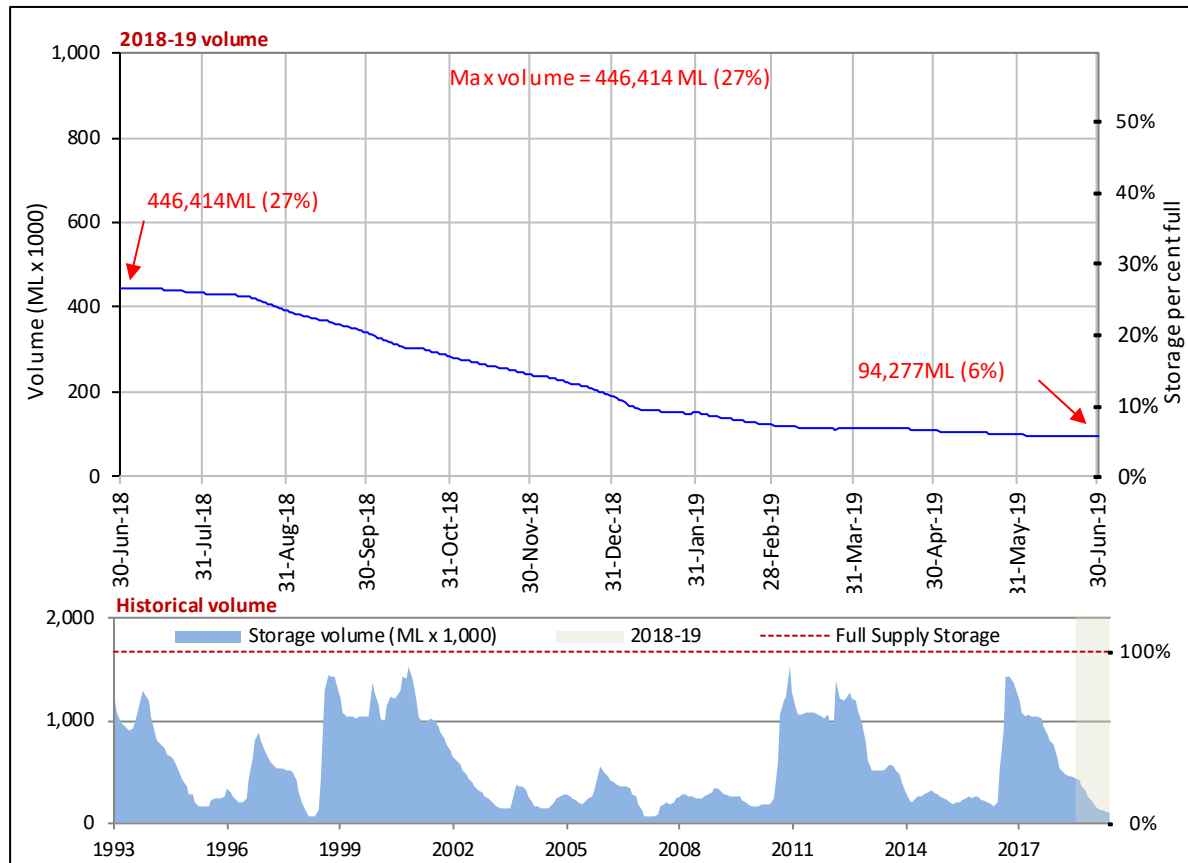


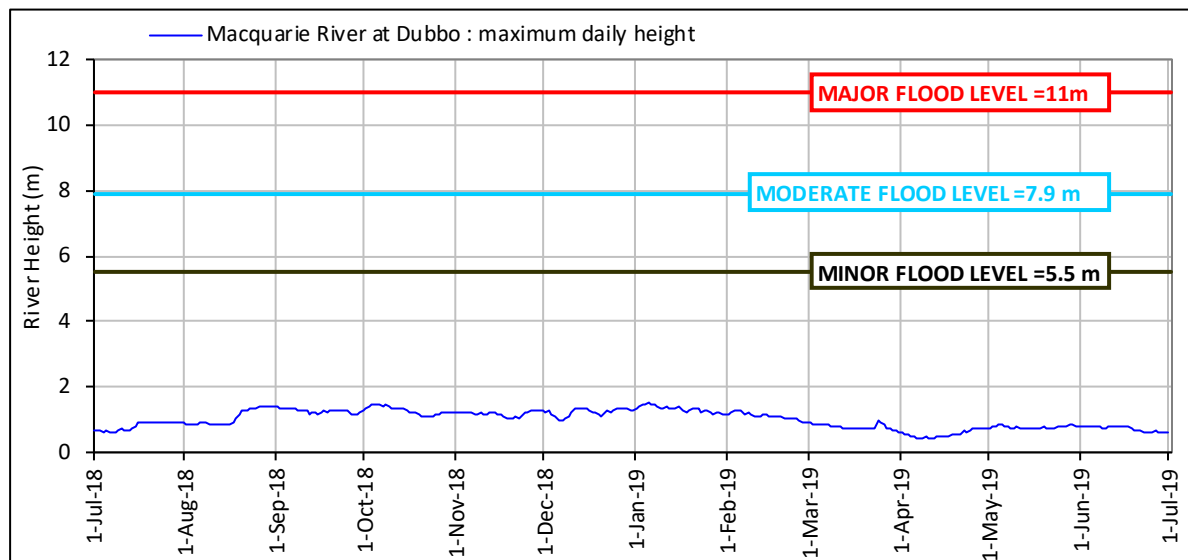
Figure 13: Burrendong Dam 2018-19 behaviour (volume and percentage)



Major high flow events

- There were no major high flow events in Macquarie River at Dubbo in 2018-19 (Figure 14). River level at Dubbo remained below 2 metres for the entirety of the reporting period.

Figure 14: Macquarie River at Dubbo maximum daily flow heights



Surface water resources and management

Legislation

The Macquarie and Cudgegong Regulated Rivers water source was managed under the conditions set out in the Water Sharing Plan for the Macquarie and Cudgegong Regulated River Water Source 2016, for the entirety of the reporting period. The water sharing plan commenced on 1 July 2016 and will remain active until 30 June 2026. The water sharing plan was produced to meet the water management principles outlined in the Water Management Act 2000.

Access licence account management

The licence allocation accounting rules that were in place are summarised in Table 3. While an annual accounting procedure is implemented, the rules allow for general security licence holders to carryover up to 1 megalitre per issued share. All other categories have an account limit of 100% or 1 megalitre per share and cannot carryover water between water years.

Table 3: Macquarie and Cudgegong licence allocation accounting rules

Licence Category	Account limit	Carryover limit	Annual use limit	Maximum AWD
Domestic and Stock	100%	0%	N/A	100%
Domestic and Stock [Domestic]	100%	0%	N/A	100%
Domestic and Stock [Stock]	100%	0%	N/A	100%
Local Water Utility	100%	0%	N/A	100%
Regulated River (General Security) ³	N/A	1 ML/Share	N/A	1 ML/Share
Regulated River (High Security)	1 ML/Share	0 ML/Share	N/A	1 ML/Share
Regulated River (High Security) (Research)	1 ML/Share	0 ML/Share	N/A	1 ML/Share
Regulated River (High Security) (Town Water Supply)	1 ML/Share	0 ML/Share	N/A	1 ML/Share
Supplementary	N/A	0 ML/Share	N/A	1 ML/Share

Cudgegong details

The Cudgegong is defined as that part of the water source upstream of the upper limit of Burrendong storage.

Extreme events stage and temporary water restrictions (Cudgegong)

The NSW Extreme Events Policy was released in October 2018 to provide a framework for managing extreme events in the major river systems of the NSW Murray-Darling Basin. This framework is based on a staged approach, providing a range of measures for water managers to implement as conditions deteriorate.

Temporary water restrictions are an example of the type of measures that can be implemented to manage a water shortage. These restrictions are issued under section 324 of the *Water Management Act 2000* and have been implemented in several river valleys in the current drought to preserve water for critical needs.

³ Specific general security licences in the Cudgegong catchment, listed in the Water Sharing Plan schedule, are permitted to carryover volumes as listed in the schedule. These volumes exceed those resulting from the carryover rule.

Table 4 outlines the conditions that may be associated with different stages of criticality for surface water quality. Further information is available at www.industry.nsw.gov.au/water/what-we-do/legislation-policies/eep

Table 4: Determination of stages of criticality for surface water quantity

Stage	Stage description	Stage evidence base
1	Normal management	Can deliver all account water under normal river operations practices.
2	Emerging drought	Unable to deliver 100% of high priority account water and maximum expected use of General Security under normal river operations practices.
3	Severe drought	Only able to deliver restricted high priority demands and restricted remaining General Security account water.
4	Critical drought	Only able to deliver restricted town water supply, stock and domestic and other restricted high priority demands.

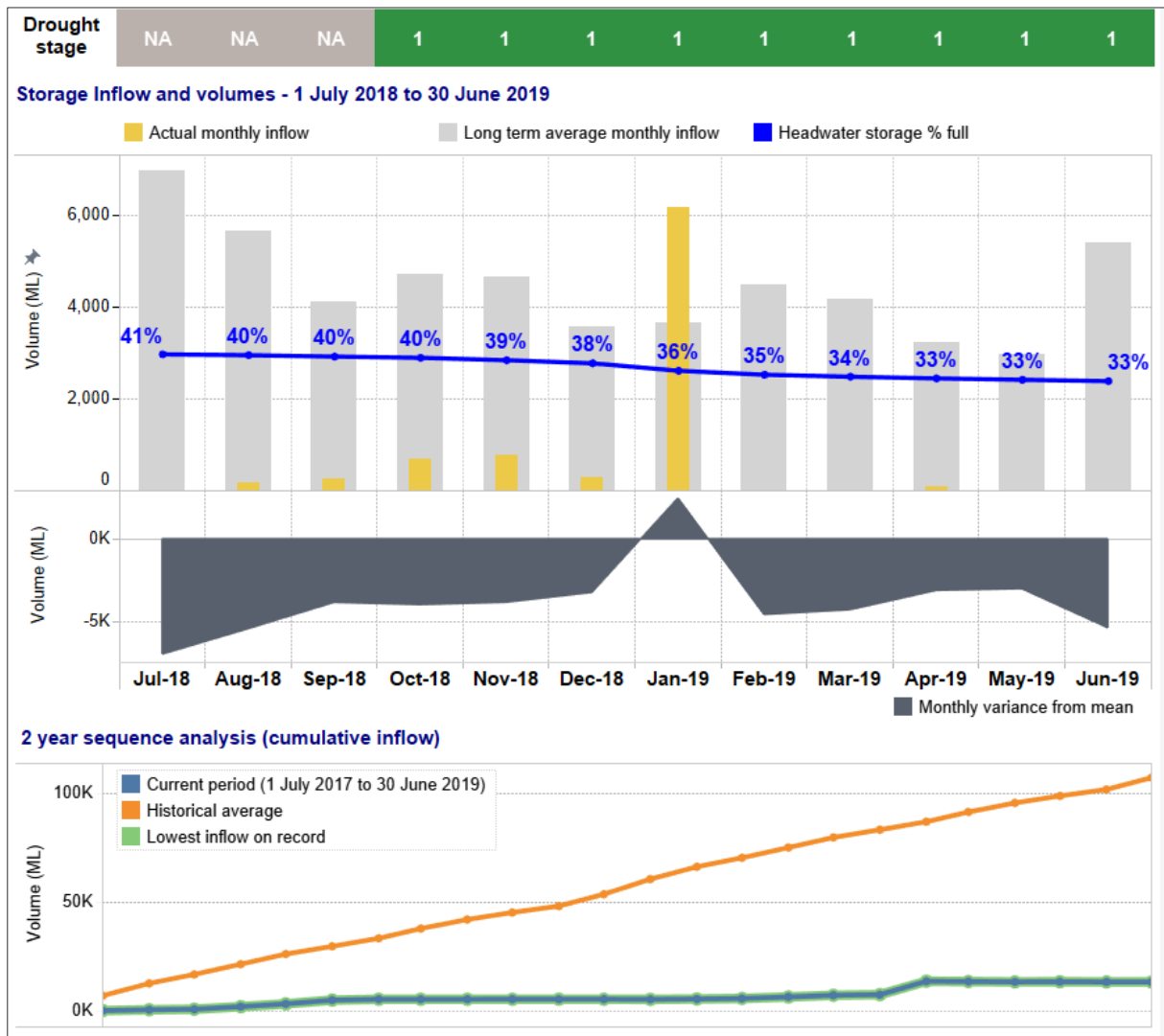
Temporary water restrictions for the reporting period

No temporary water restrictions were enforced within the Cudgegong Regulated River water source throughout the reporting period.

Extreme events stage

- Following the release of the NSW Extreme Events Policy in October 2018, the Cudgegong Regulated River Water Source was declared as being in Stage 1.
- The Cudgegong Regulated River Water Source remained in Stage 1 for the reporting period.
- The historical 2 year inflow sequence of major storage inflow to 30 June 2019 reached a deficit of 93,780 megalitres relative to long-term average 2 year inflow, equivalent to 25% of the full supply volume of Windamere storage (Figure 15).
- The historical 2-year inflow sequence was the lowest on record (reference data period 1895 to 2019).

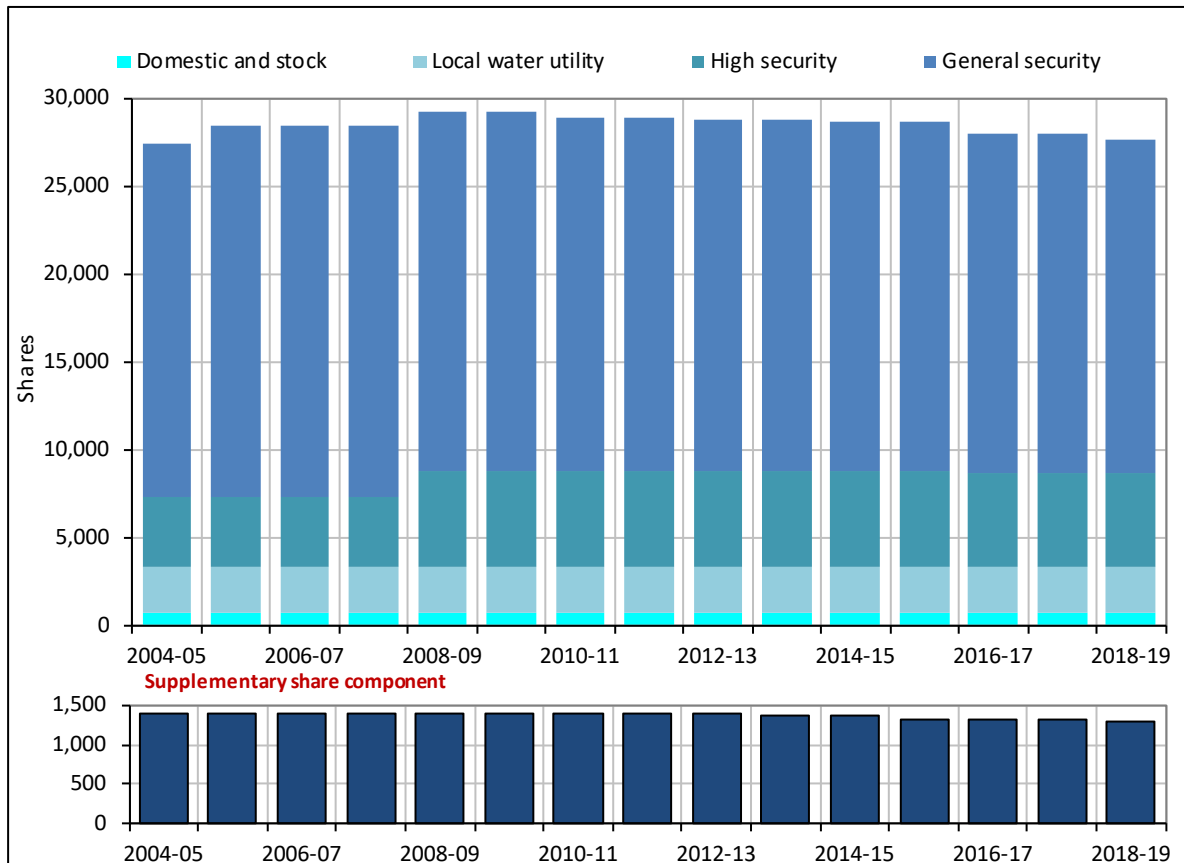
Figure 15: Drought stage for the reporting period referenced with monthly headwater storage inflows, monthly storage inflow variance from mean and two-year cumulative inflow sequence—Windamere Storage



Access rights

- The share component of general security decreased by 333 shares which was moved to the Macquarie (Figure 16)
- The share component of supplementary decreased by 22 shares which was moved to the Macquarie (Figure 16)
- The total issued shares at the end of the reporting period was 28,920 including 1,290 shares of supplementary access licences.

Figure 16: Cudgegong share component since the commencement of the water sharing plan



Water availability

- Water availability⁴ reached the maximum allowable limits for all categories of licence except general security in the reporting period.
- General security access licences had a carryover of 19,581 megalitres into the reporting period, equating to 103% of issued share component for this category in the Cudgegong.
- General security access licence received an opening available water determination of zero megalitres per share, and no further announcements were made throughout the year.
- Storage spill allocations adjustments occurred in 2010-11, 2011-12 and 2016-17 (full reset of allocation accounts to 1 megalitre per share). Refer to Note 5 (detailed item notes) for more information on this accounting process.
- Including the carryover, the total water availability for general security was 103% of the issued share component for this category (Figure 17).
- Overall, water availability was the lowest of the past 3 years (Figure 18).

⁴ Supplementary licences have been excluded. Each year of the plan this licence category has been granted an available water determination of 1 megalitre per share, however access to this water is contingent on high flow events available. Actual usage information against this category of licence is available in note 20 of this GPWAR. Includes all access licences issues under the water sharing plan and therefore held environmental water. Includes credits and debits resulting from account spill reset (see disclosure note 5 for details). At the commencement of the water sharing plan (2004-05) water held in general security accounts was allowed to be brought forward as an opening balance.

Figure 17: Incremental available water determination and carryover volumes for General Security as a proportion of share component

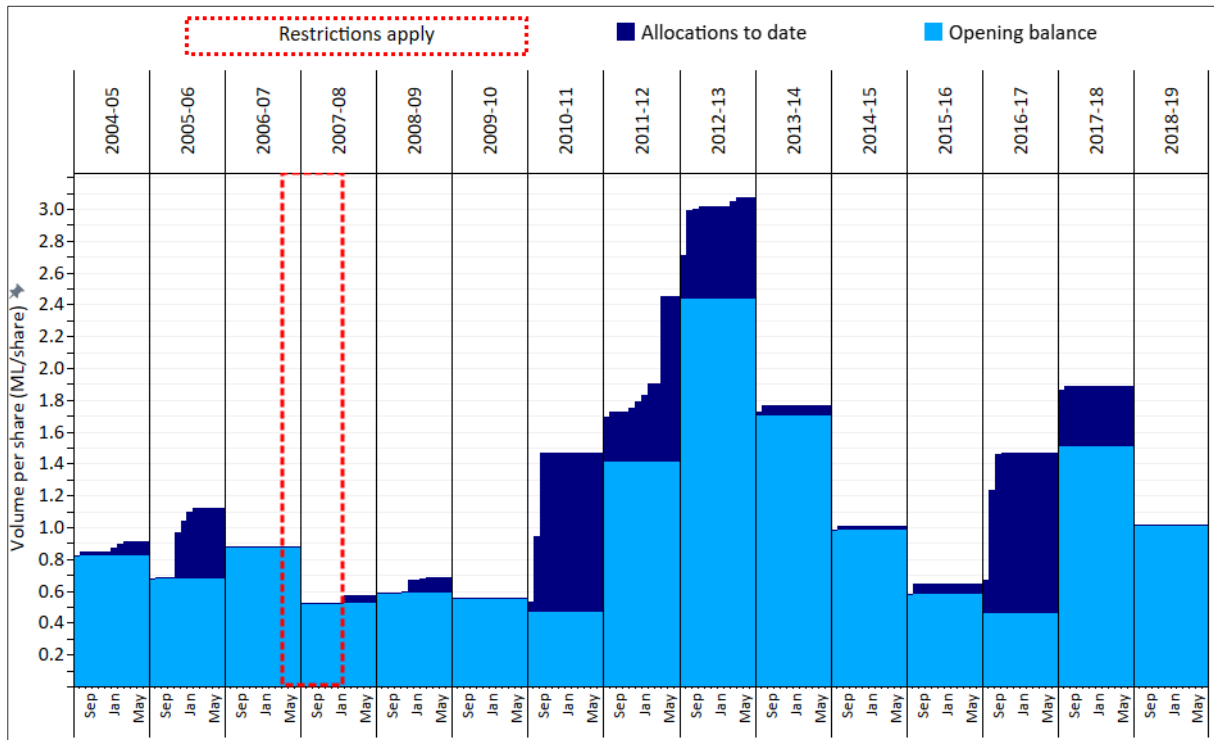
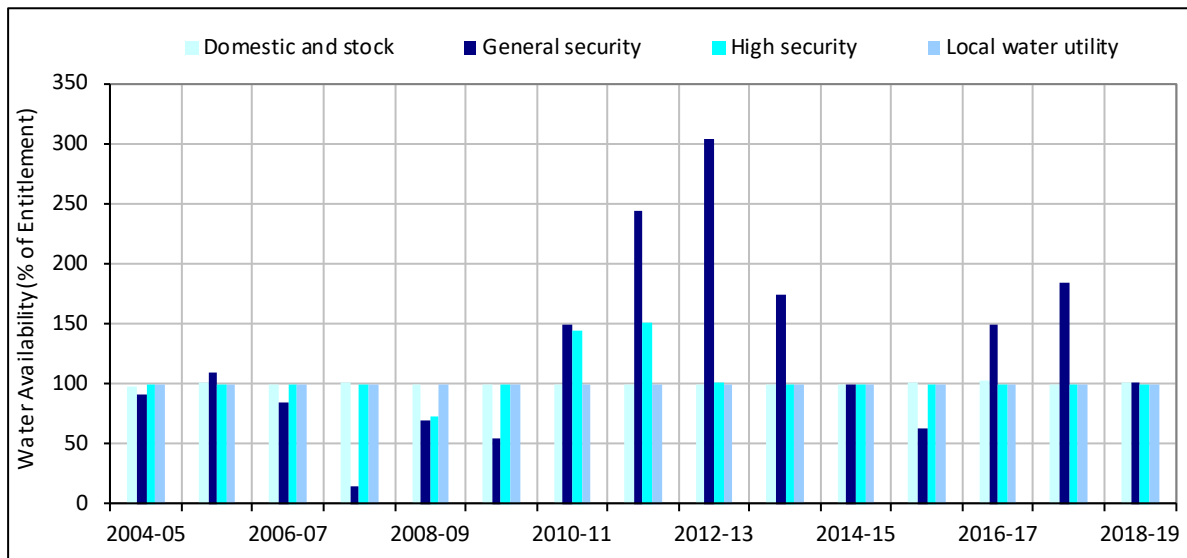


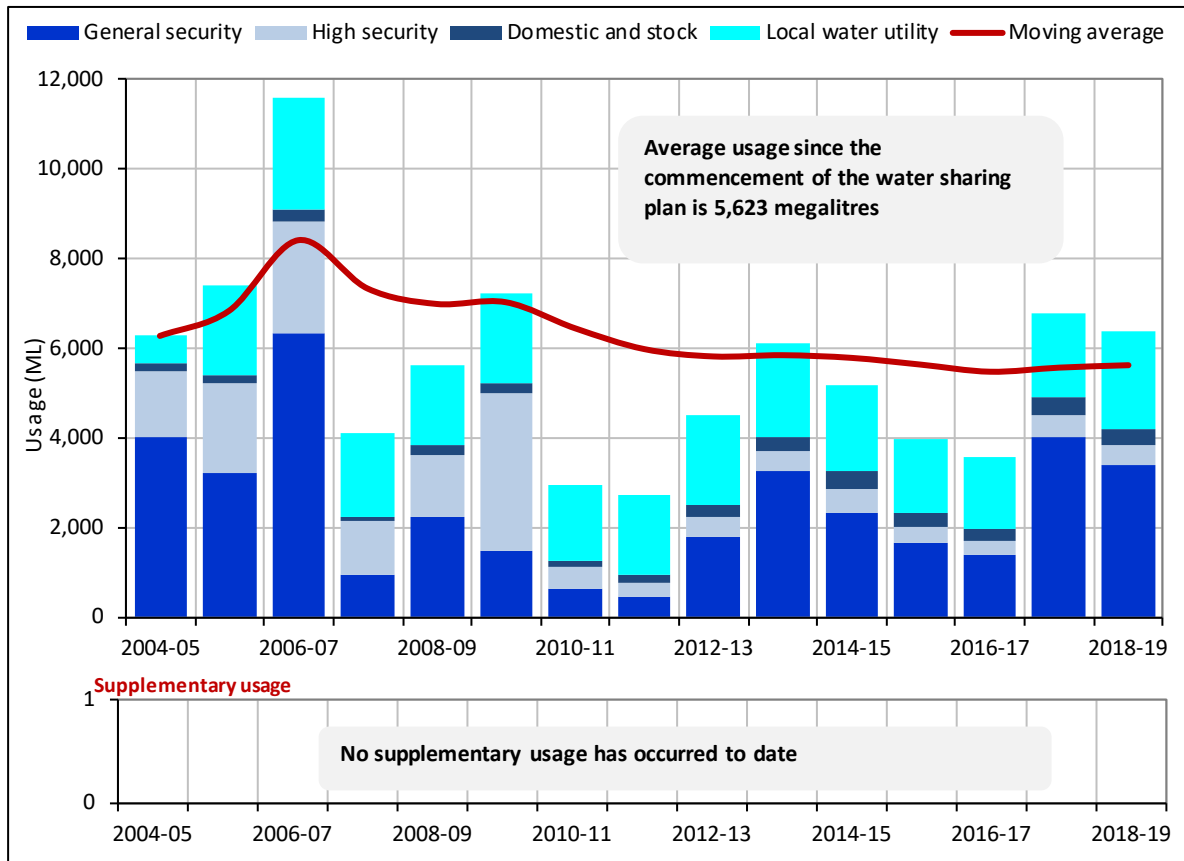
Figure 18: Cudgongong Account Water Availability (Carryover + Available Water Determinations)



Account usage

- Water usage in the Cudgongong decreased slightly with 6,385 megalitres debited against accounts (Figure 19).
- No supplementary usage has occurred in the Cudgongong under water sharing plan management conditions (commencing 2004-05).
- The average usage (since 2004-05) increased to 5,623 megalitres.

Figure 19: Cudgegong annual usage against moving average usage



Utilisation and inactive share

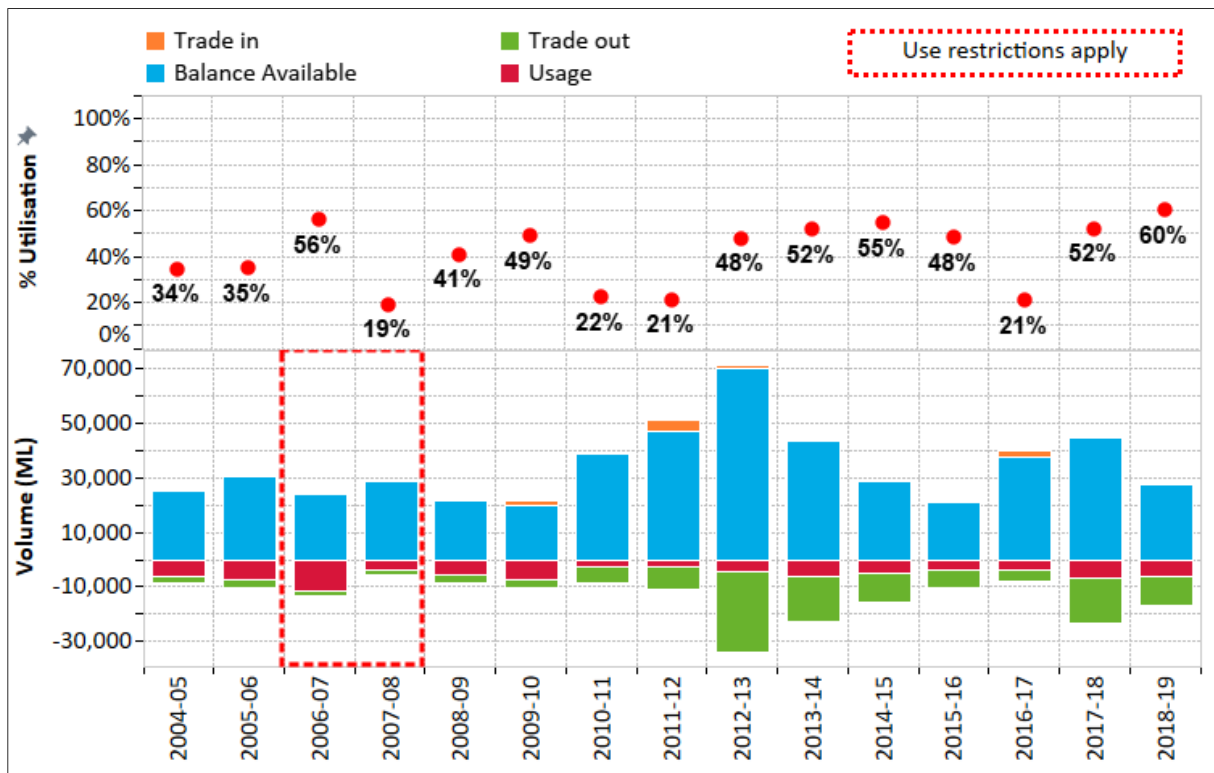
- 22% of general security share component was inactive for the reporting period, which is a significant increase of 18% on the prior reporting period (Table 5).
- Considering all categories of access licences issued 17% of share component was inactive, an increase of 13% on the prior reporting period.
- Utilisation⁵ of available water from regulated supplies (excluding supplementary) increased by 8% to 60%, the highest level under water sharing plan management conditions (Figure 20).

⁵ An access licence is considered inactive if the holding does not use water or engage in the temporary trading market for the reporting period. Utilisation reflects the amount of water used, relative to the maximum available for use.

Table 5: Inactive licence summary Cudgegong

Licence category	Inactive licences (number) 2018–19	Inactive share component 2018–19	Inactive share component % of total 2018–19	Inactive share component % of total prior year 2017–18
Domestic and Stock	25	256	39%	30%
Domestic and Stock [Stock]	3	15	100%	100%
Domestic and Stock [Domestic]	7	19	100%	53%
Local water utility	0	0	0%	0%
Regulated river (General Security)	66	4236	22%	4%
Regulated river (High Security)	5	38	1%	0%
Regulated river (High Security) [research]	1	1	100%	0%
Total regulated supply	107	4,565	17%	4%
Supplementary Water	88	1290	100%	100%

Figure 20: Cudgegong percentage utilisation (water availability plus trade in from external water source against account usage and trade out to external water source)

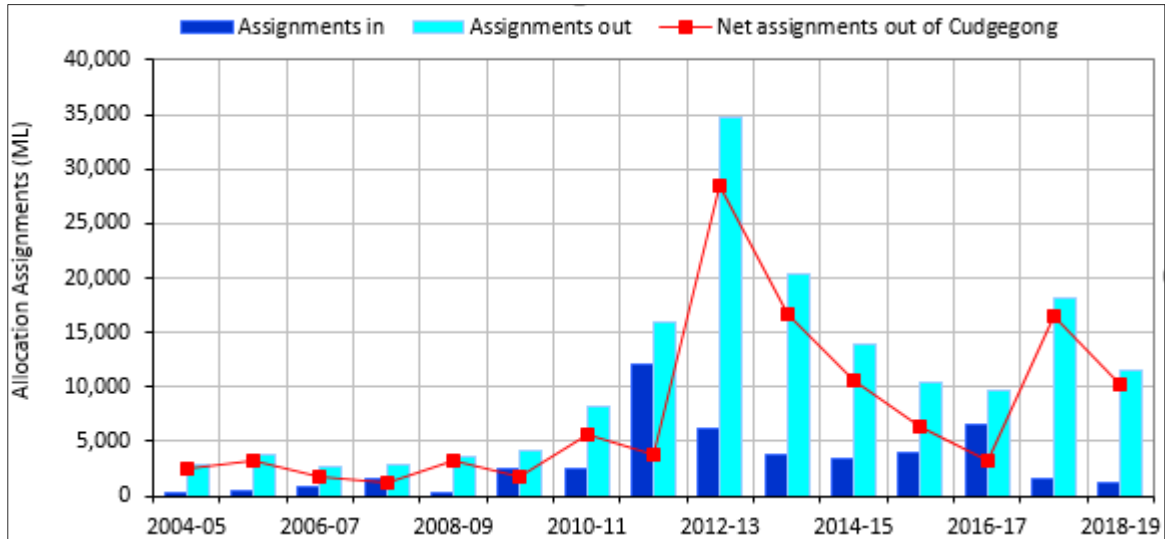


Temporary trading (allocation assignments)

Temporary trading is implemented in this water source under the clause 71 T (assignment of water allocations between access licences) of the water management act 2000.

- Trade activity by volume (and) net assignments out of the Cudgegong (to the Macquarie), after increasing for the first time in five years last year, reduced this year (Figure 21)
- 1,282 megalitres was traded into Cudgegong access licences and 11,538 was traded out of access licences, a net assignment out of 10,256 megalitres (to the Macquarie)

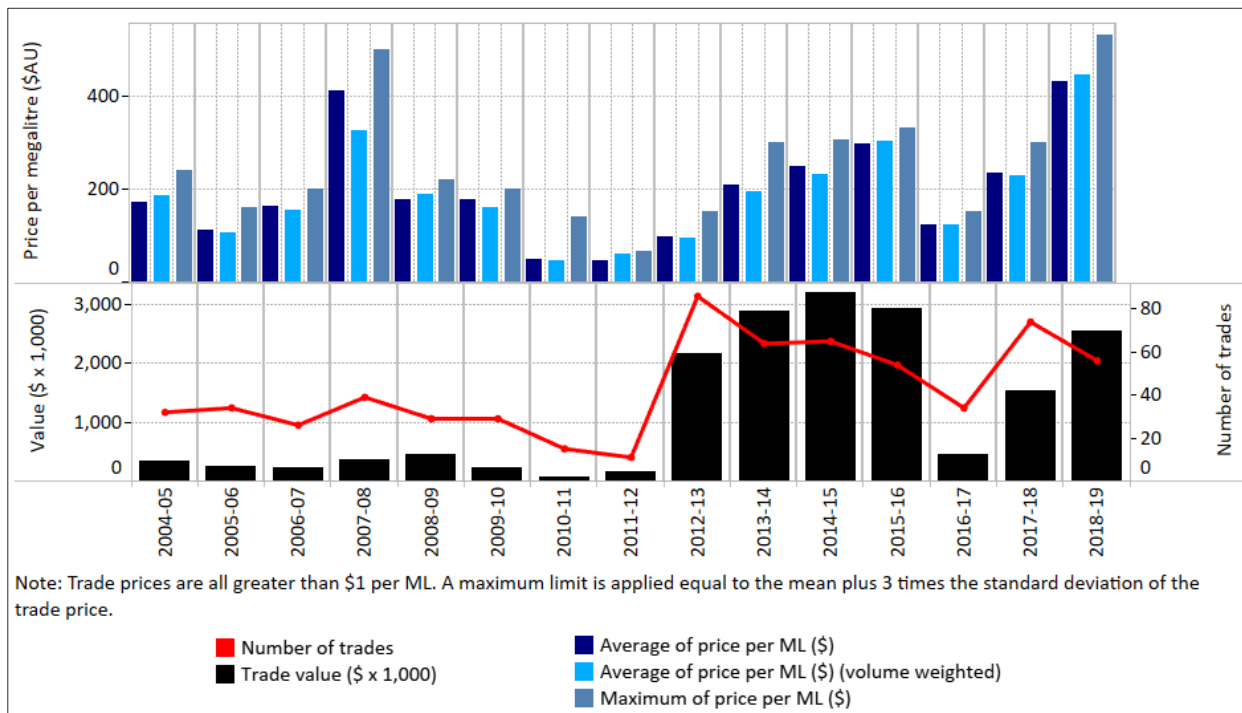
Figure 21: Cudgegong allocation assignment (temporary trading) summary



Commercial temporary trading statistics

- Considering commercial temporary trading activity⁶, the average price of water increased to \$430 per megalitre (\$444 weighted average) for the reporting period (Figure 22).
- The maximum price was \$530 per megalitre.
- In total 56 commercial trades were processed for an exchange of \$2,552,000

Figure 22: Cudgegong allocation assignments—trade price statistics



Note: Trade prices are all greater than \$1 per ML. A maximum limit is applied equal to the mean plus 3 times the standard deviation of the trade price.

Commercial statistics, permanent trading (share assignments and transfer of licence)

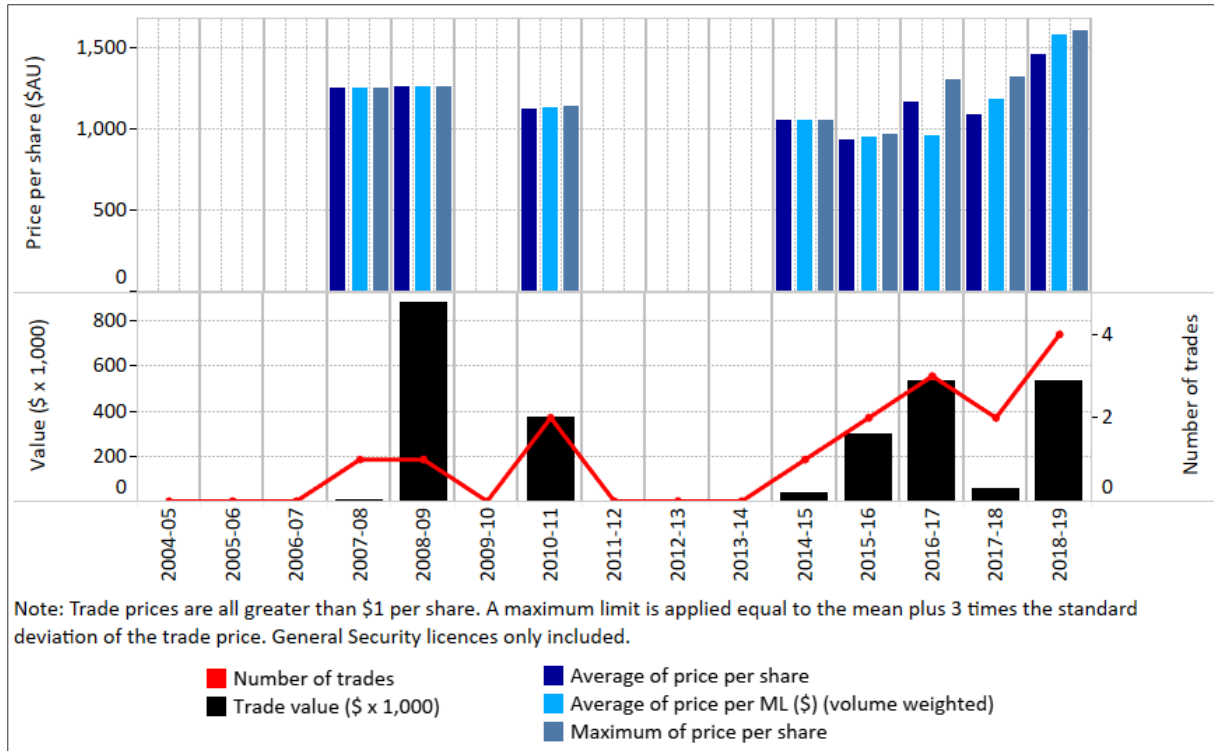
Division 4 (dealings with access licences) of the water management act 2000 allows for a range of dealing options that permanently effect the title of the water access licence. Two of the more common dealing practises under this division are assignments of rights under

⁶ Allocation assignments with a trade price greater than \$1 per megalitre

access licences (clause 71Q) and transfer of access licences (clause 71M). With consideration to these dealing types from a commercial perspective⁷:

- Broadly the market is relatively inactive in the Cudgegong, with 71Q dealing never exceeding 5 transactions in any water year.
- Four commercial general security 71 Q transactions were processed in the reporting period (Figure 23).
- The average price was \$1,460 per general security share (weighted average \$1,578).
- Additionally, a total of 3 (71M) commercial transactions⁸ were processed in the reporting period which moved a total of 1,859 shares to a new holder (Figure 24).

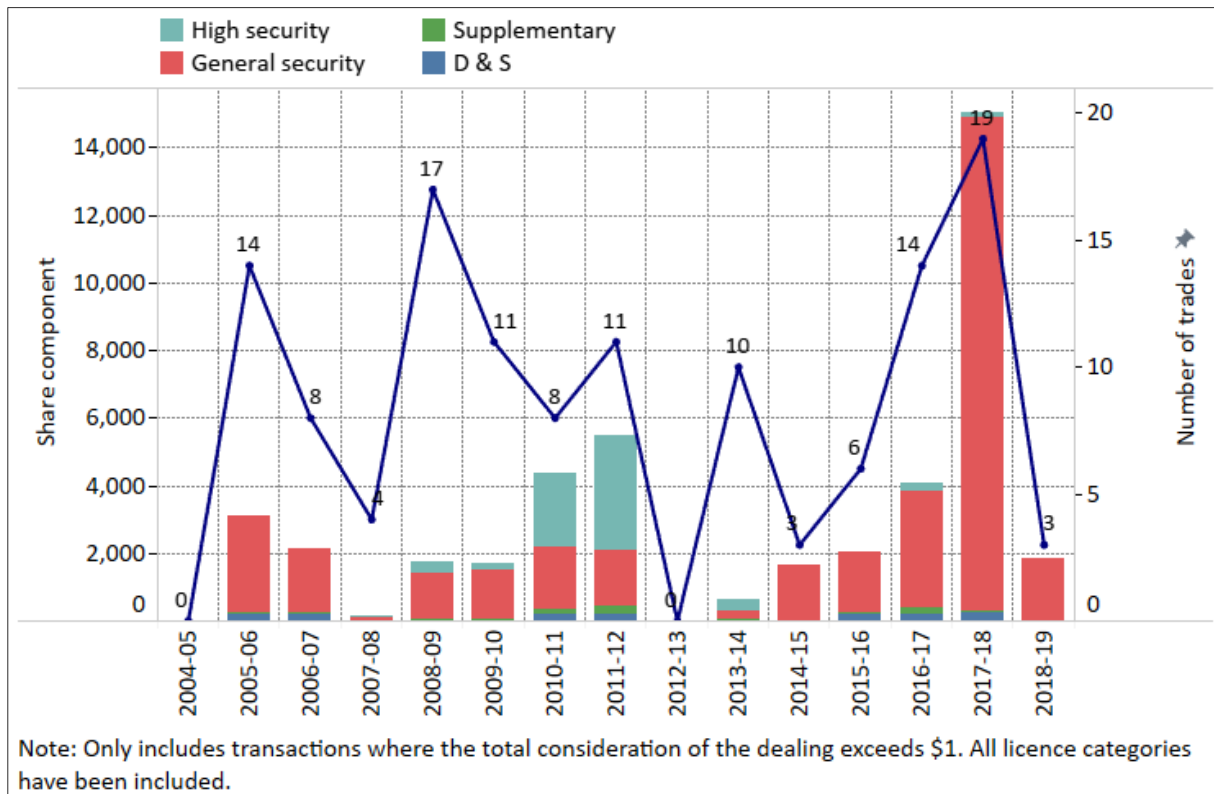
Figure 23: Commercial share assignment statistics, General Security, Cudgegong



⁷ Considers only those transactions associated with a consideration greater than \$1 per share

⁸ Considers all categories of licence

Figure 24: Commercial change of holder transactions—Cudgegong



Macquarie details

The Macquarie is defined as that part of the water source downstream of the upper limit of Burrendong storage.

Extreme events stage and temporary water restrictions (Macquarie)

Generic policy background on the NSW extreme events policy and temporary water restrictions is provided under “Extreme events stage and temporary water restrictions (Cudgegong)” of this document

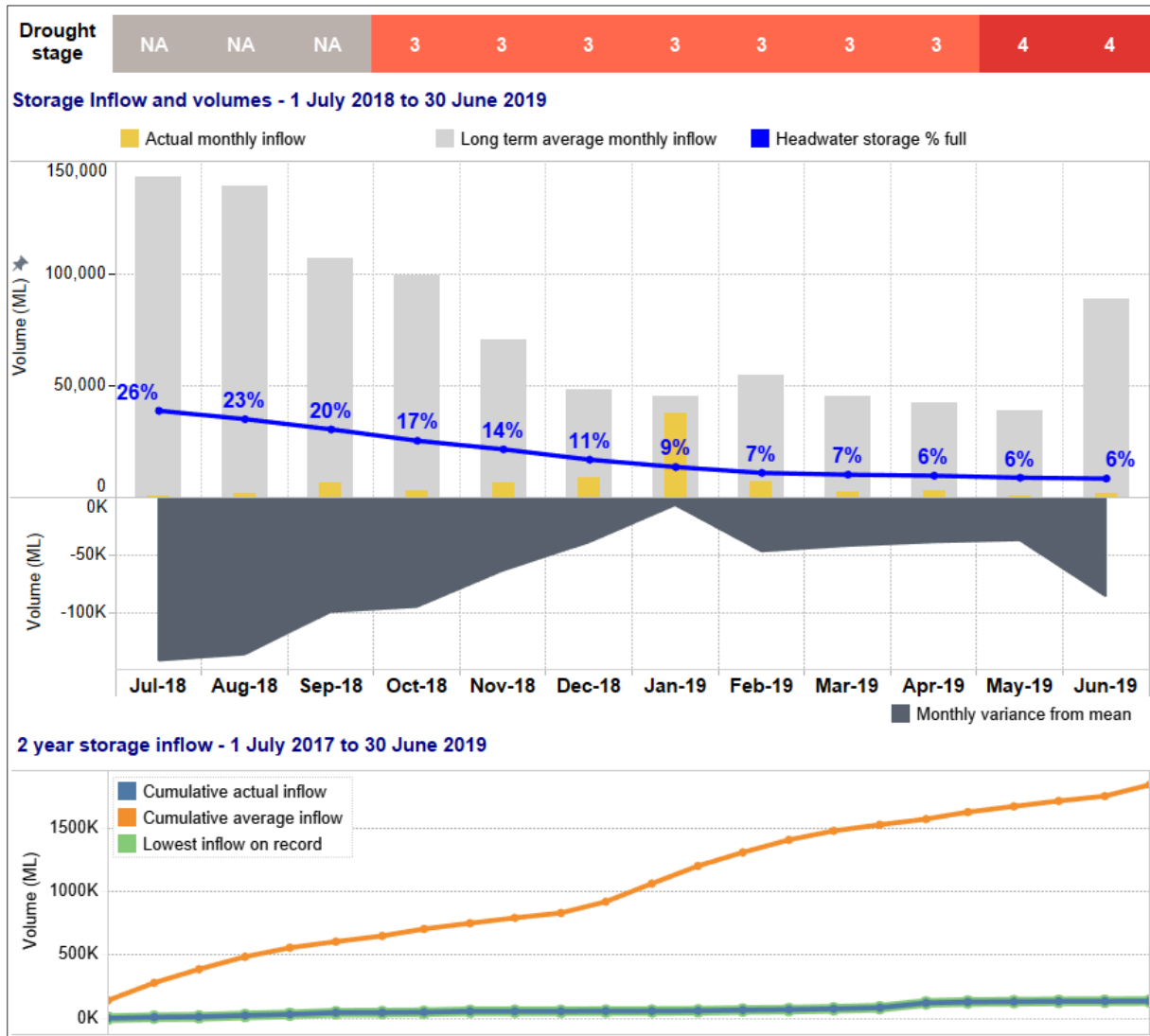
Temporary Water Restriction

A temporary restriction on water take was issued for the regulated river water source on 30 August 2018. Access to the 1 July account balance of general security entitlement holders in the Macquarie regulated river water source was restricted by 30%.

Extreme events stage

- Following the release of the NSW Extreme Events Policy in October 2018, the Macquarie Regulated River Water Source was declared as being in Stage 3.
- Climatic conditions continued to deteriorate throughout the reporting period with major storage inflow tracking significantly below long-term monthly averages for all of the water year.
- Consequently, the water source was declared as being Stage 4 in May 2019.
- The historical 2 year inflow sequence of major storage inflow to 30 June 2019 reached a deficit of 1,702,416 megalitres relative to long-term average 2 year inflow, equivalent to 101% of the full supply volume of Burrendong storage (Figure 25)
- The historical 2 year inflow sequence was the lowest on record (reference data period 1895 to 2019)

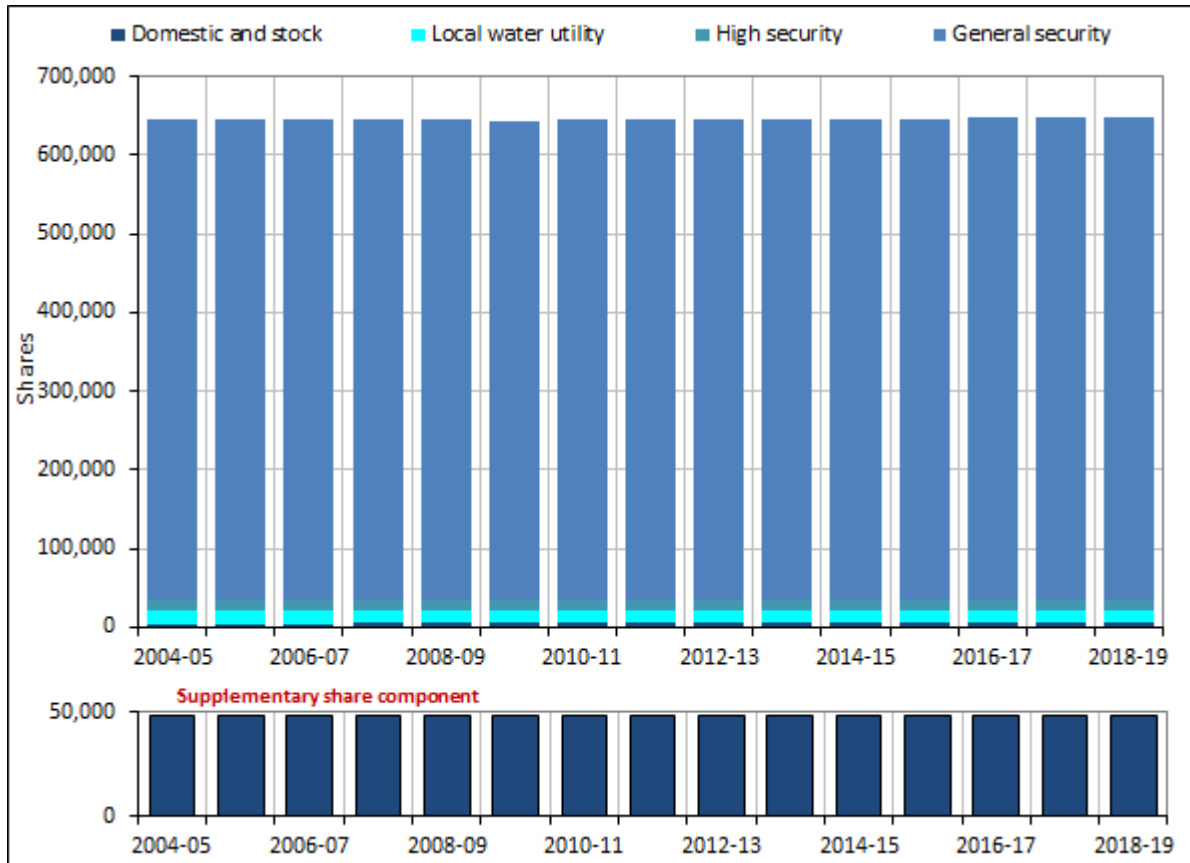
Figure 25: Drought stage for the reporting period referenced with monthly headwater storage inflows, monthly storage inflow variance from mean and two-year cumulative inflow sequence—Burrendong Storage



Access rights

- Share component of general security increased by 333 shares which was moved from the Cudgong to the Macquarie (Figure 266).
- Share component of Supplementary increased by 22 shares was moved from the Cudgong to the Macquarie (26).
- Domestic and Stock shares decreased by 15 due to licence cancellation
- The total issued share at the end of the reporting period was 696,209 including 48,708 shares of supplementary access licences.

Figure 26: Macquarie share component since the commencement of the water sharing plan



Water availability

- Water availability reached the maximum allowable limits for all categories of licence except general security in the reporting period
- General security access licences had a carryover of 316,454 megalitres into the reporting period, equating to 52% of issued share component for this category in the Macquarie (Figure 27).
- General security access licence received an opening available water determination of zero megalitres per share, and no further announcements were made throughout the year.
- A temporary restriction was placed on general security access licence suspending access to 30% of the 1 July 2018 available balance.
- Storage spill allocations adjustments occurred in 2010-11, 2011-12 and 2016-17 (full spill of carryover and reset of allocation to 1 megalitre per share), and 2012-13 (partial spill of carryover). Refer to Note 5 (detailed item notes) for more information on this accounting process.
- Overall, the water availability⁹ was the lowest since the 2015-16 season (Figure 28).

⁹ Supplementary licences have been excluded. Each year of the plan this licence category has been granted an available water determination of 1 megalitre per share, however access to this water is contingent on high flow events available. Actual usage information against this category of licence is available in note 20 of this GPWAR. Includes all access licences issues under the water sharing plan and therefore held environmental water. Includes credits and debit resulting from account spill reset (see disclosure note 5 for details). At the commencement of the water sharing plan (2004–05) water held in general security accounts was allowed to be brought forward as an opening balance.

Figure 27: Incremental available water determination and carryover volumes for General Security as a proportion of share component

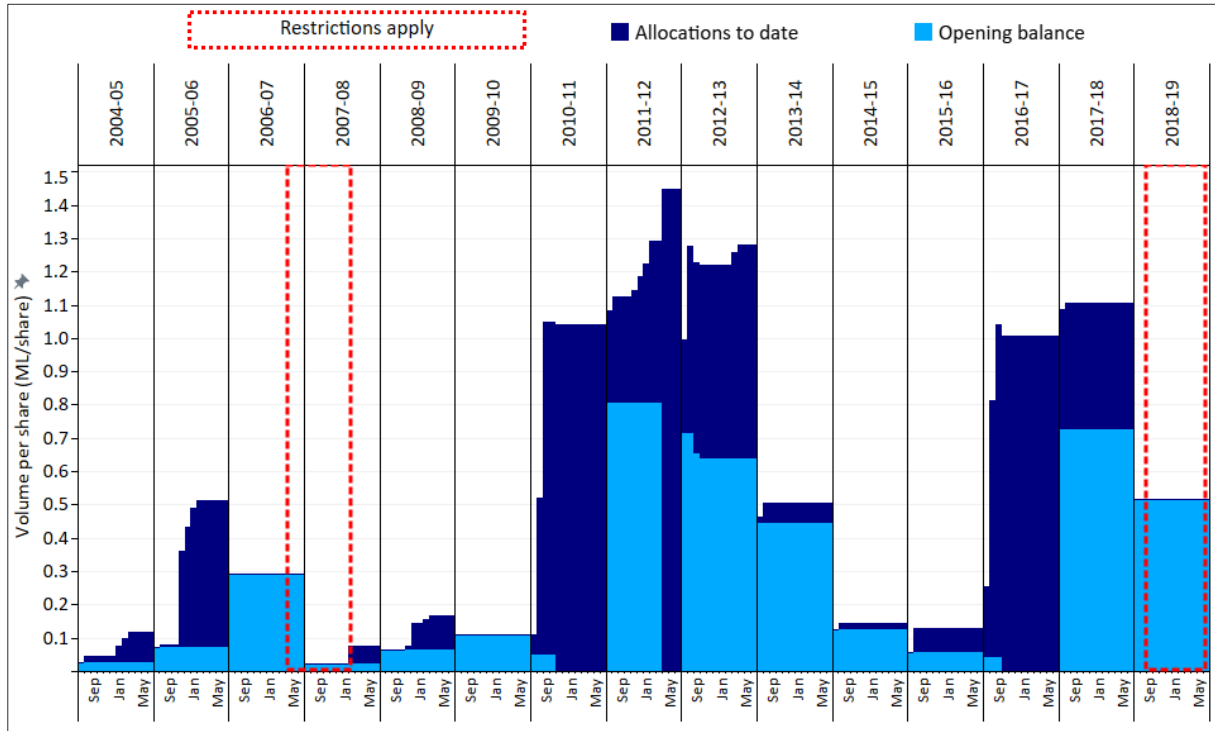
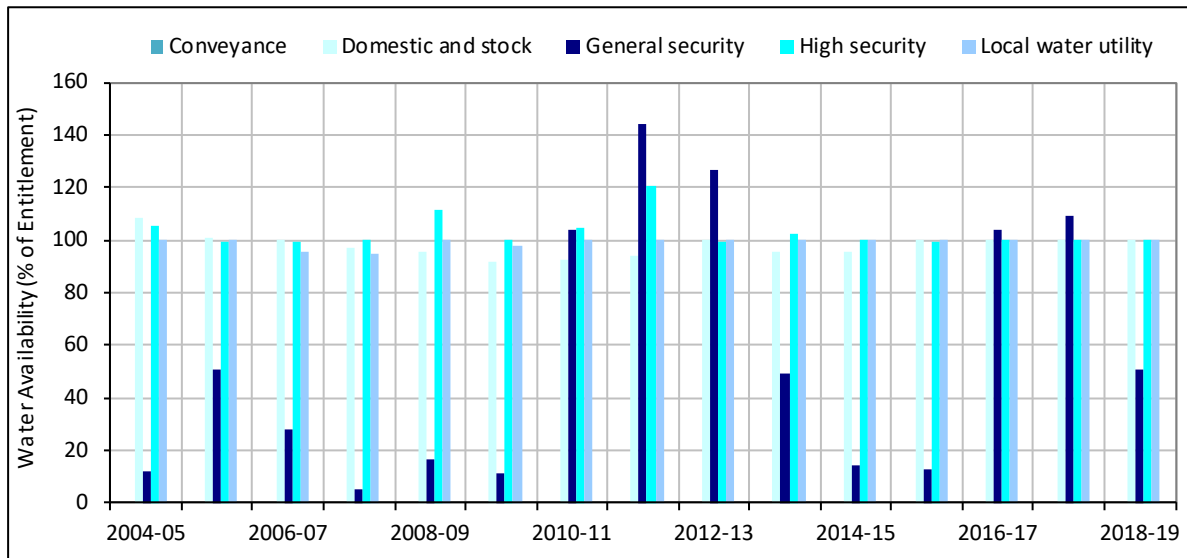


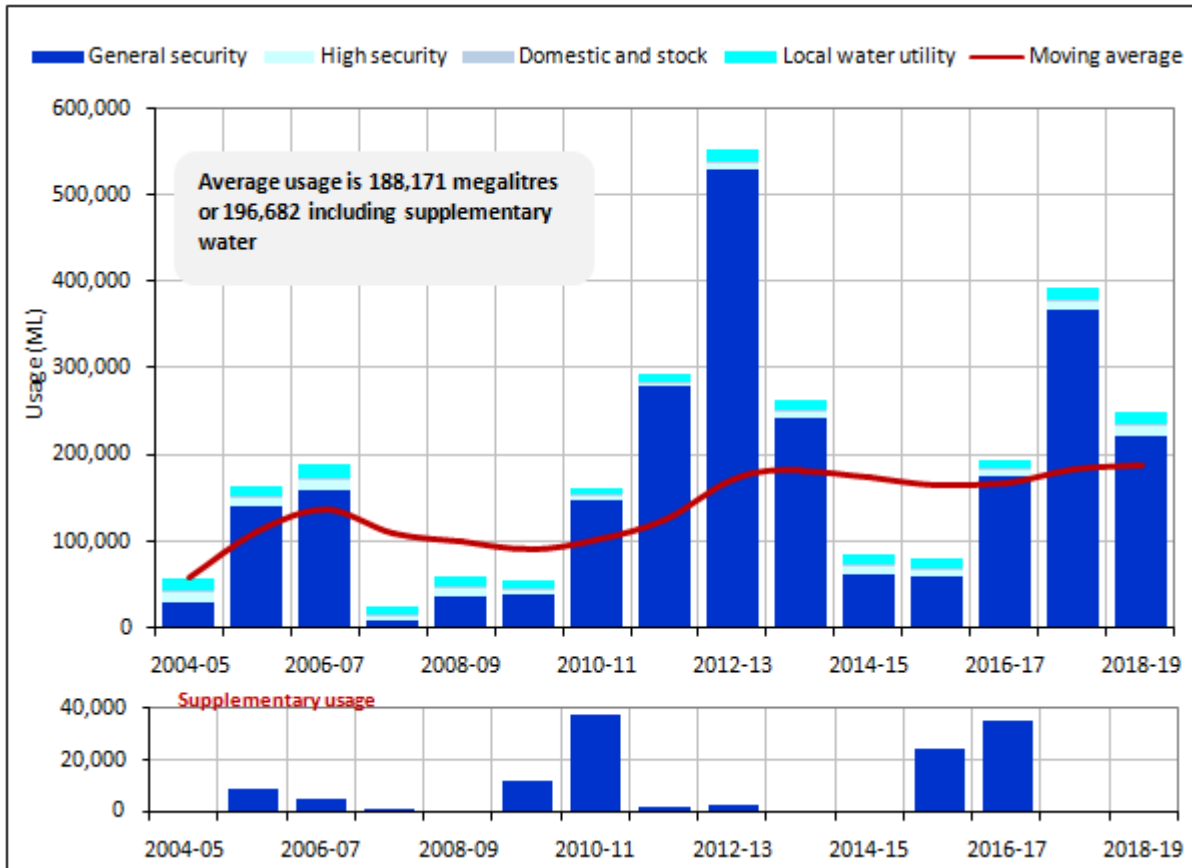
Figure 28: Macquarie account water availability (Carryover + available water determinations)



Account usage

- Water usage from regulated supply in the Macquarie decreased relative to the previous reporting period, with 249,454 megalitres debited against accounts (Figure 29).
- There was no supplementary usage during the reporting period.
- Average usage (since 2004-05) increased to 188,171 (regulated supply) megalitres per year, or 196,682 megalitres per year including access to supplementary water.

Figure 29: Macquarie annual usage against moving average usage



Utilisation and inactive share

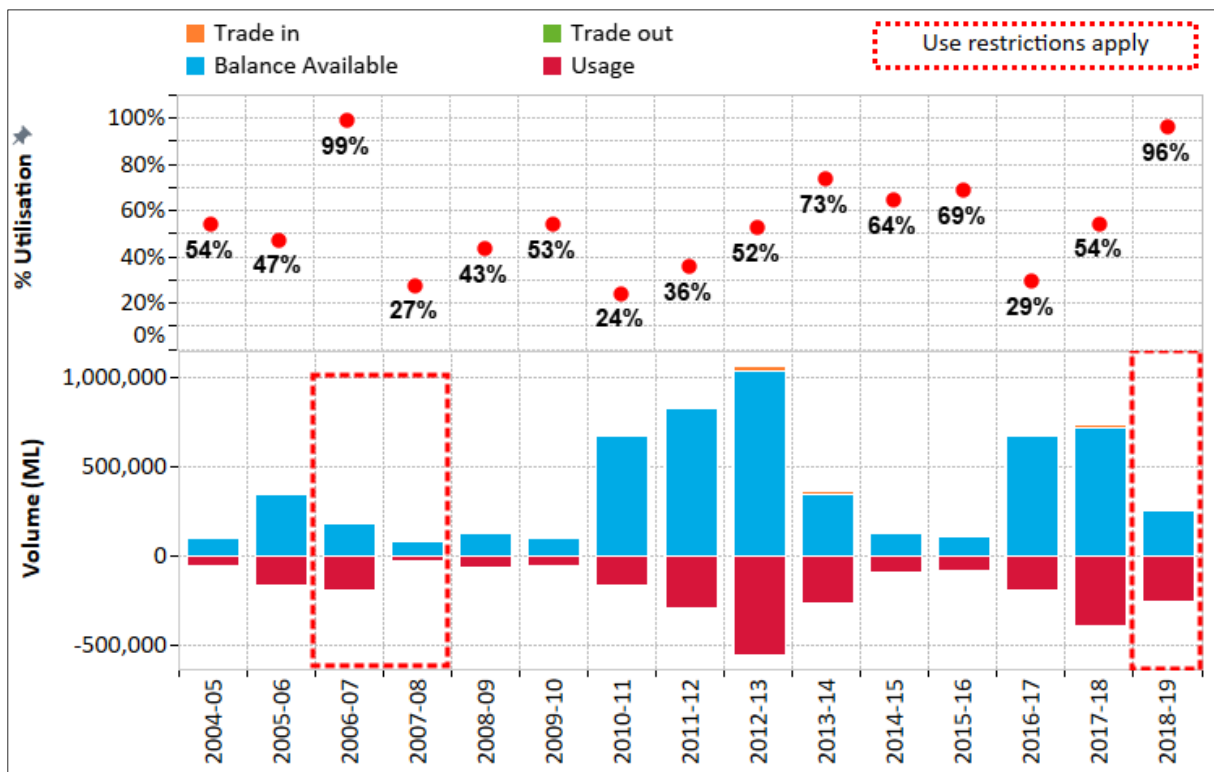
- 6% of general security share component was inactive for the reporting period, an increase of 5% on the prior reporting period (Table 6).
- Considering all categories of access licences issued 6% of share component was inactive, an increase of 4% on the prior reporting period.
- Utilisation¹⁰ of available water from regulated supplies (excluding supplementary) increased significantly to 96%, the second highest level under water sharing plan management conditions (Figure 30).

¹⁰ An access licence is considered inactive if the holding does not use water or engage in the temporary trading market for the reporting period. Utilisation reflects the amount of water used, relative to the maximum available for use.

Table 6: Inactive licence summary Macquarie

Licence category	Inactive licences (number) 2018–19	Inactive share component 2018–19	Inactive share component % of total 2018–19	Inactive share component % of total prior year 2017–18
Domestic and Stock	120	2010	47%	41%
Domestic and Stock [Stock]	20	105	64%	74%
Domestic and Stock [Domestic]	54	584	74%	74%
Local water utility	0	0	0%	0%
Regulated river (General Security)	259	36072	6%	1%
Regulated river (High Security)	9	168	2%	3%
Regulated river (High Security) [research]	2	344	9%	8%
Total regulated supply	464	39283	6%	2%
Supplementary Water	408	39752	82%	77%

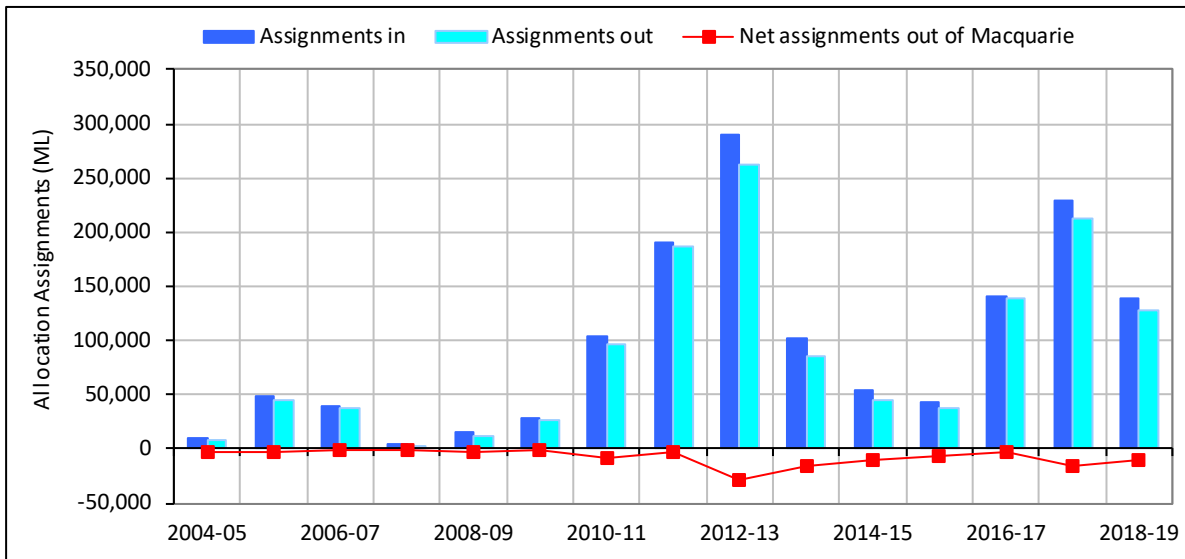
Figure 30: Macquarie percentage utilisation (water availability plus trade in from external water source against account usage and trade out to external water source)



Temporary trading (allocation assignments)

- By volume allocation assignments significantly decreased with a 130,272 megalitres traded into Macquarie access licences (Figure 31).
- A total of 128,308 megalitres was traded out of Macquarie access licences resulting in a net assignment into the Macquarie of 10,256 megalitres.

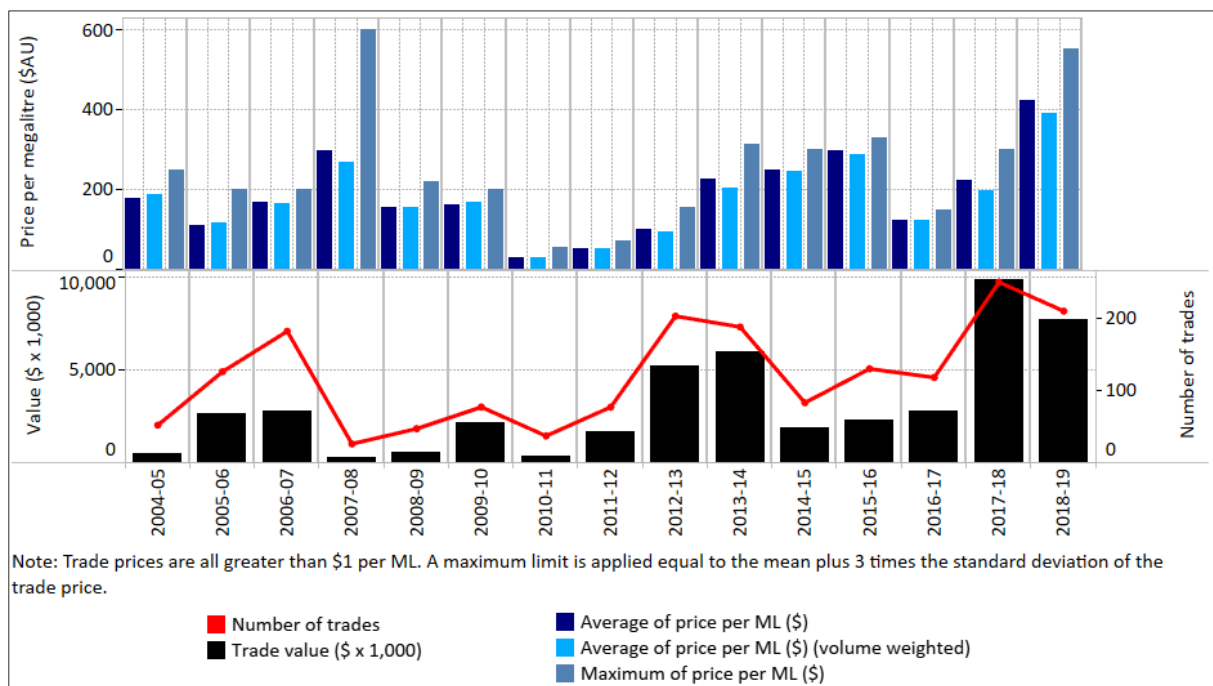
Figure 31: Macquarie allocation assignment (temporary trading) summary



Commercial temporary trading statistics

- Considering commercial temporary trading activity¹¹, the average price of water increased to \$422 per megalitre (\$390 weighted average) for the reporting period, the highest under water sharing plan management conditions (Figure 32).
- The maximum price was \$553 per megalitre.
- In total 210 commercial trades were processed for an exchange of \$7,752,000. This is the second-highest number in terms of trade numbers and trade value since the Water sharing plan commenced 2004-05.

Figure 32: Macquarie allocation assignments—trade price statistics

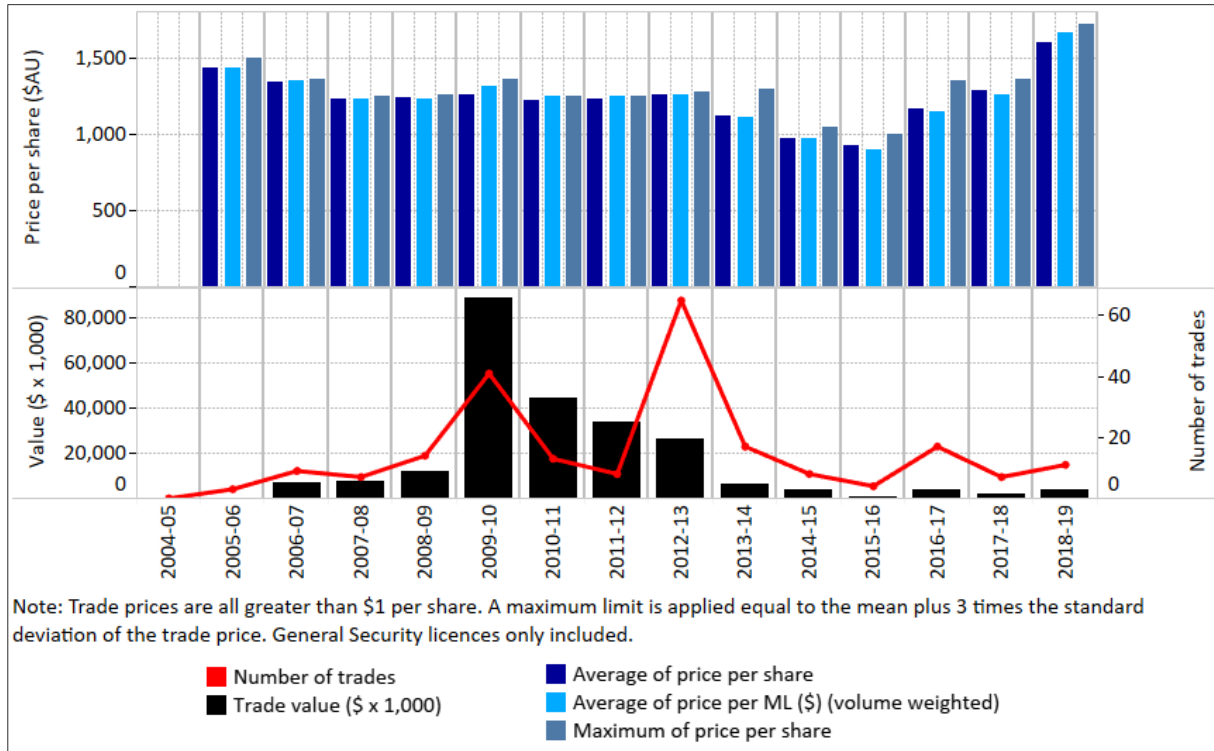


¹¹ Allocation assignments with a trade price greater than \$1 per megalitre

Permanent trading (share assignments and transfer of licence)

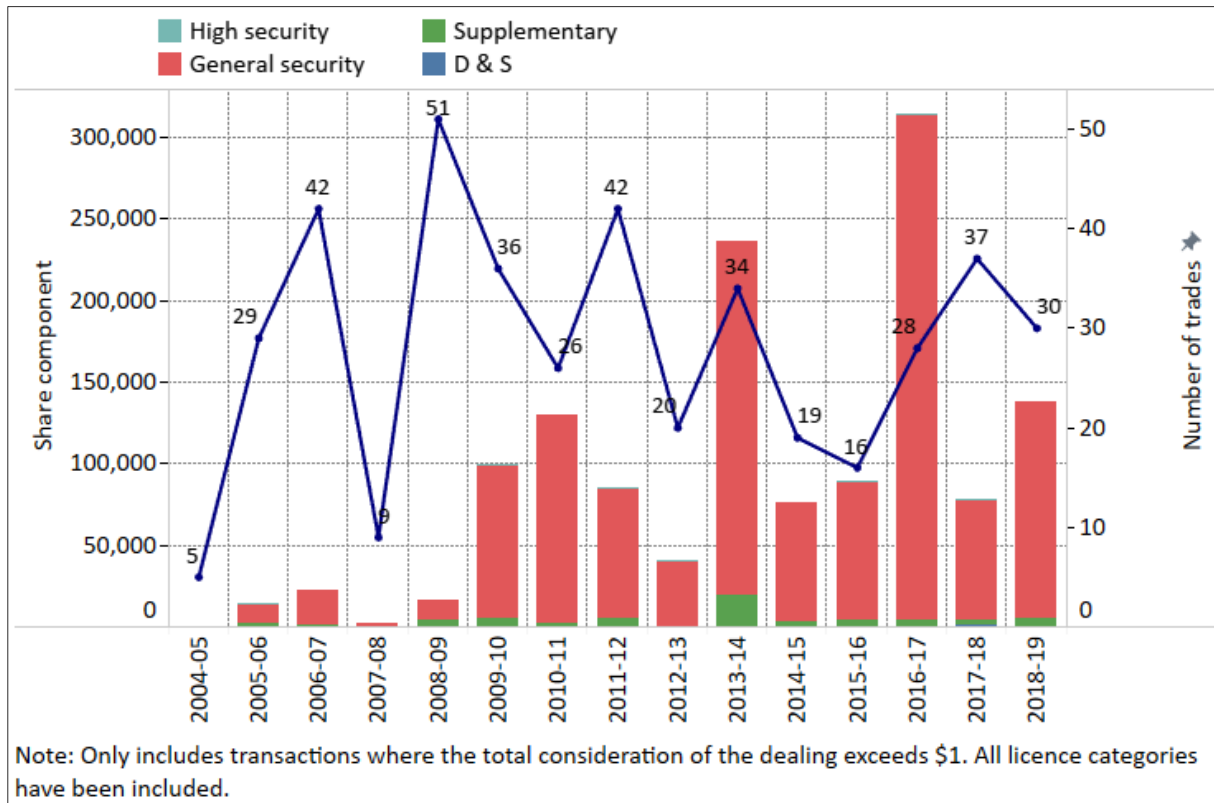
- Eleven commercial general security 71Q transactions were processed in the reporting period (Figure 33)
- The average price was \$1,609 per general security share (weighted average \$1,667).
- Additionally, a total of 30 (71M) commercial transactions¹² were processed in the reporting period which moved a total of 137,372 shares to a new holder (Figure 34).

Figure 33: Commercial share assignment statistics, General Security, Macquarie



¹² Considers all categories of licence

Figure 34: Commercial change of holder transactions—Macquarie



Replenishment flows

- Due to dry weather conditions throughout the water year and no significant rainfall, there has been no uncontrolled flows produced.
- Replenishment flow was provided to:
 - Marra Creek—1,767 ML
 - Lower Bogan below Gunningbar confluence—8,301 ML
- No replenishment flow was provided to the following areas due to the dry conditions:
 - Crooked Creek (below Mumblebone)
 - Bogan River
 - Nyngan (Gunningbar confluence)
 - Belaringar Creek (downstream of Albert Priest Channel)
 - Ewenmar Creek (Reddenville Break)
 - Belaringar Creek
- For details on replenishment flow events refer to Note 21.

Environmental Water

Planned environmental water

- The environmental water allowance had an opening balance of 126,038 megalitres for the reporting period
- There were no credits applied to the account during the reporting period.
- A total of 51,072 megalitres was used (51,072 megalitres from the active sub-account and 0 translucent sub-account).
- The end of year balance (carry forward) totalled 69,372 megalitres (41,623 active sub-account and 27,749 translucent sub-account).
- There were two environmental flow events in the Cudgegong (12 January 2019) and (22 January 2019) which were delivered from Windamere Dam. A total 2,632 megalitres of environmental water was delivered across the two events. These are illustrated at Windamere Dam (storage release) and Rock Water Hole (daily flow at site) in Figure 36 and Figure 37 respectively.
- Further details on planned environmental water are available in Note 7 of this GPWAR.

Figure 35: Environmental water allowance summary since commencement of plan

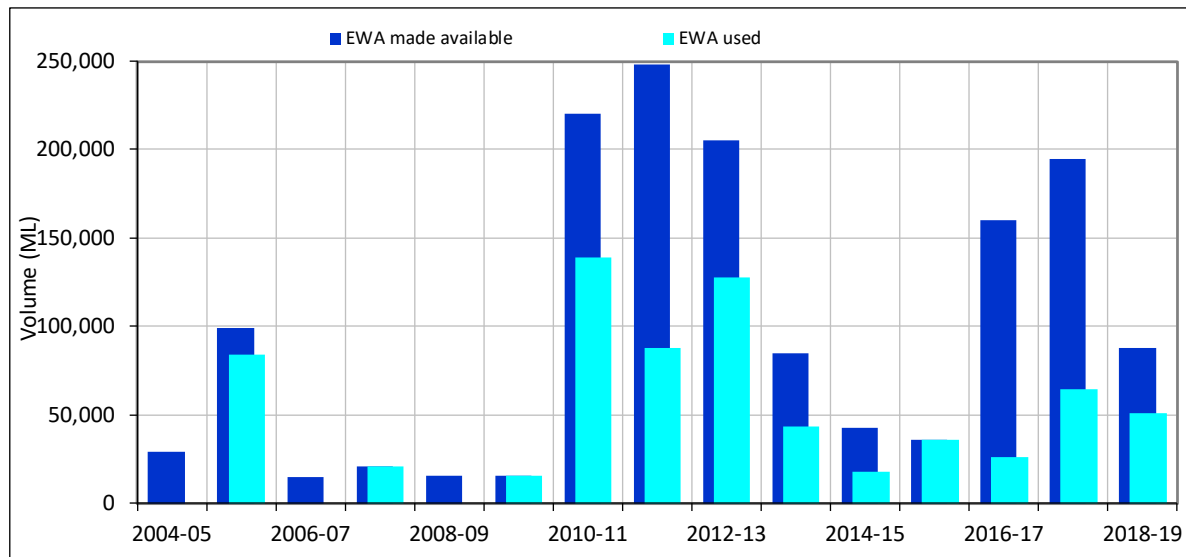


Figure 36: Windamere Dam planned environmental releases

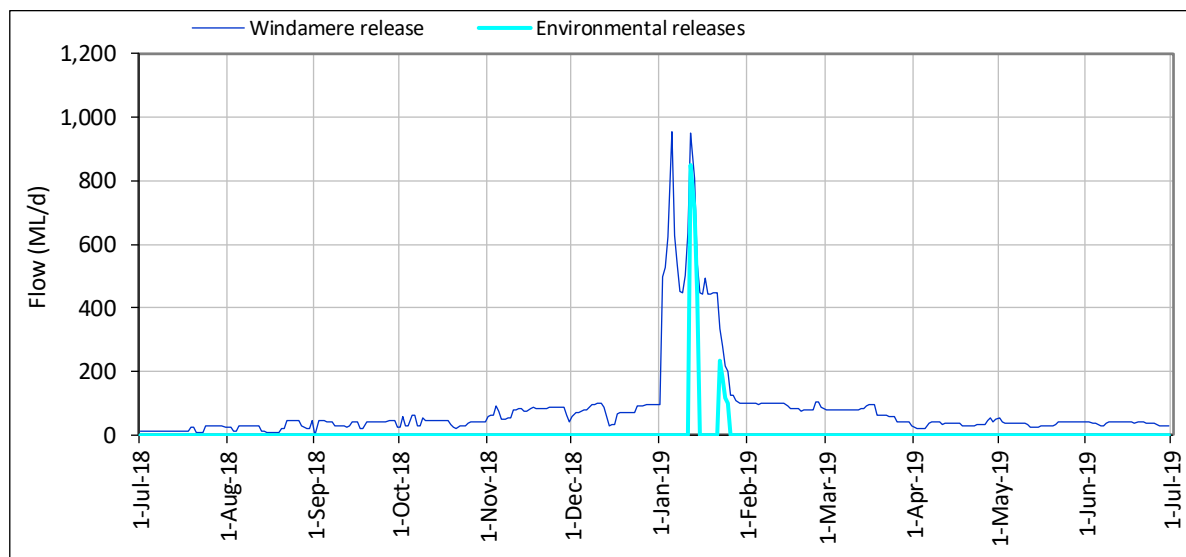
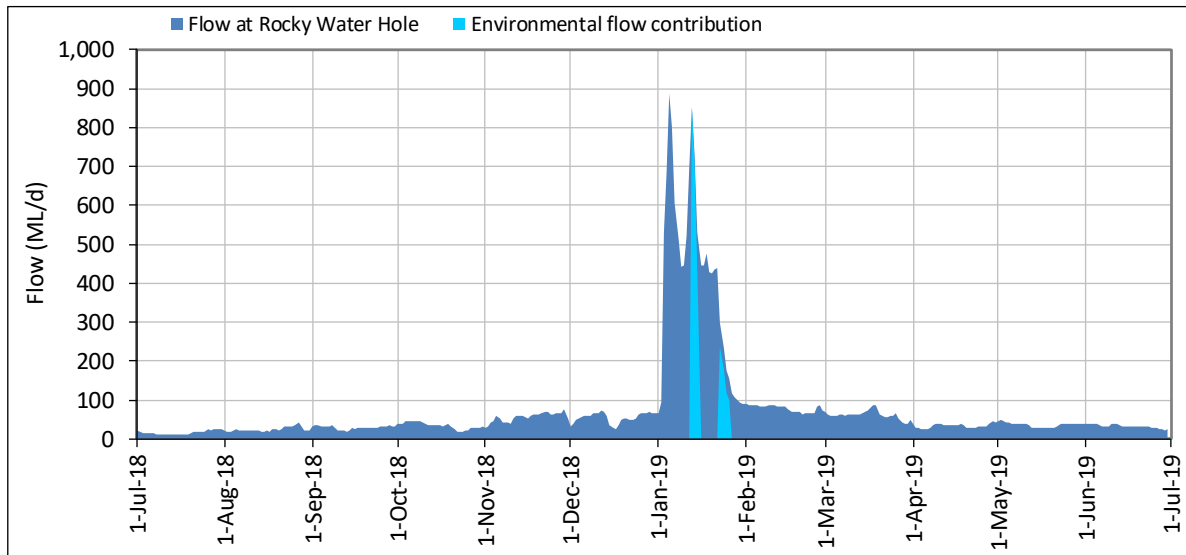


Figure 37: Cudgegong River at Rocky Water Hole planned environmental flow

Held environmental water

Cudgegong

- There was an additional licence added to the held environmental water portfolio in the reporting period (zero share, regulated river general security)
- Another zero share supplementary access licence in the Cudgegong has been held since 2010–11.
- A total of 901 general security shares were managed for environmental purposes as of 30 June 2019 (Figure 38).
- No usage has occurred against held environmental licences in the Cudgegong to date (however the allocations may be traded to Macquarie licences to be used).

Macquarie

- There was no increase to the held environmental water portfolio share in the reporting period. The number of licences held reduced from 12 to 11.
- A total of 183,486 shares were managed for environmental purposes as of 30 June 2019, consisting of 173,742 general security and 9,744 supplementary (Figure 39).
- A total of 75,705 megalitres was used consisting of 75,705 megalitres regulated supply (general security) and 0 megalitres supplementary water (Figure 40).
- Details on environmental watering targets and outcomes are available from the NSW Department of Planning, Industry and Environment—Environment Energy and Science website.
- For additional details on held environmental water refer to Note 6.

Figure 38: Held environmental water share component in the Cudgong catchment

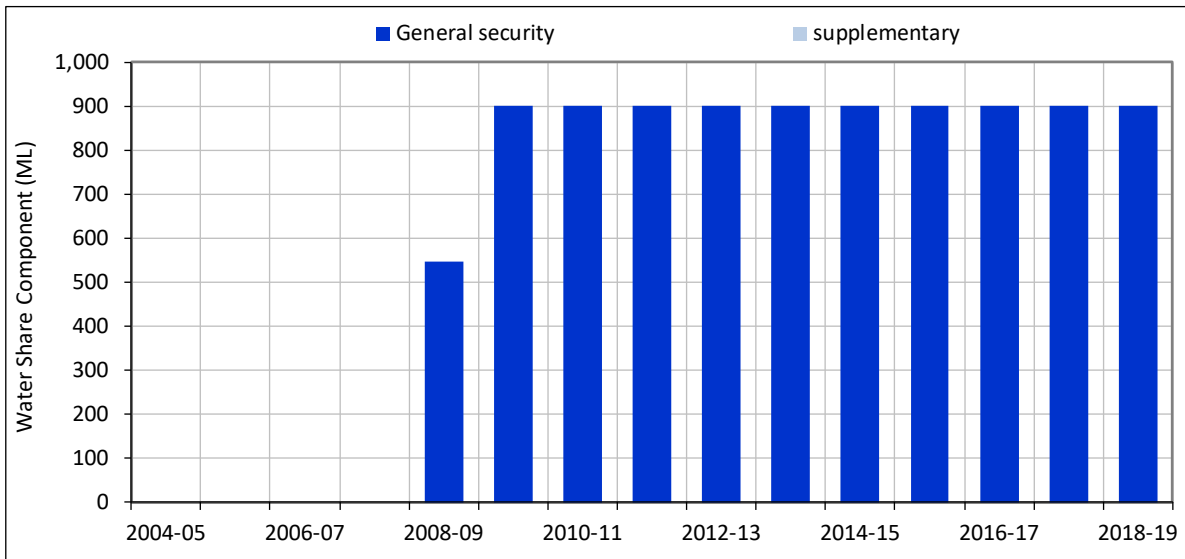


Figure 39: Held environmental water share component in the Macquarie catchment

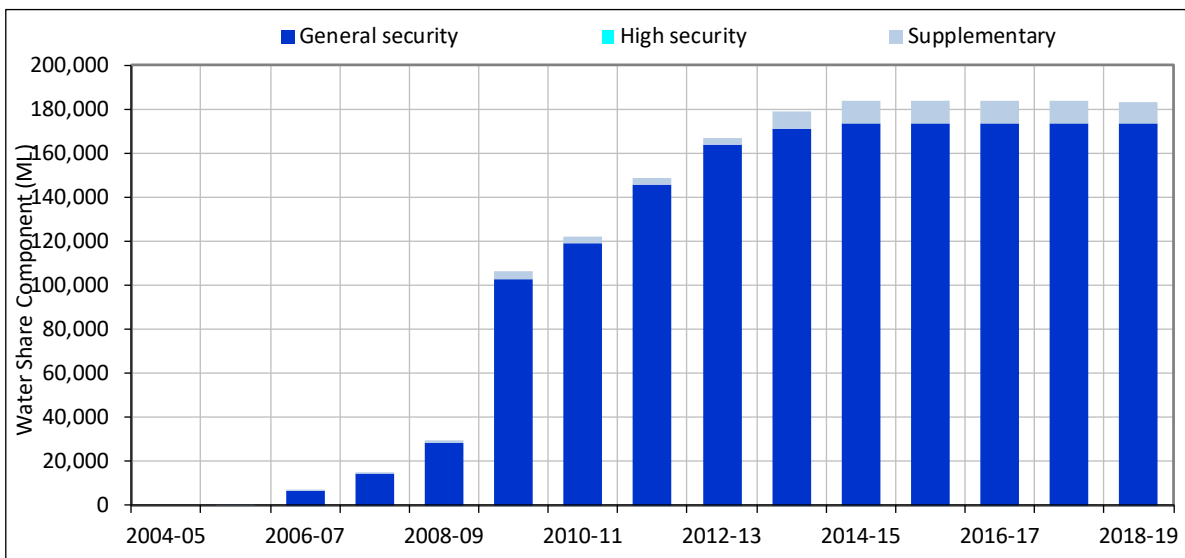
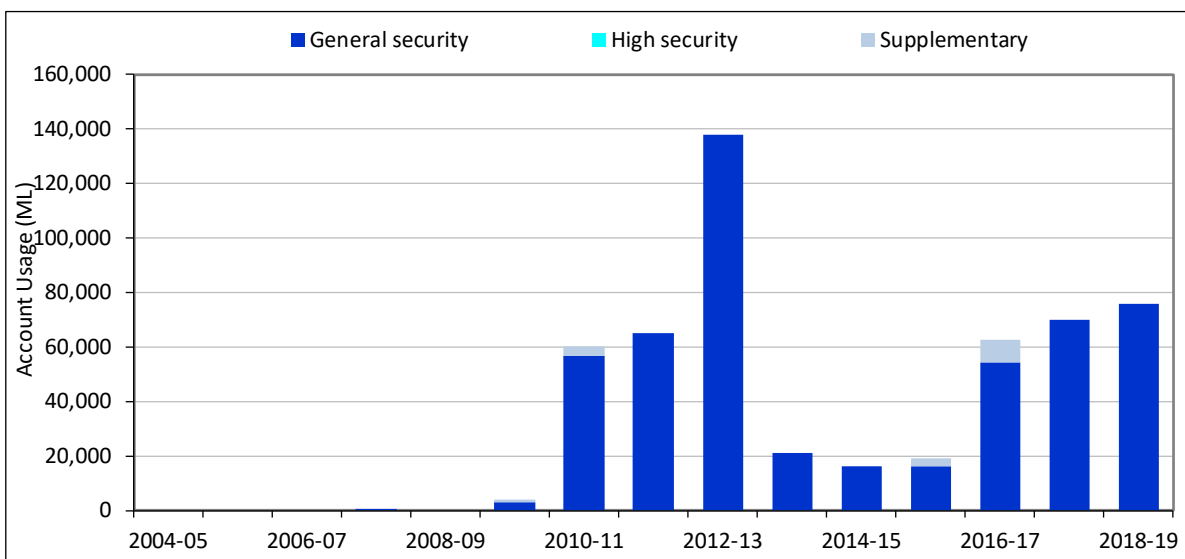


Figure 40: Held environmental usage in the Macquarie catchment



Water Accounting Statements

Significant water accounting policies

The water accounting statements in this GPWAR have been prepared using an accrual basis of accounting. All figures are in megalitres (ML).

The 'Statement of Physical Flows' has been excluded for this GPWAR as all transactions have been presented in the statements 'Water Assets and Liabilities' and 'Changes in Water Assets and Water Liabilities'. A 'Physical Flow Diagram' that represents the physical movements of water has been included in order to provide a clearer depiction of those accounting processes associated with physical flow movement.

For general information on how to interpret the NSW Department of Planning, Industry and Environment water accounting statements refer to the Guide to General Purpose Water Accounting Reports available for download from the NSW Department of Planning, Industry and Environment website at www.industry.nsw.gov.au/water

Quantification of data

Data accuracy

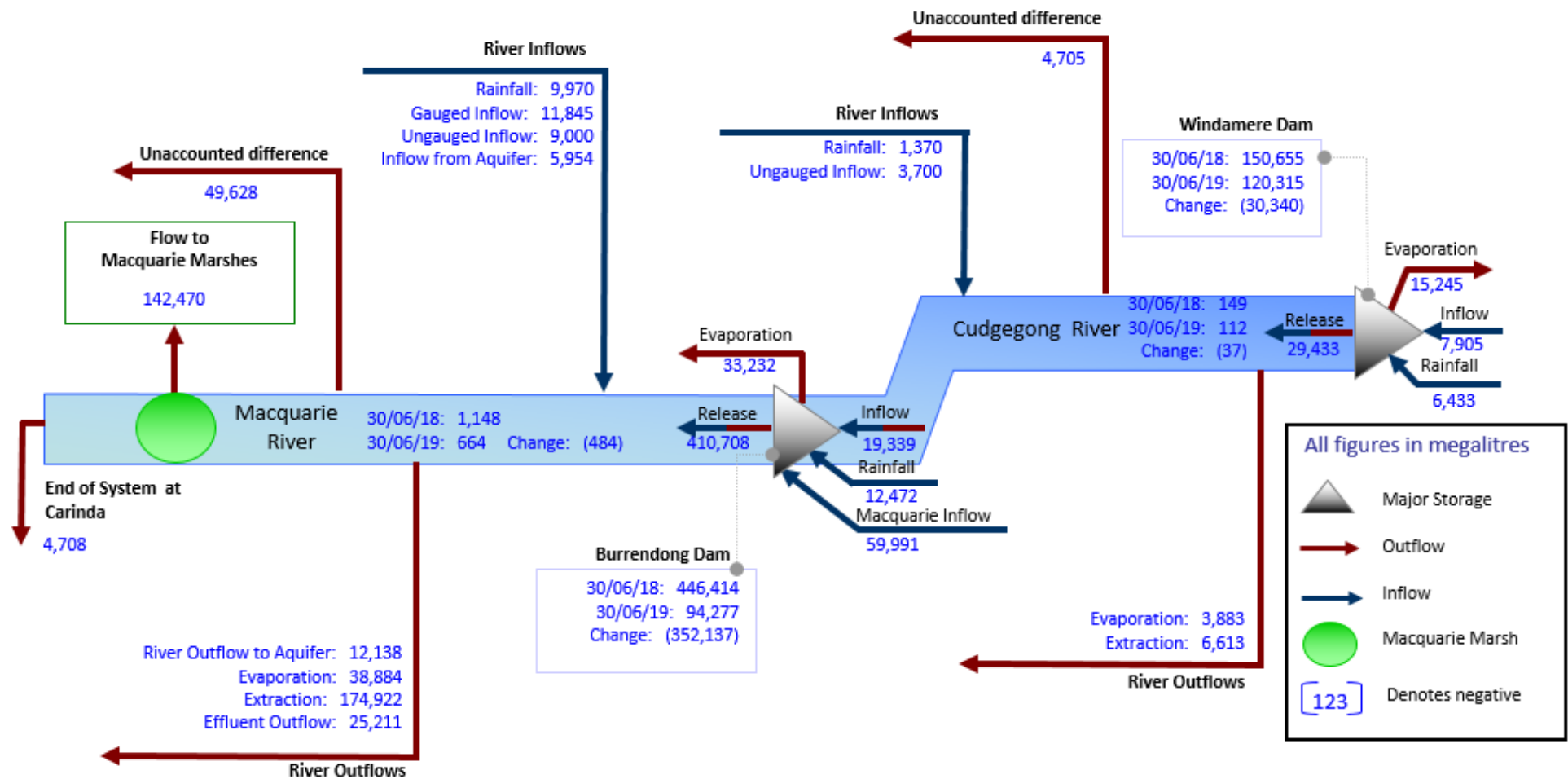
It is important to recognise that the data used to account for water movement and management in the reporting entity has been obtained from a variety of sources and systems. The data ranges from observed values where a high accuracy would be anticipated through to modelled results and estimates where accuracy can be highly variable depending on a range of factors. To address the inconsistencies in accuracy and prevent misuse of the data in the accounts, all figures in the water accounting statements will be accompanied by an assessment of accuracy (Table 7).

Table 7: Water account data accuracy estimates key

Accuracy	Description
A1 ¹³	+/- 0% Data is determined rather than estimated or measured. Therefore, the number contains no inaccuracies.
A	+/- 10%
B	+/- 25%
C	+/- 50%
D	+/- 100%

¹³ Non-physical administration items, such as available water determinations, trading and carryover volumes are assumed to have no inherent error for the purposes of this report. Items are reported as extracted from the NSW Planning, Industry and Environment corporate database

2018-19 Macquarie physical flows mass balance diagram



Statement of water assets and water liabilities

For the year ended 30 June 2019

In all tables (..) denotes a negative value.

Surface water assets

1. Surface water storage	Accuracy	Notes	30 June 2019	30 June 2018
Burrendong Dam	A	8	94,276	446,414
Windamere Dam	A	8	120,315	150,655
River (Cudgegong)	B	9	112	149
River (Macquarie)	B	9	664	1,148
Total surface water storage (Asws)			215,367	598,366
<i>Change in surface water storage</i>			((382,999))	(626,649)

Surface water liabilities

2. Allocation account balance	Accuracy	Notes	30 June 2019	30 June 2018
Cudgegong	A1	1		
High Security			0	0
General Security			10,180	19,581
Macquarie	A1	1		
Domestic and Stock			(-2)	0
High Security (HS)			(-2)	0
Local Water Utility			(-29)	
General Security			99,234	316,434
Environmental water allowance	A1	7	69,373	126,038
Total allocation account balance (Lsws)			0	0
<i>Change in allocation account balance</i>			!B23 Is Not In Table	(146,215)

Surface water net changes

3. Net change	30 June 2019	30 June 2018
Net surface water assets (Asws – Lsws)	!B7 Is Not In Table	!C7 Is Not In Table
<i>Change in net water assets</i>	!B27 Is Not In Table	(480,434)

Changes in water assets and water liabilities

For the year ended 30 June 2019 (1 of 4)

1. Changes in surface water storage (physical water balance)

Surface water storage inflows	Accuracy	Notes	2018-2019	2017-2018
Burrendong Dam				
Inflow (Cudgegong)	A	10	19,339	16,564
Inflow (Upper Macquarie)	A	10	59,991	29,060
Rainfall	B	11	12,472	16,644
Windamere Dam				
Inflow	A	10	7,905	3,485
Rainfall	B	11	6,433	5,666
Cudgegong River				
Rainfall	C	12	1,370	1,299
Ungauged Inflow	C	14	3,700	6,500
Inflow from Windamere	A	15	29,433	22,384
Macquarie River				
Rainfall	B	11	9,970	8,045
Gauged inflow	A	13	11,845	11,390
Ungauged inflow	C	14	9,000	11,900
Inflow from aquifer	D	22	5,954	5,678
Inflow from Burrendong Dam	A	15	410,708	582,582
Total surface water storage increases (Isws)			588,120	721,197

Changes in water assets and water liabilities

For the year ended 30 June 2019 (2 of 4)

Surface water storage outflows	Accuracy	Notes	2018-2019	2017-2018
Burrendong				
Releases	A	15	410,708	582,582
Evaporation	B	11	33,232	75,332
Windamere				
Releases	A	15	29,433	22,384
Evaporation	B	11	15,245	18,187
Cudgegong River				
Evaporation	C	12	3,883	3,971
Basic Rights extractions	C	19	227	227
Licenced extractions from river	A	18	6,386	6,770
Flow to Burrendong	A	10	19,339	16,564
Macquarie River				
Evaporation	C	12	38,884	41,688
Basic Rights extractions	C	19	973	973
Licenced extractions from river	A	18	173,949	323,161
Flow to Macquarie Marsh	B	17		
Licenced			75,505	70,145
Other			66,965	92,284
End of system flow	A	16	4,708	15,439
Regulated effluent	A	16		
Marra Creek			1,540	926
Crooked Creek			7,803	8,111
Duck Creek			3,322	5,965
Gunningbar Creek			12,546	11,008
River outflow to aquifer	D	22	12,138	9,682
Total surface water storage decreases (Dsws)			90,142	1,305,399
Unaccounted volume (balancing item) (Usws)	D	23		
Cudgegong			4,705	2,620
Macquarie			49,628	39,827

Net surface water storage changes	Accuracy	Notes	2018-2019	2017-2018
Net surface water storage inflow (Isws – Dsws – Usws)			!B19 Is Not In Table	(626,649)

Changes in Water Assets and Water Liabilities

For the year ended 30 June 2019 (3 of 4)

2. Changes in allocation accounts

Allocation account increases	Accuracy	Notes	2018-2019	2017-2018
Available water determinations	A1	2		
Cudgegong				
Domestic and Stock			706	706
General Security			0	7,328
High Security			5,412	5,412
High Security (Research)			1	1
Local Water Utility			2,600	2,600
Macquarie				
Domestic and Stock			5,270	5,265
General Security			0	233,009
High Security			8,416	8,416
High Security (Research)			4,044	4,044
High Security (TWS)			40	40
Local Water Utility			16,205	16,205
Environmental water allowance	A1	7	0	60,800
New licence	A1	1		
Cudgegong			0	0
Supplementary water demand	A	20		
Macquarie			0	0
Internal trade—buyers	A1	4		
Cudgegong			1,282	1,572
Macquarie			130,272	219,987
Storage spill reset—increase	A1	5		
Cudgegong			0	0
Macquarie			0	0
Macquarie EWA			0	0
Adjusting account entry—increase	A1	24	0	0
Total allocation account increases (laa)			174,248	565,385

Changes in water assets and water liabilities

For the year ended 30 June 2019 (4 of 4)

Allocation account decreases	Accuracy	Notes	2018-2019	2017-2018
Account usage	A	3		
Cudgegong				
Domestic and Stock			323	388
General Security			3,404	4,040
High Security			462	471
Local Water Utility			2,196	1,871
Macquarie				
Domestic and Stock			1,950	1,641
General Security			221,289	366,875
High Security			7,418	7,400
High Security (Research)			3,700	2,608
Local Water Utility			15,097	14,782
Supplementary			0	0
EWA	A1	7	51,072	64,232
Account forfeiture	A	1		
Cudgegong				
Domestic and Stock			375	318
General Security			601	1,057
High Security			91	108
High Security (Research)			1	0
Local Water Utility			404	729
Macquarie				
Domestic and Stock			3,301	3,624
General Security			5,920	12,535
High Security			245	307
High Security (Research)			344	1,436
High Security (TWS)			40	40
Local Water Utility			2,137	1,423
Licence cancelled	A1	1		
Cudgegong			8	0
Macquarie			21	0
Internal trade—sellers	A1	4		
Cudgegong			11,538	18,085
Macquarie			120,016	203,474
Adjusting account entry—decrease	A1	24		
Cudgegong				0
Storage spill reset—decrease	A1	5		
Macquarie			0	0
Environmental Water Allowance			5,593	4,155
Total allocation account decreases (Daa)			457,546	711,599

Net change in allocation accounts	2018-2019	2017-2018
Net allocation account balance increase (Iaa – Daa)	ID41 Is Not In Table	(146,215)

3. Overall changes

Surface water assets	2018-2019	2017-2018
Change in net surface water assets (Isws – Dsws – Usws – Iaa + Daa)	(89,468)	(480,434)

Note Disclosures

Reconciliation and future prospect descriptions

Reconciliation of change in net water asset to net change in physical water storage ¹⁴	2018–19 ML	2017–18 ML
Change in net surface water assets	(99,700)	(480,434)
Non-physical adjustments		
Net change in allocation accounts	(226,634)	(138,628)
Net change in claims to water: EWA	(56,665)	(7,587)
Total non-physical adjustments	(283,299)	(666,298)
Net change in physical surface water storage	(382,999)	(626,649)

Reconciliation of closing water storage to total surface water assets	30 June 2019 ML	30 June 2018 ML
Closing water storage		
Surface water storage	215,367	598,366
Total surface water assets	215,367	598,366

Water assets available to settle water liabilities and future commitments within 12 months of reporting date

Availability of final datasets for reporting in the GPWAR which include field staff finalising meter readings inhibit the ability to publish the account in a timeframe to render a 12-month forecast from the reporting date useful to users of this report.

In lieu of this information, web links to information sources for the latest water availability information for the Cudgegong and Macquarie Water Sources are provided below. Carryovers and available water determinations at the time of reporting are also presented along with probability information pertaining to the reliability of the Cudgegong and Macquarie systems.


¹⁴ All figures in the reconciliation tables can be derived from or found directly in the Water Accounting Statements of the General Purpose Water Accounting Report

Latest Water Availability


You can find the latest information on water availability, including water allocation statements, water allocations summaries and 2019-20 available water determinations, on the NSW Department of Planning, Industry and Environment webpage at industry.nsw.gov.au/water/allocations-availability/allocations

You can also subscribe to receive the latest updates.


Allocations

- 


How water is allocated

Water sharing plans are developed in consultation with the community to determine how much water can be extracted and set aside.
- 


Allocations dashboard

Data visualisation tool to view and analyse water availability announcements.
- 


Summary of current water allocations

A listing of current water allocation for regulated rivers.
- 

Water allocation statements

Water allocation statements are issued to announce an increase in an allocation for a specific water source and licence category.
- 

Available water determinations

Available water determinations inform licensed water users how much water they can extract. They are issued on 1 July and periodically throughout the year.
- 

Outlook, forecasts and status updates

Information products providing outlooks, forecasts and periodic status updates.

Significant events since 2018–19

System inflows continue to track well below historical median inflows.

System reliability

The latest long-term planning model (IQQM) reflecting a water sharing plan management scenario in the Macquarie- Cudgegong system provide indicative system reliability information for the commencement and closure of a watering season¹⁵.

In any given year, the simulation indicates high security entitlements are likely to have full allocation 100% of the time for Macquarie-Cudgegong system.

At the commencement of the water year, the simulation shows that, over the long-term, the allocation of General Security licence holders equal or exceed 100% of their entitlement 24% of the time (Figure 41).

¹⁵ Modelled data simulated as July to June water year. Simulation period 1 June 1892 to 30 June 2018

Availabilities significantly increase throughout the water year as storages are supplemented from new inflow. By the end of the water year, the simulation results indicate a water availability of 100% of entitlement or greater 46% of the time in the Macquarie–Cudgegong (Figure 42).

Figure 41: Macquarie-Cudgegong start of water year simulated availability for General Security access licences

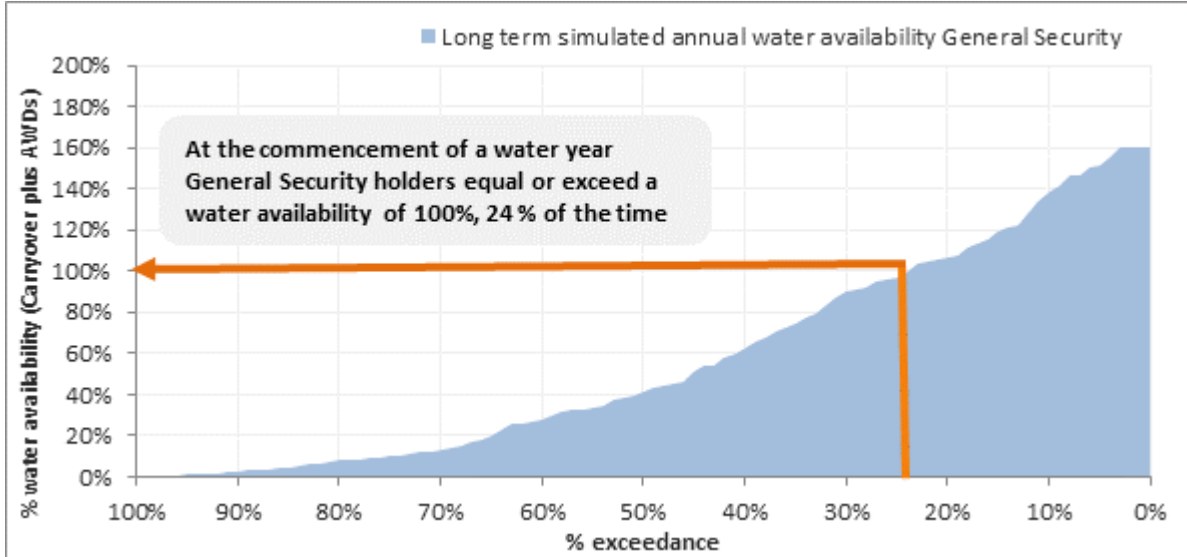
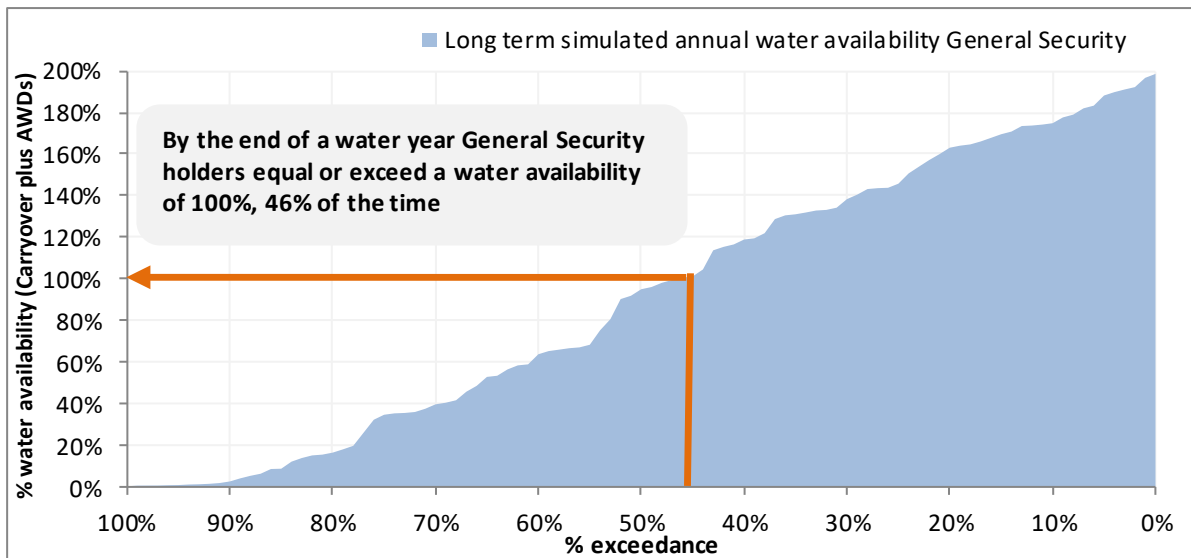


Figure 42: Macquarie-Cudgegong end of water year simulated availability for General Security access licences



Cudgegong carryovers and available water determinations 2019–20 (as of January 2020)

Date	Individual announcement	Share component	Allocation volume (ML)	Cumulative volume (ML)	Allocation volume (%)	Cumulative volume (%)	Balance available (ML)	Balance not available (ML)	Balance total (ML)	Balance available (%)	Balance total (%)
Domestic and Stock											
1-Jul-19	Opening	664			0.0%	0.0%	0	0	0	0.0%	0.0%
1-Jul-19	AWD 80.0%	664	531	531	80.0%	80.0%	531	0	531	80.0%	80.0%
Domestic and Stock [Domestic]											
1-Jul-19	Opening	19			0.0%	0.0%	0	0	0	0.0%	0.0%
1-Jul-19	AWD 80.0%	19	15	15	80.0%	80.0%	15	0	15	80.0%	80.0%
Domestic and Stock [Stock]											
1-Jul-19	Opening	15			0.0%	0.0%	0	0	0	0.0%	0.0%
1-Jul-19	AWD 80.0%	15	12	12	80.0%	80.0%	12	0	12	80.0%	80.0%
Local Water Utility											
1-Jul-19	Opening	2,600			0.0%	0.0%	0	0	0	0.0%	0.0%
1-Jul-19	AWD 80.0%	2,600	2,080	2,080	80.0%	80.0%	2,080	0	2,080	80.0%	80.0%
Regulated River (General Security)											
1-Jul-19	Opening	18,919			0.0%	0.0%	10,179	0	10,179	53.8%	53.8%
1-Jul-19	AWD 0.0 ML per Share	18,919	0	0	0.0%	0.0%	10,179	0	10,179	53.8%	53.8%
Regulated River (High Security)											
1-Jul-19	Opening	5,297			0.0%	0.0%	0	0	0	0.0%	0.0%
1-Jul-19	AWD 0.7 ML per Share	5,297	3,708	3,708	70.0%	70.0%	3,708	0	3,708	70.0%	70.0%
Regulated River (High Security) [Research]											
1-Jul-19	Opening	1			0.0%	0.0%	0	0	0	0.0%	0.0%
1-Jul-19	AWD 35.0%	1	0	0	30.0%	30.0%	0	0	0	30.0%	30.0%
Supplementary Water											
1-Jul-19	Opening	1,290			0.0%	0.0%	0	0	0	0.0%	0.0%
1-Jul-19	AWD 1.0 ML per Share	1,290	1,290	1,290	100.0%	100.0%	1,290	0	1,290	100.0%	100.0%

Macquarie carryovers and available water determinations 2019–20 (as of January 2020)

Date	Individual announcement	Share component	Allocation volume (ML)	Cumulative volume (ML)	Allocation volume (%)	Cumulative volume (%)	Balance available (ML)	Balance not available (ML)	Balance total (ML)	Balance available (%)	Balance total (%)
DOMESTIC AND STOCK											
1-Jul-19	Opening	4,291			0.0%	0.0%	(1)	0	(1)	0.0%	0.0%
1-Jul-19	AWD 80.0%	4,291	3,433	3,433	80.0%	80.0%	3,432	0	3,432	80.0%	80.0%
DOMESTIC AND STOCK[DOMESTIC]											
1-Jul-19	Opening	794			0.0%	0.0%	(1)	0	(1)	(0.1)%	(0.1)%
1-Jul-19	AWD 80.0%	794	634	634	79.9%	79.9%	633	0	633	79.8%	79.8%
DOMESTIC AND STOCK[STOCK]											
1-Jul-19	Opening	165			0.0%	0.0%	0	0	0	0.0%	0.0%
1-Jul-19	AWD 80.0%	165	132	132	80.0%	80.0%	132	0	132	80.0%	80.0%
LOCAL WATER UTILITY											
1-Jul-19	Opening	16,205			0.0%	0.0%	(29)	0	(29)	(0.2)%	(0.2)%
1-Jul-19	AWD 80.0%	16,205	12,964	12,964	80.0%	80.0%	12,935	0	12,935	79.8%	79.8%
REGULATED RIVER (GENERAL SECURITY)											
1-Jul-19	Opening	613,547			0.0%	0.0%	5,245	93,987	99,232	0.9%	16.2%
1-Jul-19	AWD 0.0 ML per Share	613,547	0	0	0.0%	0.0%	5,245	0	5,245	0.9%	0.9%
1-Jul-19	Drought Suspension 100.0%	613,547			0.0%	0.0%	(195)	99,427	99,232	0.0%	16.2%
REGULATED RIVER (HIGH SECURITY)											
1-Jul-19	Opening	8,531			0.0%	0.0%	(1)	0	(1)	0.0%	0.0%
1-Jul-19	AWD 0.7 ML per Share	8,531	5,972	5,972	70.0%	70.0%	5,971	0	5,971	70.0%	70.0%
REGULATED RIVER (HIGH SECURITY)[RESEARCH]											
1-Jul-19	Opening	4,044			0.0%	0.0%	0	0	0	0.0%	0.0%
1-Jul-19	AWD 35.0%	4,044	1,415	1,415	35.0%	35.0%	1,415	0	1,415	35.0%	35.0%
REGULATED RIVER (HIGH SECURITY)[TOWN WATER SUPPLY]											
1-Jul-19	Opening	40			0.0%	0.0%	0	0	0	0.0%	0.0%
1-Jul-19	AWD 35.0%	40	14	14	35.0%	35.0%	14	0	14	35.0%	35.0%
6-Jul-19	AWD 45.0%	40	18	32	45.0%	80.0%	32	0	32	80.0%	80.0%
SUPPLEMENTARY WATER											
1-Jul-19	Opening	48,708			0.0%	0.0%	0	0	0	0.0%	0.0%

Date	Individual announcement	Share component	Allocation volume (ML)	Cumulative volume (ML)	Allocation volume (%)	Cumulative volume (%)	Balance available (ML)	Balance not available (ML)	Balance total (ML)	Balance available (%)	Balance total (%)
1-Jul-19	AWD 1.0 ML per Share	48,708	48,708	48,708	100.0%	100.0%	48,708	0	48,708	100.0%	100.0%

Detailed item notes

Note 1—Allocation accounts

This note is reference for the volume held in the allocation accounts at the time of reporting and is also relevant for the various processes that occur to either increase or decrease an allocation account throughout the water year.

The volume of water that is in the licence allocation accounts at the time of reporting is a net balance for the relevant licence category and represents that water that can be carried forward to the next water year as dictated by the carryover rules in place for that year or required under the water sharing plan.

A negative number for the carryover figure indicates that more usage has occurred than has been allocated to the account, and the deficit must be carried forward to the next season.

Water that is in the accounts at the end of a water year but is not permitted to be carried over is forfeited and has been represented as a decrease in water liability.

The accounting presented is relevant to licence category and is therefore inclusive of licences held by environmental holders (these are also detailed separately in Note 6).

Data type

Derived from measured data

Policy

Water Sharing Plan for the Macquarie and Cudgegong Regulated Rivers Water Source 2016

Available on the NSW Department of Planning, Industry and Environment website at www.industry.nsw.gov.au/water

Data accuracy

A1—Nil inaccuracy +/- 0%

Providing agency

NSW Department of Planning, Industry and Environment

Data source

WaterNSW/NSW Department of Planning, Industry and Environment—Water Accounting System (joint ownership)

Methodology

The carryover volume of water in the allocation account for each licence category is determined once all transactions and end of year forfeit rules have been applied. Below is list of typical transactions that can apply to an allocation account:

- Available Water Determination (AWD) (detailed in Note 2)
- Allocation account usage (detailed in Note 3)
- Forfeiture due to:
 - No or limited carryover being permitted (end of year forfeit)
 - Account limit breaches
 - Storage spills (detailed in Note 5)
 - Evaporation reductions on carryover

- Cancellation of licence
- Trade of allocation water between accounts (detailed in Note 4)
- Determined carryover volume

Additional information

The tables on the following page provide a balanced summary of the water allocation accounts for each category of access licence. Below is a description of each of the table components.

Table 8: Explanatory information for allocation account summary

Heading		Description
Share		This is the total volume of entitlement in the specific licence category.
Opening balance		The volume of water that has been carried forward from previous years allocation account.
AWD—Available water determination		The total annual volume of water added to the allocation account as a result of allocation assessments. This figure includes additional AWD made as a result of a storage spill reset as defined in the water sharing plan.
Licences	New	Increase in account water as a result of the issuing of a new licence.
	Cancelled	Decrease in account water as a result of a licence cancellation where account balance has not been traded to another licence.
Assignments	In	Increase in account water as a result of temporary trade in.
	Out	Decrease in account water as a result of temporary trade out.
Account usage		Volume of water that is extracted or diverted from the river and is accountable against the access licence allocation
Spill	Increase	High security and general security accounts are rest to 100% of entitlement when Burrendong Dam enters the flood mitigation zone by a volume equal to or greater than the volume currently in the carryover sub accounts.
	Decrease	This is that volume forfeited from the carryover sub accounts, of either general security or high security licences, as a result of Burrendong Dam entering the flood mitigation zone. The volume being forfeited is the volume in the flood mitigation zone until all the carryover water has been forfeited.
Forfeits	During Year	Account water forfeited throughout the year as a result of the accounting rules specified in the water sharing plan. Forfeited water may occur due to account limits being reached, conversions between licence categories and various types of other licence dealings. It also includes any reductions on carryover volumes due to storage evaporation as required by the water sharing plan.
	End of year forfeit	Account water that is forfeited at the end of the water year as a result of carryover rules that restrict the carry forward volume.
End of year balance	Available	Account balance that is available to be taken at the conclusion of the water year.
	Non-available	Account balance that is not available to be taken at the conclusion of the water year (due to restrictions or water sharing plan account limit rules
Carry forward		This represents the account water that is permitted to be carried forward into the next water year as determined by the carryover rules.
()		Negative figures are shown in red brackets

Table 9: Cudgegong account balance summary for the reporting period

Category	Share 30 June 2019	Opening balance	AWD	Licences		Assignments		Account usage	Spill		During year forfeit	End of year balance		End of year forfeit	Carry forward
				New	Cancelled	In	Out		Increase	Decrease		Available	Non- available		
Domestic and Stock	664	0	672	0	8	0	0	323	0	0	0	341	0	341	0
Domestic and Stock [Domestic]	19	0	19	0	0	0	0	0	0	0	0	19	0	19	0
Domestic and Stock [Stock]	15	0	15	0	0	0	0	0	0	0	0	15	0	15	0
Local Water Utility	2,600	0	2,600	0	0	0	0	2,196	0	0	0	404	0	404	0
General Security	18,919	19,581	0	0	0	1,192	6,589	3,404	0	0	597	10,183	0	4	10,179
High Security	5,412	0	5,412	0	0	90	4,949	462	0	0	0	91	0	91	0
High Security [Research]	1	0	1	0	0	0	0	0	0	0	0	1	0	1	0
Supplementary Water	1,290	0	1,290	0	0	0	0	0	0	0	0	1,290	0	1,290	0

Table 10: Macquarie account balance summary for the reporting period

Category	Share 30 June 2019	Opening balance	AWD	Licences		Assignments		Account usage	Spill		During year forfeit	End of year balance		End of year forfeit	Carry forward
				New	Cancelled	In	Out		Increase	Decrease		Available	Non- available		
Domestic and Stock	4,291	0	4,307	0	16	0	0	1,753	0	0	0	2,538	0	2,539	(1)
Domestic and Stock [Domestic]	794	0	793	0	0	0	0	142	0	0	0	652	0	652	(1)
Domestic and Stock [Stock]	165	0	170	0	5	0	0	55	0	0	0	110	0	110	0
Local Water Utility	16,205	0	16,205	0	0	1,000	0	15,097	0	0	0	2,108	0	2,137	(29)
General Security	613,547	316,434	0	0	0	129,118	119,107	221,289	0	0	5,910	5,229	94,016	10	99,236
High Security	8,416	0	8,416	0	0	154	909	7,418	0	0	1	242	0	244	(1)
High Security [Research]	4,044	0	4,044	0	0	0	0	3,700	0	0	0	344	0	344	0
High Security [Town Water Supply]	40	0	40	0	0	0	0	0	0	0	0	40	0	40	0
Supplementary Water	48,708	0	48,708	0	0	8,292	8,292	0	0	0	0	48,708	0	48,708	0

Note 2—Available water determination (AWD) (allocation announcement)

This is the process by which the regulated surface water asset available for use within the regulated system is determined and shared. The process calculates the volume of water that is to be added to an individual's licence allocation account. Announcements of allocations are made on a seasonal basis—usually corresponding with the financial year and are updated on a regular basis or following significant inflow events. Under the *Water Management Act 2000* the announcements are termed available water determinations.

Data type

Derived from measured data.

Policy

Water Management Act 2000 (NSW).

- Chapter 3—Part 2 Access Licences.
 - Clause 59—Available Water Determinations.

Water Sharing Plan for the Macquarie and Cudgegong Regulated Rivers Water Source 2016

- Part 8—Limits to the availability of water
 - Division 2—Available Water Determinations.

Available on the NSW Department of Planning, Industry and Environment website at www.industry.nsw.gov.au/water

Data accuracy

A1—Nil inaccuracy +/- 0%

Providing agency

NSW Department of Planning, Industry and Environment.

Methodology

The AWD procedure itself is generally divided into two sections; the available water asset, and system commitments. Once the required system commitments have been allowed for, the remaining water asset is then available for distribution to the access licence categories in order of priority (see following table). Announcements are expressed as either a percentage of the share component for all access licences where share components are specified as megalitres per year, or megalitres per unit share for all regulated river (high security) access licences, regulated river (general security) access licences and supplementary water access licences.

Table 11: Priority of access licence categories

Licence category	AWD priority
General Security	Low
High Security	High
Conveyance	Low
Domestic and Stock ¹⁶	Very High
Local Water Utility	Very High

Available Water Asset—this is calculated by summing the water currently available in storage, future (minimum) inflows to the system, and additional volumes due to recessions of inflows from the current levels to the minimum inflow levels. Also taken into consideration is the reduction of the total inflows to the system for those that arrive too late in the season to be useful.

System Commitments—this is an assessment of the existing commitments that have to be delivered from the Available Water Asset in either the current or future years. Key components include:

- essential supplies include things such as town water supplies, stock and domestic requirements, industrial use and permanent plantings (e.g. orchards, vineyards) and environmental allowances
- undelivered account water is the water that has already been allocated to accounts but yet to be provided
- end of system flow requirement is an estimate of the flow that to pass through the system as a result of operation of the system
- losses which are estimated as the amount of water that will be lost by the system either through evaporation or in the process of delivering the water via transmission losses

Available water determinations are limited to an equivalent volume of 100% of share component (entitlement) for all categories other than general security. The sum of available water determinations for general security holders cannot exceed 1 megalitre per share, unless the AWD is a result of a storage spill reset (see Note 5 for more details).

Additional information

The following pages contain the allocation summary reports for the reporting period. Below is a table containing report notes to help interpret the report.

Table 12: Allocation summary report notes

Report heading	Description
Opening	Remaining allocation account balances at the conclusion of the previous season that is allowed to be carried forward to this season.
Individual announcement	Actual announcement made to each licence category
Share component (Entitlement)	Sum of the licensed volume of water within the licence category on the announcement date.
Allocation announced volume	Volume of water credited to accounts within a licence category as a result of the announcement made.
Allocation cumulative announced volume	Cumulative total of the announced volumes for the water year and licence category.

¹⁶ Domestic and Stock is further broken down into three subcategories: Domestic and Stock, Domestic and Stock (Domestic) and Domestic and Stock (Stock). For the purposes of this report and the general purpose water account they were all treated as Domestic and Stock.

Report heading	Description
Allocation announced volume % of share	This is the announced volume expressed as a percentage of the entitlement applicable on the particular date.
Allocation cumulative announced volume % of share	This is the cumulative total percent (of total entitlement) that has been issued on the announcement date (inclusive)
Account balance available	Sum of water available in allocation accounts that has been made available to be taken during the season.
Account balance not available	Water allocated that is not accessible at this point in time.
Account balance total	Total balance of accounts (available plus not available)
Account balance available % of share	Account balance available expressed as a percentage of share component.
Account balance total % of share	Account balance expressed as a percentage of share component.
Supplementary water	Water that is not a stored source of water and is only made available if an uncontrolled flow event occurs.

Table 13: Allocation announcements for the reporting period—Cudgegong

Date	Individual announcement	Share component	Allocation volume (ML)	Cumulative volume (ML)	Allocation volume (%)	Cumulative volume (%)	Balance available (ML)	Balance not available (ML)	Balance total (ML)	Balance available (%)	Balance total (%)
Domestic and Stock											
1-Jul-18	Opening	672			0.0%	0.0%	0	0	0	0.0%	0.0%
1-Jul-18	AWD 100.0%	672	672	672	100.0%	100.0%	672	0	672	100.0%	100.0%
Domestic and Stock [Domestic]											
1-Jul-18	Opening	19			0.0%	0.0%	0	0	0	0.0%	0.0%
1-Jul-18	AWD 100.0%	19	19	19	100.0%	100.0%	19	0	19	100.0%	100.0%
Domestic and Stock [Stock]											
1-Jul-18	Opening	15			0.0%	0.0%	0	0	0	0.0%	0.0%
1-Jul-18	AWD 100.0%	15	15	15	100.0%	100.0%	15	0	15	100.0%	100.0%
Local Water Utility											
1-Jul-18	Opening	2,600			0.0%	0.0%	0	0	0	0.0%	0.0%
1-Jul-18	AWD 100.0%	2,600	2,600	2,600	100.0%	100.0%	2,600	0	2,600	100.0%	100.0%
Regulated River (General Security)											
1-Jul-18	Opening	19,252			0.0%	0.0%	19,581	0	19,581	101.7%	101.7%
1-Jul-18	AWD 0.0 ML per Share	19,252	0	0	0.0%	0.0%	19,581	0	19,581	101.7%	101.7%
Regulated River (High Security)											
1-Jul-18	Opening	5,412			0.0%	0.0%	0	0	0	0.0%	0.0%
1-Jul-18	AWD 1.0 ML per Share	5,412	5,412	5,412	100.0%	100.0%	5,412	0	5,412	100.0%	100.0%
Regulated River (High Security) [Research]											
1-Jul-18	Opening	1			0.0%	0.0%	0	0	0	0.0%	0.0%
1-Jul-18	AWD 100.0%	1	1	1	100.0%	100.0%	1	0	1	100.0%	100.0%
Supplementary Water											
1-Jul-18	Opening	1,312			0.0%	0.0%	0	0	0	0.0%	0.0%
1-Jul-18	AWD 1.0 ML per Share	1,312	1,312	1,312	100.0%	100.0%	1,312	0	1,312	100.0%	100.0%

Table 14: Allocation announcements for the reporting period—Macquarie

Date	Individual Announcement	Share Component	Allocation Volume (ML)	Cumulative Volume (ML)	Allocation Volume (%)	Cumulative Volume (%)	Balance Available (ML)	Balance Not Available (ML)	Balance Total (ML)	Balance Available (%)	Balance Total (%)
Domestic and Stock											
1-Jul-18	Opening	4,307			0.0%	0.0%	0	0	0	0.0%	0.0%
1-Jul-18	AWD 100.0%	4,307	4,307	4,307	100.0%	100.0%	4,307	0	4,307	100.0%	100.0%
Domestic and Stock [Domestic]											
1-Jul-18	Opening	790			0.0%	0.0%	0	0	0	0.0%	0.0%
1-Jul-18	AWD 100.0%	790	790	790	100.1%	100.1%	790	0	790	100.1%	100.1%
Domestic and Stock [Stock]											
1-Jul-18	Opening	170			0.0%	0.0%	0	0	0	0.0%	0.0%
1-Jul-18	AWD 100.0%	170	170	170	100.0%	100.0%	170	0	170	100.0%	100.0%
Local Water Utility											
1-Jul-18	Opening	16,205			0.0%	0.0%	0	0	0	0.0%	0.0%
1-Jul-18	AWD 100.0%	16,205	16,205	16,205	100.0%	100.0%	16,205	0	16,205	100.0%	100.0%
Regulated River (General Security)											
1-Jul-18	Opening	613,214			0.0%	0.0%	316,434	0	316,434	51.6%	51.6%
1-Jul-18	AWD 0.0 ML per Share	613,214	0	0	0.0%	0.0%	316,434	0	316,434	51.6%	51.6%
1-Jul-18	Drought Suspension 30.0%	613,214			0.0%	0.0%	225,874	90,560	316,434	36.8%	51.6%
Regulated River (High Security)											
1-Jul-18	Opening	8,416			0.0%	0.0%	0	0	0	0.0%	0.0%
1-Jul-18	AWD 1.0 ML per Share	8,416	8,416	8,416	100.0%	100.0%	8,416	0	8,416	100.0%	100.0%
Regulated River (High Security) [Research]											
1-Jul-18	Opening	4,044			0.0%	0.0%	0	0	0	0.0%	0.0%
1-Jul-18	AWD 100.0%	4,044	4,044	4,044	100.0%	100.0%	4,044	0	4,044	100.0%	100.0%
Regulated River (High Security) [Town Water Supply]											

Date	Individual Announcement	Share Component	Allocation Volume (ML)	Cumulative Volume (ML)	Allocation Volume (%)	Cumulative Volume (%)	Balance Available (ML)	Balance Not Available (ML)	Balance Total (ML)	Balance Available (%)	Balance Total (%)
1-Jul-18	Opening	40			0.0%	0.0%	0	0	0	0.0%	0.0%
1-Jul-18	AWD 100.0%	40	40	40	100.0%	100.0%	40	0	40	100.0%	100.0%
Supplementary Water											
1-Jul-18	Opening	48,686			0.0%	0.0%	0	0	0	0.0%	0.0%
1-Jul-18	AWD 1.0 ML per Share	48,686	48,687	48,687	100.0%	100.0%	48,687	0	48,687	100.0%	100.0%

Note 3—Allocation account usage

This is the volume of water that is extracted, diverted or measured as usage and is accountable against an access licence issued under the water sharing plan.

Data type

Measured/administration data

Policy

Water Sharing Plan for the Macquarie and Cudgegong Regulated Rivers Water Source 2016

Data accuracy

A—Estimated in the range +/- 10%

Providing agency

NSW Department of Planning, Industry and Environment

Data source

WaterNSW / NSW Department of Planning, Industry and Environment– Water Accounting System (Joint ownership of system).

Methodology

Usage information is determined by either on-farm meters that measure extraction, gauges on diversion works or orders/releases when the volume cannot be effectively metered, such as an environmental watering event.

Meter readings are collected for individual licence holders at intervals during the year and converted via a calibration factor to a volume of water extracted. Water diverted from the river is measured by recording the height at either the gauge or weir with the volume diverted being derived by passing these heights through a rating table. With potentially multiple categories of access licences being extracted through the same pumps additional information and methodologies are required to separate use under the various licence categories. Below is a description of these:

- Based on periods of announcement—during periods of supplementary water announcements extractions can be debited against the supplementary water licences
- Usage based on water orders—users place orders for water against an access licence and usages are debited against accounts in proportion to the orders placed.
- Licence category apportionment—if no water orders are available water extracted is apportioned against categories of access licence in order of priority as set out in the table below. The prioritising is based on the nature of and rules around each of the licence categories.

The following table provides the order in which extractions are apportioned to access licence categories in the water accounting system. This is a generic list where not all categories will necessarily appear in this GPWAR. There are also various subcategories of licence associated with some of the categories.

Table 15: Licence category metered usage apportionment table

Priority	Surface water
1	Supplementary
2	Uncontrolled Flow
3	Domestic and Stock
4	Regulated River High Security
5	Regulated River General Security
6	Conveyance
7	Local Water Utility
8	Major Water Utility

Table 16: Account usage summary for the reporting period

Licence category	Macquarie Account usage (ML)	Cudgegong Account usage (ML)
Domestic and Stock	1,753	323
Domestic and Stock [Domestic]	142	0
Domestic and Stock [Stock]	55	0
Local Water Utility	15,097	2,196
General Security	221,289	3,404
High Security	7,418	462
High Security (Research)	3,700	0
High Security (Town Water Supply)	0	N/A
Supplementary Water	0	0
Total usage	249,454	6,385

Note 4—Internal trading (allocation assignments)

This represents the temporary trading (allocation assignments) of water between allocation accounts within the regulated Macquarie and Cudgegong water sources.

Data type

Administration

Policy

Water Sharing Plan for the Macquarie and Cudgegong Regulated Rivers Water Source 2016

- Part 10 Access licence dealing rules
 - Clause 49 rules relating to constraints within a water source
 - Available on the NSW Department of Planning, Industry and Environment website at www.industry.nsw.gov.au/water

Data accuracy

A1—Nil inaccuracy +/- 0%

Providing agency

NSW Department of Planning, Industry and Environment

Data source

WaterNSW/NSW Department of Planning, Industry and Environment—Water Accounting System (joint ownership of system).

Methodology

Trading is permitted between certain categories of access licences and between certain water sources. This is detailed in the water sharing plan or stipulated under the licence holder's conditions.

The net internal trade for each licence category is zero for a water year. As such, trades occur as both a water liability decrease (sellers of water) and a water liability increase (buyers of water).

Additional information

Table 17 shows the internal trading figures between licence categories. All figures represent a volume in megalitres.

Table 17: Macquarie catchment allocation assignments summary for reporting period

Allocation assignments summary			To					Total	
			Macquarie			Cudgegong			
			Local Water Utility	General Security	High Security	Supplementary Water	General Security		High Security
From	Macquarie	General Security	753	118,245	109			119,107	
		High Security		889	20			909	
		Supplementary Water				8,292		8,292	
	Cudgegong	General Security	247	5,388	25		928	6,589	
		High Security		4,595			264	90	4,949
		Grand total	1,000	129,118	154	8,292	1,192	90	139,847

Note 5—Storage spill account reset

Windamere Dam

As set out in the water sharing plan allocation is progressively withdrawn from Cudgegong general security and high security carryover sub accounts whenever, Windamere Dam is spilling while the volume held in Burrendong Dam is in exceedance of full supply capacity (i.e. in the flood mitigation zone). Water will be withdrawn monthly at a volume equivalent to the volume spilled from Windamere Dam, while these conditions prevail, until the sub accounts are empty.

All remaining water in the AWD sub accounts will be forfeited and reset to 1 megalitre per share once all allocation has been withdrawn from the carryover sub accounts in the Macquarie. Following the reset each month that Burrendong Dam remains above its full supply level (i.e. in the flood mitigation zone) the AWD sub accounts will be topped up to the equivalent of 1 megalitre per share. Detailed rules about the implementation of this process are available in the water sharing plan.

Burrendong Dam

Similarly, water sharing plan allocation is progressively withdrawn from general security and high security carryover sub accounts and the Environmental Water Allowance (EWA) whenever the volume held in Burrendong storage is in exceedance of full supply capacity (i.e. in the flood mitigation zone). Once all allocation has been withdrawn from the carryover sub accounts all remaining water in the AWD sub accounts will be forfeited and they will be reset to 1 megalitre per share or 160,000 megalitres for the EWA. Following the reset each month that Burrendong Dam remains above its full supply level (i.e. in the flood mitigation zone) the AWD sub accounts will be topped up to the equivalent of 1 megalitre per share while EWA account will be topped up to 160,000 megalitres. Detailed rules about the implementation of this process are available in the water sharing plan.

Water traded out of accounts during the year prior to a spill reset is accounted for under the rules of its source location and licence category during the spill reset process.

Data type

Administration

Policy

Water Sharing Plan for the Macquarie and Cudgegong Regulated Rivers Water Source 2016

Part 9 Rules for Managing Access Licences

Division 2 Water Allocation Account Management

Clause 44 Carrying over of water allocation credits, water allocation account limits and withdrawal of water allocations

Part 8 Limits to the availability of water

Division 2 Available water determinations

Clause 36 Available water determinations for regulated river (high security) access licences

Clause 37 Available water determinations for regulated river (general security) access licences

Part 3 Environmental water provisions

Clause 14 Planned environmental water

Available from the NSW Department of Planning, Industry and Environment website at www.industry.nsw.gov.au/water

Data accuracy

A1—Nil inaccuracy +/- 0%

Providing agency

NSW Department of Planning, Industry and Environment

Data source

WaterNSW/NSW Department of Planning, Industry and Environment—Water Accounting System (Joint ownership of System).

Methodology

Data is extracted directly from the corporate databases which results in a reduction and/or increase in the associated general security account.

Additional information

Table 18: Storage Spill forfeitures and resets

Cudgegong	Spill forfeiture	Spill AWD reset
General Security	0	0
High Security	0	0

Macquarie	Spill forfeiture	Spill AWD reset
General Security	0	0
High Security	0	0
EWA	0	0

Note 6—Held environmental water

This represents that environmental water that is held as part of a licensed volumetric entitlement. These licences are either purchased on the market by environmental agencies or issued as a result of water savings achieved through investment by those relevant agencies.

These licences are held within the same licence categories as all other water access licences hence are subject to the same operating rules. Therefore, they are subject to the following key rules:

- Available Water Determinations (AWD) for their share of the entitlement to be added to accounts
- Carryover rules hence the forfeiting of unused water that cannot be carried over
- Provide water orders prior to use.

These licences are used to provide environmental benefit and outcomes to the catchment by either providing water to, or supplementing water requirements of, a specific environmental events or incidents.

Measured

Policy

Water Management Act 2000

- Dealings with access licences (Division 4)
 - 71T Assignment of water allocations between access licences

Water Sharing Plan for the Macquarie and Cudgegong Regulated Rivers Water Source 2016

Available on the NSW Department of Planning, Industry and Environment website at www.industry.nsw.gov.au/water

Data accuracy

A1—Estimated in the range +/- 10%

Providing agency

NSW Department of Planning, Industry and Environment

Data source

WaterNSW/NSW Department of Planning, Industry and Environment– Water Accounting System (Joint ownership of System).

Available Water Determination Register—NSW Department of Planning, Industry and Environment website at www.industry.nsw.gov.au/water

Methodology

The water held for the environment represents a volume of water in corresponding allocation accounts. This allocation account represents the sum of the remaining volume of held environmental water at the conclusion of the water year once all transactions and forfeit rules have been applied to the accounts. These environmental balances are at the licence category level and represent the water that can be carried forward for use in the next year. Below is list of typical transactions that can apply to an environmental allocation account:

- Available Water Determination (AWD) (detailed in Note 2)
- Allocation account usage (detailed in Note 3)
- Forfeiture due to:
 - No or limited carryover being permitted (end of year forfeit)

- Account limit breaches
- Storage spills (detailed in Note 5)
- Evaporation reductions on carryover
- Cancellation of licence
- Trade of allocation water between accounts (detailed in Note 4)
- Determined carryover volume

In addition, the trade and purchase of environmental water is tracked to capture the movement of environmental entitlement both in number of entitlements, and volume.

Additional information

The tables on the following page provide a summary of held environmental water accounting for the reporting period.

Table 19: Explanatory information for Environmental Account Summary

Heading		Description
Share		This is the total volume of entitlement in the specific licence category.
Opening balance		The volume of water that has been carried forward from previous years allocation account.
AWD—Available water determination		The total annual volume of water added to the allocation account as a result of allocation assessments. This figure includes additional AWD made as a result of a storage spill reset as defined in the water sharing plan.
Licences	New	Increase in account water as a result of the issuing of a new licence.
	Cancelled	Decrease in account water as a result of a licence cancellation where account balance has not been traded to another licence.
Assignments	In	Increase in account water as a result of temporary trade in.
	Out	Decrease in account water as a result of temporary trade out.
Account usage		Volume of water that is extracted or diverted from the river and is accountable against the access licence allocation
Spill	Increase	High security and general security accounts are rest to 100% of entitlement when Burrendong Dam enters the flood mitigation zone by a volume equal to or greater than the volume currently in the carryover sub accounts.
	Decrease	This is that volume forfeited from the carryover sub accounts, of either general security or high security licences, as a result of Burrendong Dam entering the flood mitigation zone. The volume being forfeited is the volume in the flood mitigation zone until all the carryover water has been forfeited.
Forfeits	During Year	Account water forfeited throughout the year as a result of the accounting rules specified in the water sharing plan. Forfeited water may occur due to account limits being reached, conversions between licence categories and various types of other licence dealings. It also includes any reductions on carryover volumes due to storage evaporation as required by the water sharing plan.
	End of year forfeit	Account water that is forfeited at the end of the water year as a result of carryover rules that restrict the carry forward volume.
End of year balance	Available	Account balance that is available to be taken at the conclusion of the water year.
	Non-available	Account balance that is not available to be taken at the conclusion of the water year (due to restrictions or water sharing plan account limit rules
Carry forward		This represents the account water that is permitted to be carried forward into the next water year as determined by the carryover rules.
()		Negative figures are shown in red brackets

Table 20: Environmental account balance summary for reporting period—Macquarie

Category	Share 30 June 2019	Opening balance	AWD	Licences		Assignments		Account usage	Spill		During year forfeit	End of year balance		End of year forfeit	Carry forward
				New	Cancelled	In	Out		Account reset	CO forfeit		Available	Not available		
General Security	173,742	112,369	0	0	0	66,580	68,942	75,705	0	0	272	319	33,711	0	34,030
Supplementary Water	9,744	0	9,744	0	0	8,292	8,292	0	0	0	0	9,744	0	9,744	0

Table 21: Environmental account balance summary for reporting period—Cudgegong

Category	Share 30 June 2019	Opening balance	AWD	Licences		Assignments		Account usage	Spill		During year forfeit	End of year balance		End of year forfeit	Carry forward
				New	Cancelled	In	Out		Account reset	CO forfeit		Available	Not Available		
General Security	901	482	0	0	0	0	438	0	0	0	4	40	0	0	40
Supplementary Water	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Table 22: Annual change in held environmental water—Macquarie

Category	Volume 30 June 2018	Volume 30 June 2019	Volume difference	No. licences 30 June 2018	No. licences 30 June 2019	No. licence difference
General Security	173,742	173,742	0	12	11	-1
Supplementary Water	9,744	9,744	0	6	6	0

Table 23: Annual change in held environmental water—Cudgegong

Category	Volume 30 June 2018	Volume 30 June 2019	Volume difference	No. licences 30 June 2018	No. licences 30 June 2019	No. licence difference
General Security	901	901	0	3	4	1
Supplementary Water	0	0	0	1	1	0

Table 24: Macquarie and Cudgegong environmental temporary trading summary

Environmental allocation assignments summary				To								Total
				Enviro		Non-Enviro						
				Macquarie		Macquarie			Cudgegong			
				General Security	Supplementary Water	General Security	Local Water Utility	High Security	Supplementary Water	General Security	High Security	
From	Enviro	Macquarie	General Security	67,141.8		2,000						69,141.8
			Supplementary Water		8,292.4							8,292.4
		Cudgegong	General Security	438.1								438.1
	Non-enviro	Macquarie	General Security			49,104	752.8	108.8				49,965.6
			High Security			889		20				909
			Supplementary Water									0
		Cudgegong	General Security			4,950.1	247.4	25		928.4		6,150.9
			High Security			4,595.2				263.6	90	4,948.8
Total				67,579.9	8,292.4	61,538.3	1,000.2	153.8	0	1192	90	139,846.6

Component summaries

	Environment to environment trade	75,872
	Environment to consumptive trade	2,000
	Consumptive to environment trade	0
	Consumptive to consumptive trade	61,974

Note 7—Environmental provisions

There a number of planned environmental provisions allowed for within the regulated Macquarie and Cudgegong water sources, implemented under the water sharing plan, with the aim of enhancing environmental benefits.

A long-term extraction limit

Macquarie-Cudgegong Regulated River Water river extractions must be limited to a long-term average of 391,900 megalitres. All flows above the plan extraction limit, approximately 73%, are reserved for environmental health.

Increased natural flows in the upper reaches of the Cudgegong River

This is achieved by releasing a portion of inflows to Windamere Dam to attain, in combination with downstream tributary contributions, a flow of 150 to 1,500 megalitres per day at Rocky Water Hole. No releases occur when the capacity of Windamere Dam is less than 110,000 megalitres, and releases are subject to an annual limit of 10,000 megalitres.

Establish an environmental water allowance for the Macquarie River

The plan allows for up to 160,000 megalitres to be credited to an environmental water allowance in any water year. Part of this allowance (sub account 1) is used to provide more natural flows downstream of Burrendong Dam. Releases are made during the periods 1 June to 30 November, and 15 March to 31 May each year to attain, in combination with downstream tributary inflows, a flow of between 500 and 4,000 megalitres per day at Marebone Weir. The other part of the environmental water allowance (sub account 2) is released when needed for special environmental purposes such as enhancing native fish recruitment, ensuring completion of water bird breeding events, and alleviating severe, unnaturally prolonged drought conditions in the Macquarie Marshes. An Environmental Flow Reference Group provides advice on when the water should be released for environmental purposes.

Data type

Measured

Policy

Water Sharing Plan for the Macquarie and Cudgegong Regulated Rivers Water Source 2016

- Part 3 Environmental Water Provisions
 - Clause 14 Planned Environmental Water

Available on the NSW Department of Planning, Industry and Environment website at www.industry.nsw.gov.au/water

Data accuracy

A1—Nil inaccuracy +/- 0%

Providing agency

NSW Department of Planning, Industry and Environment

Data source

WaterNSW/NSW Department of Planning, Industry and Environment—Water Accounting System (Joint ownership of System).

WaterNSW annual compliance report (internal document)

Additional information

Table 25: Summary balance of environmental water allowance

Water year	Carryover account as at 1-July	AWD	AWD Spill reset	Forfeiture Spill	Forfeiture Evaporation	Annual usage	End of year balance as at 30 June
2004–05	14,803	14,400	0	0	731	0	28,472
2005–06	28,472	70,400	0	0	0	83,784	15,088
2006–07	15,088	0	0	0	2,136	0	12,952
2007–08	12,952	8,000	0	0	0	20,952	0
2008–09	0	16,000	0	0	0	0	16,000
2009–10	16,000	0	0	0	0	16,000	0
2010–11	0	160,000	160,000	99,624	0	139,098	81,278
2011–12	81,278	78,400	160,000	71,446	0	88,232	160,000
2012–13	160,000	102,400	0	57,071	0	128,119	77,210
2013–14	77,210	9,600	0	0	1,886	43,671	41,254
2014–15	41,254	3,200	0	0	1,516	17,746	25,192
2015–16	25,192	11,200	0	0	0	36,392	0
2016–17	0	160,000	160,000	160,000	0	26,375	133,625
2017–18	133,625	60,800	0	0	4,155	64,232	126,038
2018–19	126,038	0	0	0	5,593	51,072	69,372

Table 26: Environmental water allowance usage and balances by sub account

Water year	Active sub-account usages	Active sub-account balance as at 30 June	Translucent sub-account usages	Translucent sub-account as at 30 June
2011-12	68,064	96,000	20,168	64,000
2012-13	117,436	5,761	10,683	71,449
2013-14	27,861	23,091	15,810	18,163
2014-15	17,746	17,176	0	8,016
2015-16	36,392	0	0	0
2016-17	23,189	72,812	3,186	60,813
2017-18	64,232	75,623	0	50,415
2018-19	51,072	41,623	0	27,749

Note 8—Surface water storage

This is the actual volume of water stored in the individual surface water storages at the date of reporting. The volumes provided represent the total volume of water in the storage, including dead storage which is the volume of water which can't be accessed under normal operating conditions e.g. volume below low level outlet. It is assumed that the dead storage can be accessed if required via alternative access methods e.g. syphons.

Data type

Derived from measured data

Policy

Not applicable

Data accuracy

A—Estimated in the range +/- 10%

Providing agency

NSW Department of Planning, Industry and Environment

Data source

NSW Department of Planning, Industry and Environment— HYDSTRA

Methodology

Storage volumes are calculated by processing a gauged storage elevation through a rating table that converts it to a volume.

Additional information

Table 27: Storage summary table

Name	Capacity (ML)	Dead storage (ML)
Windamere Dam	368,120	1,130
Burrendong Dam	1,190,060 ¹⁷	33,730

For plots of storage behaviour for the reporting period, including volumes and percentages, see Figure 10 and Figure 13 in this report.

¹⁷ Burrendong also has a flood mitigation storage zone of 489,940 megalitres. Combined capacity is 1,680,000 megalitres.

Note 9—River channel storage

The volume of water stored in the river channel on the day of reporting.

Policy

Not applicable

Data type

Derived from measured data

Data accuracy

B—Estimated in the range +/- 25%

Providing agency

NSW Department of Planning, Industry and Environment

Data sources

NSW Department of Planning, Industry and Environment: HYDSTRA, CAIRO

Methodology

For each river section S(n):

$$V = Q \times T$$

The river channel storage will be equal to the sum of all river section volumes.

$$\text{River channel storage} = \sum S(n) V$$

Table 28: Summary of river channel storage calculation components

Symbol	Variable	Data source	Unit
Q	Average flow in the river section. Calculated by averaging the daily flows at the upstream and downstream river gauges.	HYDSTRA	ML/d
V	Volume in each river section.	Calculated	ML
T	Average travel time for a parcel of water to travel through the river section.	CAIRO	days

Assumptions and approximations:

- Travel times are estimated to the nearest day.
- Daily flow change between gauging sites assumed to be linear.

Note 10—Storage inflow

Storage inflow refers to the volume of water flowing into the major headwater storages—Windamere Dam and Burrendong Dam.

Policy

Not applicable

Data type

Derived from measured data

Data accuracy

A—Estimated in the range +/- 10%

Providing agency

NSW Department of Planning, Industry and Environment

Data sources

NSW Department of Planning, Industry and Environment: HYDSTRA, Integrated Quantity and Quality Model (IQQM)

Methodology

In most of the major storages in NSW there is no direct measurement of inflows. However, it is possible to calculate inflows by using a mass balance approach (based on balancing the change in storage volume) where inflow is the only unknown (assuming seepage as negligible). This is referred to a backcalculation of inflows.

The backcalculation figures were derived using a one day time step with the inflow calculated according to the equation below. The daily inflows are then summed to provide an annual inflow figure.

$$\sum_{i=1}^n I_i = \Delta S_i + O_i + Se_i + \frac{(E_i - R_i) * A_i}{100}$$

Table 29: Components for back calculation of inflow

Symbol	Variable	Unit
I	Inflow	ML/day
ΔS	Change in storage volume	ML
O	Outflow	ML/day
Se	Seepage	ML/day
R	Rainfall	mm/day
E	Evaporation (Mortons shallow lake estimation, SILO)	mm/day
A	Surface area—derived from height to surface areas lookup curve	ha

Additional information

For plots of daily storage inflows refer to Figure 9 and Figure 12 earlier in this report.

Note 11—Storage evaporation and storage rainfall

This refers to the volume of water effective on Windamere and Burrendong Dam that is either lost as a result of evaporation or gained as a result of rainfall.

Data type

Derived from measured data

Policy

Not applicable

Data accuracy

B—Estimated in the range +/- 25%

Providing agency

NSW Department of Planning, Industry and Environment

Data source

NSW Department of Planning, Industry and Environment— IQQM backcalculation, HYDSTRA

Methodology

Daily rainfall and mortons shallow lake evaporation data (accessed via SILO) are applied to storage surface area time-series from HYDSTRA to achieve a volume in megalitres which is then aggregated to an annual figure. The rainfall and evaporation data utilised is equivalent to the data used in the storage inflow backcalculation (note 10)

Rainfall:

$$\sum_{i=1}^n V_i = \frac{R_i \times A_i}{100}$$

Evaporation:

$$\sum_{i=1}^n V_i = \frac{E_i \times A_i}{100}$$

Table 30: Components for storage evaporation and rainfall

Symbol	Variable	Unit
V	Volume	ML/year
R	Rainfall	mm/day
A	Surface area—derived from height to surface areas lookup curve	Ha
E	Evaporation (Mortons shallow lake estimation, SILO)	mm/day

Note 12—River evaporation and river rainfall

This refers to the volume of water effective on the accounted river reach that is either lost as a result of evaporation or gained as a result of rainfall.

Data type

Derived from measured data

Policy

Not applicable

Data accuracy

C—Estimated in the range +/- 50%

Providing agency

NSW Department of Planning, Industry and Environment

Data source

NSW Department of Planning, Industry and Environment: HYDSTRA, ARCGIS

QLD Department of Natural Resources: SILO

Methodology

The volume applied for evaporation and rainfall on the regulated river is achieved by first calculating a daily time-series of river area. This is achieved by breaking the river up into reaches and utilising the cross sections recorded at river gauging locations to determine the average width of the river with a given daily flow. River length is then determined between two gauging locations using ARCGIS and as such an area for each reach can be defined.

Area (m²) = Average W (m) x L (m)

Where W is the daily width determined from the gauging cross sections and L is the length as determined through ARCGIS analysis.

With daily area determined, various climate stations are then selected based on their proximity to each river reach. Rainfall and evaporation data is then extracted from SILO and applied to the area time-series to achieve a volume in megalitres which is then aggregated to an annual figure.

Rainfall:

$$\sum_{i=1}^n V_i = \frac{R_i \times A_i}{10^6}$$

Evaporation:

$$\sum_{i=1}^n V_i = \frac{ETO_i \times K_c \times A_i}{10^6}$$

Table 31: Components for storage evaporation and rainfall

Symbol	Variable	Unit
V	Volume	ML/year
R	Rainfall	mm/day
A	Surface area—derived from height to surface areas lookup curve	m ²
ETO	reference evapotranspiration from SILO	mm/day
Kc	Crop coefficient for open water (1.05)	-

Note 13—Gauged tributary inflow

The inflow into the regulated river that occurs downstream of the headwater storages that is measured at known gauging stations.

Policy

Not applicable

Data type

Measured data

Data accuracy

A—Estimated in the range +/- 10%

Providing agency

NSW Department of Planning, Industry and Environment

Data sources

NSW Department of Planning, Industry and Environment: HYDSTRA

Methodology

The flows are obtained by measuring river heights at gauging stations along the river, and then passing these heights through a rating table that converts them to a daily flow volume.

Additional information

The total gauged inflow for the reporting period is the sum of the inflows for the gauged tributaries defined in the table below.

Table 32: Summary of gauged tributary inflow for the reporting period

Station	Name	Catchment area (km ²)	Inflow (ML)
421048	Little River at Obley No.2	612	1,448
421042	Talbragar River at Elong Elong	3,050	6,743
421018	Bell River at Newrea	1,620	3,654
421055	Coolbaggie Creek at Rawsonville	626	0

Note 14—Ungauged runoff estimate

The inflow into the river that occurs downstream of the headwater storages that is not measured.

Policy

Not applicable

Data type

Estimated

Data accuracy

C—Estimated in the range +/- 50%

Providing agency

NSW Department of Planning, Industry and Environment

Data sources

NSW Department of Planning, Industry and Environment, WaterNSW : CAIRO

Methodology

Ungauged inflow is a very difficult component to estimate. To derive an estimate a simple mass balance approach was adopted whereby known inflows and outflows were combined with an assumed loss factor. No estimate was made for the areas below the Yamble Bridge gauge in the Cudgegong, and the Warren Weir gauge in the Macquarie (runoff to river considered negligible).

$$UI = EoS - SR - GI + E + LE$$

Where:

UI = Ungauged Inflow Estimate

EoS = Gauged Flow at the point in the system where no further inflow is estimated downstream for the purposes of this ungauged calculation (Yamble Bridge in the Cudgegong and Warren Weir in the Macquarie)

SR_k = Storage release

GI = Gauged inflows

E = Extractions (excluding any that are below the nominated 'EoS')

LE = Estimated losses. This was assumed to be 10% of the measured (gauged flow plus storage releases) entering the system for the Cudgegong and 30% for the Macquarie

Table 33: Summary of ungauged inflow estimates for reporting period

Catchment	Volume (ML)
Cudgegong	3,700
Macquarie	9,000

Note 15—Dam releases, river inflow from dam releases

The volume of water released from Windamere and Burrendong storages. In the accounting process this release is represented as both a decrease in asset (of the dam) and an equal increase in asset (of the river).

Policy

Not applicable

Data type

Measured data

Data accuracy

A—Estimated in the range +/- 10%

Providing agency

NSW Department of Planning, Industry and Environment

Data sources

NSW Department of Planning, Industry and Environment: HYDSTRA

Methodology

The flows are obtained by measuring river heights at a gauging station downstream of the dam wall, and then passing these heights through a rating table that converts them to a daily flow volume. The releases have been represented in the Statement of Changes in Water Assets and Water Liabilities as both a decrease in water asset (water leaving the dam) and an equal volume of increase in water asset (water released increasing the volume of the river). It would have been also possible to account this as a transfer in asset whereby the volumes would not appear in the statements.

Additional information

Figure 43: Burrendong Dam releases 2018–19

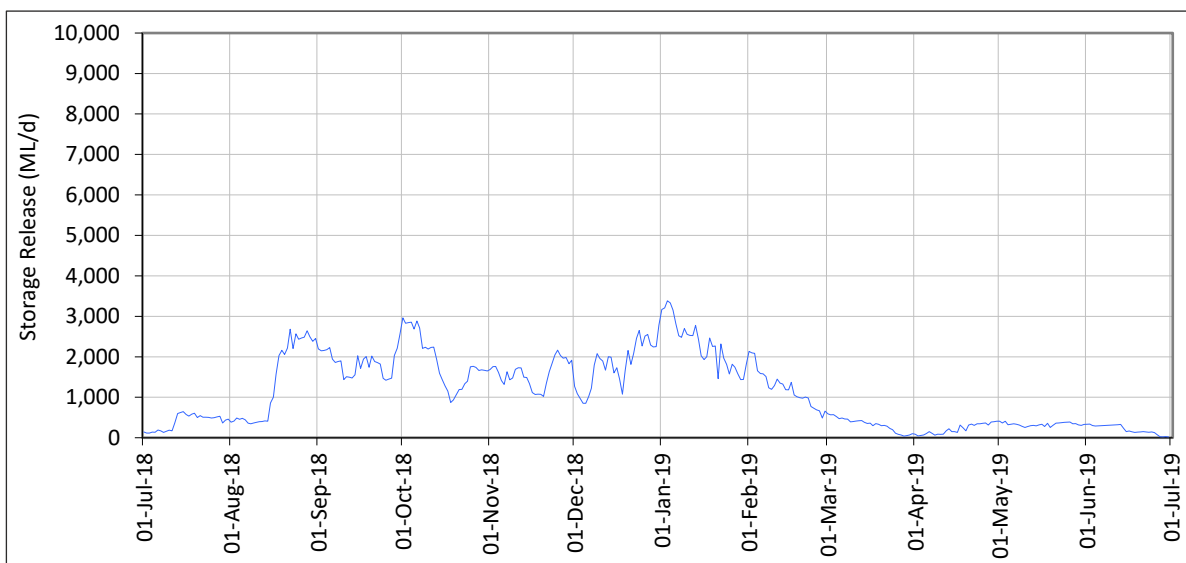
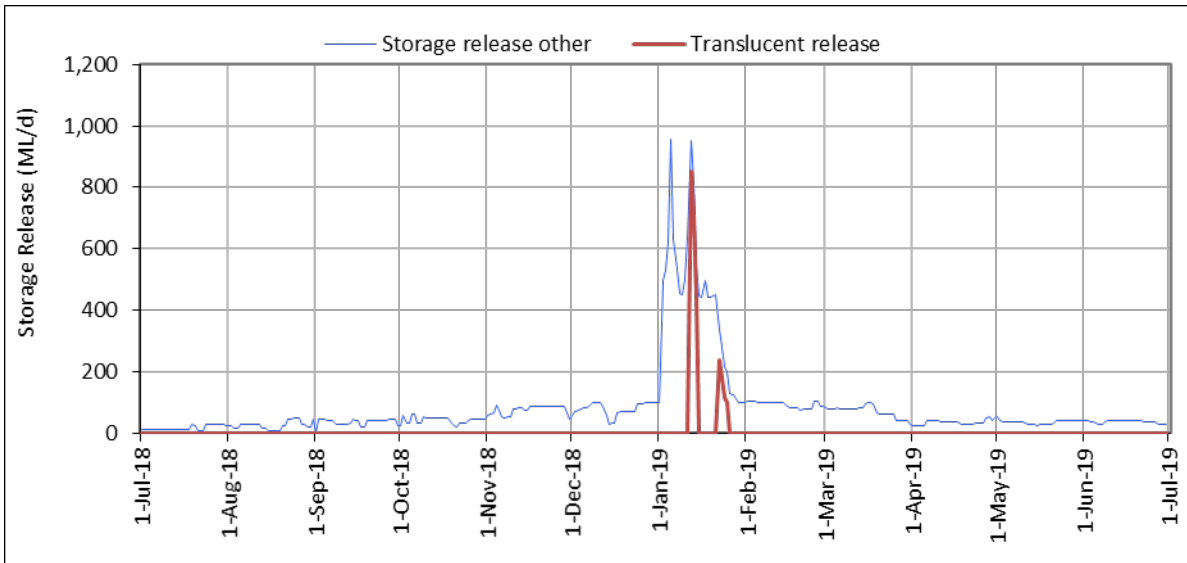


Figure 44: Windamere Dam releases 2018–19



Note 16—End of system/Regulated Effluents

This refers to flow that leaves the entity and does not return to the entity.

Data type

Derived from measured data

Policy

Not applicable

Data accuracy

A—Estimated in the range +/- 10%

Providing agency

NSW Department of Planning, Industry and Environment

Data source

NSW Department of Planning, Industry and Environment– HYDSTRA

Methodology

Summation of flows at gauging site/s measuring the volume of water that leaves the entity at end of system locations or via regulated effluents.

For the Macquarie reporting entity, the end of system is considered to be the Macquarie River at Carinda (421012).

Regulated effluents leaving are considered for Crooked Creek, Duck Creek, Gunningbar Creek and Marra Creek.

Gauges at these locations record a time series of heights which are then converted to a volume of water based on a derived 'height to flow' relationship (rating table). Effluent outflows from the Macquarie other than those defined in this note, such as flow leaving via Albert Priest channel, have not been included in this line item and form part of the unaccounted difference presented in the statements

Additional Information

Table 34: End of System Flows

Station	Location	Total flow (ML)
421166	Gunningbar Creek at Fairview Dam	12,546
421016	Crooked Creek at Profile	7,802
421164	Duck Creek at Napali	3,322
421107	Marra Creek at Billybingbone Bridge	1,540
421012	Macquarie River at Carinda	4,708
	Total	29,918

Figure 45: Macquarie end of system flow

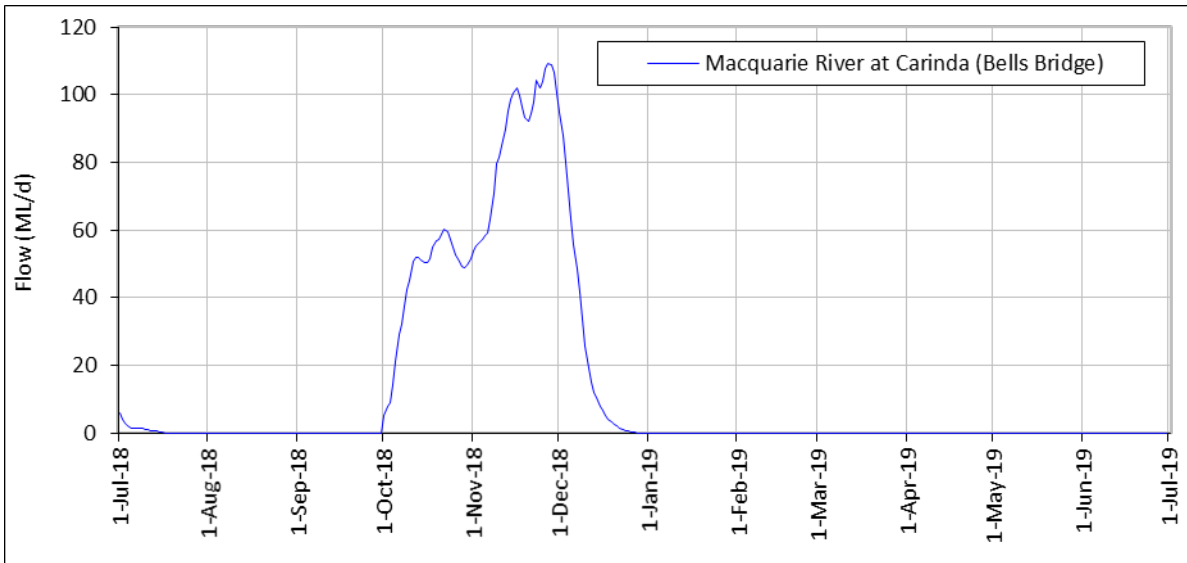
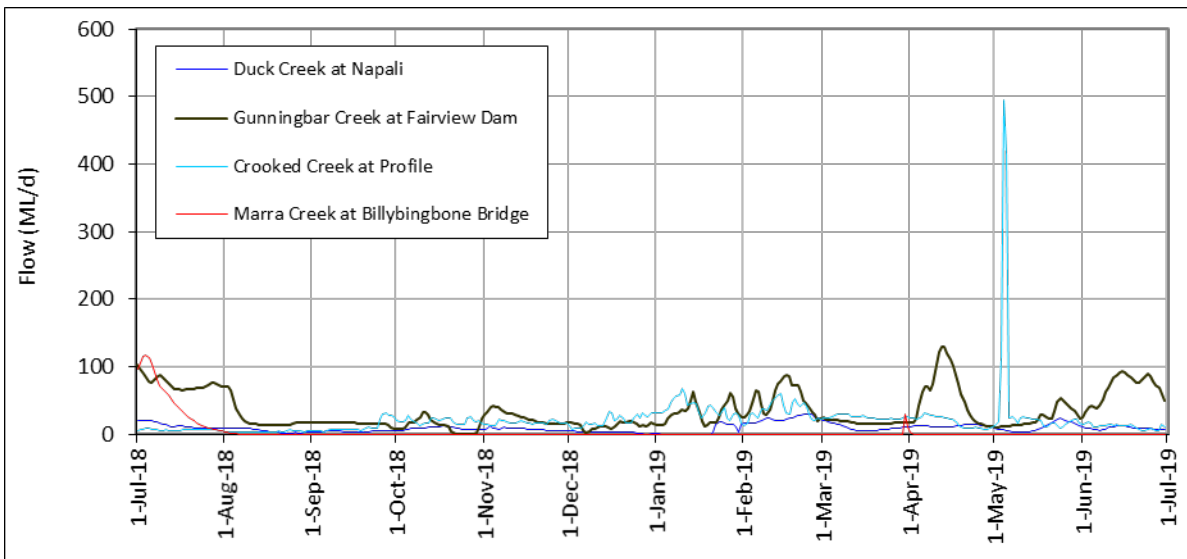


Figure 46: Macquarie regulated effluents



Note 17—Flow to Macquarie Marshes

The flow to Macquarie Marshes is an estimate of the volume of water that enters the Macquarie Marshes and does not pass through to the end of system (i.e. the Macquarie River at Carinda for the purpose of this GPWAR).

The total water entering the Macquarie Marshes in a year is made up of water provided from a variety of sources including:

- Environmental Water Allowance (EWA)
- Held Environmental Water (licensed)
- Operational loss
- High flow events

Policy

Not applicable

Data type

Measured data

Data accuracy

B—Estimated in the range +/- 25%

Providing agency

NSW Department of Planning, Industry and Environment

Data sources

NSW Department of Planning, Industry and Environment: HYDSTRA, CAIRO

Methodology

The estimate of water entering the Macquarie Marshes is obtained from operational data within the Macquarie Cairo sheet. The estimate calculates the amount of flow passing Marebone either via the Macquarie River or Marebone Break and is reduced by the amount of water ordered by downstream licence holders.

The annual flow at Macquarie River at Carinda is then subtracted from the Cairo estimate to obtain an estimate of water that is received by the marshes but not passed through.

The calculation is summarised below:

$$F_{MM} = F_{MW} + F_{MB} - O - F_{EOS}$$

Where:

F_{MM} = Annual flow to Macquarie Marshes

F_{MW} = Annual flow passing Marebone Weir via the Macquarie River

F_{MB} = Annual flow passing via Marebone Break

O = Licenced orders for extraction

F_{EOS} = Annual flow at Macquarie River at Carinda

Additional Information

Table 35: Breakdown of flow to Macquarie Marshes

Source of flow to Macquarie Marshes	Volume (ML)
Environmental water allowance	51,072
Held environmental water	75,505
Other	15,893
Total flow to Macquarie Marshes	142,470

Note 18—Extractions from river

This is the actual volume of water directly pumped or diverted from the regulated river by licence holders. Occasionally (generally in the case of environmental water) volumes are ordered against a licence account for in-stream benefits or to pass through end of system target points. As such the volume reported to be physically extracted from the accounted river extent will not always be equal to the amount of water debited against accounts for usage, which has been described in Note 3. The volume stated for extractions from river excludes basic rights extractions, which is reported as a separate line item and detailed in Note 19.

Data type

Measured data

Policy

Not applicable

Data accuracy

A—Estimated in the range +/- 10%

Providing agency

NSW Department of Planning, Industry and Environment

Data source

WaterNSW / NSW Department of Planning, Industry and Environment– Water Accounting System (joint ownership of system).

Methodology

For the purposes of this GPWAR extraction from the river is considered to be the total volume metered and debited to the allocation accounts minus any licenced account water that can be identified as being used within the system, or ordered to be passed through the system. These volumes are generally associated with environmental water orders and have already been accounted for in other line items.

Additional information

Table 36: Reconciliation of physical extraction to account usage (ML)

	Macquarie	Cudgegong
Licensed extractions from River ¹⁸	173,949	6,385
plus		
Licensed flow leaving System ¹⁹	75,505	0
plus		
In stream licenced usage ²⁰	0	0
equals		
Total account usage ²¹	249,454	6,385

¹⁸ Direct licenced extractions from the river excluding basic rights usage estimate

¹⁹ Licenced water ordered to leave the accounted Macquarie extent for environmental benefits – in this case the water was sent to the Macquarie Marshes

²⁰ Water ordered and used within the accounted system for environmental benefit (not extracted from the river)

²¹ The total amount of water accounted for usage against the allocation accounts

Note 19—Basic rights extractions

This is the non-licensed right to extract water to meet basic requirements for household purposes (non-commercial uses in and around the house and garden) and for watering of stock. It is available for anyone who has access to river frontage on their property.

This water cannot be used for irrigating crops or garden produce that will be sold or bartered, for washing down machinery sheds or for intensive livestock operations.

In times of limited supply, there may be restrictions on taking water for domestic and stock use.

Data Type

Estimated

Policy

Water Sharing Plan for the Macquarie and Cudgegong Regulated Rivers Water Source 2016

- Part 4 Basic Landholder Rights
 - Clause 17 Domestic and stock rights

Available on the NSW Department of Planning, Industry and Environment website at www.industry.nsw.gov.au/water

Data accuracy

C—Estimated in the range +/- 50%

Providing agency

NSW Department of Planning, Industry and Environment

Data source

Water Sharing Plan for the Macquarie Regulated River Water Source 2016

Methodology

The estimation of domestic and stock rights uses a series of estimates for water usage, stocking rates, population and property shape based on local knowledge to calculate riparian (stock and domestic) requirements in megalitres per year. The annual extraction for Domestic and Stock rights in the water accounts is assumed to be the estimated figure stated in the Water Sharing Plan for the Macquarie and Cudgegong Regulated Rivers Water Source 2016 being 973 megalitres per year for Macquarie and 227 megalitres per year for Cudgegong.

Note 20—Supplementary extractions

This is the volume of water extracted or diverted under supplementary access licences during announced periods of supplementary water. Supplementary flow events are announced periodically during the season when high flow events occur with the period of extraction and volume of water to be extracted determined based on the rules as set out in the water sharing plans. It is important to note that supplementary access licences differ from other categories of access licence in that the volume of water in the account refers to an annual upper limit for extractions and its provision is totally reliant on the occurrence of high flow events.

Data type

Measured data

Policy

Water Sharing Plan for the Macquarie and Cudgegong Regulated Rivers Water Source 2016

Part 8 Limits to the availability of water

Division 2—Available water determinations

- Clause 39 Available water determinations for supplementary water access licences

Part 9 Rules for managing access licences

Division 3—Extraction conditions

- Clause 47 Extraction of water under supplementary water access licences

Refer to applicable Water Sharing Plan on NSW Department of Planning, Industry and Environment website at www.industry.nsw.gov.au/water

Data accuracy

A—Estimated in the range +/- 10%

Providing agency

NSW Department of Planning, Industry and Environment

Data source

WaterNSW/NSW Department of Planning, Industry and Environment—Water Accounting System (Joint ownership of system).

Methodology

Supplementary water extraction and diversion data is collected by either on farm meters that measure extraction or gauges on diversion works. Meter readings are collected for individual licence holders at intervals during the year and converted via a calibration factor to a volume of water extracted. Water diverted from the river is measured by recording the height at either the gauge or weir with the volume diverted being derived by passing these heights through a rating table. However, with supplementary water being extracted through the same pumps as those extracting water under other categories of access licences additional information is required to separate out supplementary extraction. Basically, licence holders provide notification of their intention to pump prior to pumping or diverting water during the declared supplementary event and provide meter readings both at the commencement and conclusion of pumping. This enables the supplementary flow extraction to be assessed independent of other categories of access licences.

Additional information

There were no supplementary access events during the reporting period.

Table 37: Supplementary Announcements for reporting period

Not applicable this reporting period.

Figure 47: Supplementary usage for reporting period, by river section

Not applicable this reporting period.

Figure 48: Supplementary water daily usage

Not applicable this reporting period.

Note 21—Replenishment flows

This refers to water that is set aside as part of either essential requirements or to be provided from uncontrolled flows for the provision of flows to Marra Creek, Bogan River, downstream of Macquarie Marshes, Gum Cowal/Terrigal System, Crooked Creek, Belaringar Creek, and Ewenmar Creek. The water is to supply water for households, town use and stock and for accounting purposes and in some cases treated as water leaving the system/entity. Additional details including the annual limits to be delivered are detailed in the water sharing plan.

Data type

Calculated from measured data

Policy

Water Sharing Plan for the Macquarie and Cudgegong Regulated Rivers Water Source 2016

- Part 12 System operation rules
 - Clause 58 Replenishment flows

Available on the NSW Department of Planning, Industry and Environment website at www.industry.nsw.gov.au/water

Data accuracy

A—Estimated in the range +/- 10%

B—Estimated in the range +/- 25%

Providing agency

NSW Department of Planning, Industry and Environment

Data source

WaterNSW [Water Balance Report](#) (Public document)

Methodology

Replenishment flows are delivered at certain times of the year and the volume can be assessed by the flow recorded at the gauging station for that period.

The following tables summarise the assessed replenishment flows for the reporting period

Additional Information²²**Table 38: Replenishment flow summary for uncontrolled flow requirements**

2018–2019	Annual requirement	Volume diverted	Event period	Source of supply	Performance
Gum Cowal/ Terrigal system	Up to 10,000 ML/yr.	10,963 ML approximately	1/09/2018 to 16/10/2018	Replenishment provided by environmental flows	System completely replenished
Crooked Ck. below Mumblebone	Up to 4000 ML/yr.	Not delivered			
Bogan R. Nyngan– Gunningbar confluence	Up to 1000 ML/yr.	Not delivered			
Belaringar Ck. D/S of Albert Priest Channel	Up to 1000 ML/yr.	Not delivered			
Ewenmar Ck. (Reddenville Break)	Up to 1500 ML/yr.	Not delivered			
Belaringar Ck.	Up to 5000 ML/yr.	Not delivered			

Table 39: Replenishment flow summary for water made available from storage (or supplemented from uncontrolled flows)

2018–2019	Annual requirement	Volume diverted	Event period	Source of supply	Performance
Marra Ck.	Up to 15,000 ML/yr.	Estimated Volumes*— measured at Carinda Rd (421097) 1,767 ML	01/07/2018 to 07/07/2018 and 02/04/2019 to 16/04/2019	Replenishment partially completed by some remanent flows from last year's replenishment, majority of the replenishment provided by Talbragar river in April 2019.	System partially replenished
Lower Bogan River	Up to 15,000 ML/yr.	Estimated Volumes— measured at d/s. Fairview (421166) 2633 ML delivered as continuation from last year and 5,668 ML in April to Jun 2019. Total 8,301 ML	1/07/2019 to 7/8/2049 and 4/04/2019 to 30/06/2019	Replenishment completed by releases from Burrendong dam and tributary flows.	System completely replenished

²² Tables 38, 39 and 40 extracted from Water NSW, Annual Compliance Report

Table 40: Replenishment flows downstream of Macquarie Marshes

2018–2019	Annual requirement	Volume diverted	Event period	Source of supply	Performance
Macquarie River D/S Macquarie Marshes.	Twice yearly	6,030 ML	1/07/2018 to 11/7/2018, 25/09/2018 to 26/12/2018 and 20/04/2019 to 13/05/2019	Flows resulted from Environmental flows met the S&D requirements	System completely replenished.

Note 22—River and groundwater interaction

This note refers to water that has been identified as either flowing from the connected alluvium to the accounted river extent (increase in water asset), or alternatively from the accounted river extent to the alluvium aquifer (decrease in water asset).

Note while a detailed water budget for the groundwater aquifer itself had previously been reported within the water accounting statements (Macquarie-Bogan catchment General Purpose Water Accounting Report 2010-11), this information is now being presented in the groundwater appendix of this document.

Data type

Modelled

Policy

Not applicable

Data accuracy

D—Estimated in the range +/- 100%

Providing agency

NSW Department of Planning, Industry and Environment

Data source

NSW Department of Planning, Industry and Environment MODFLOW (Data inputs from HYDSTRA, GDS)

Methodology

For the lower Macquarie groundwater source the annual budget has been estimated using the NSW Department of Planning, Industry and Environment MODFLOW model for the Lower Macquarie Groundwater Management Area (for a more detailed explanation of the Method, see 'Method A' in the document NSW General Purpose Water Accounting Reports—Groundwater Methodologies, available for download from the NSW Department of Planning, Industry and Environment website at www.industry.nsw.gov.au/water)

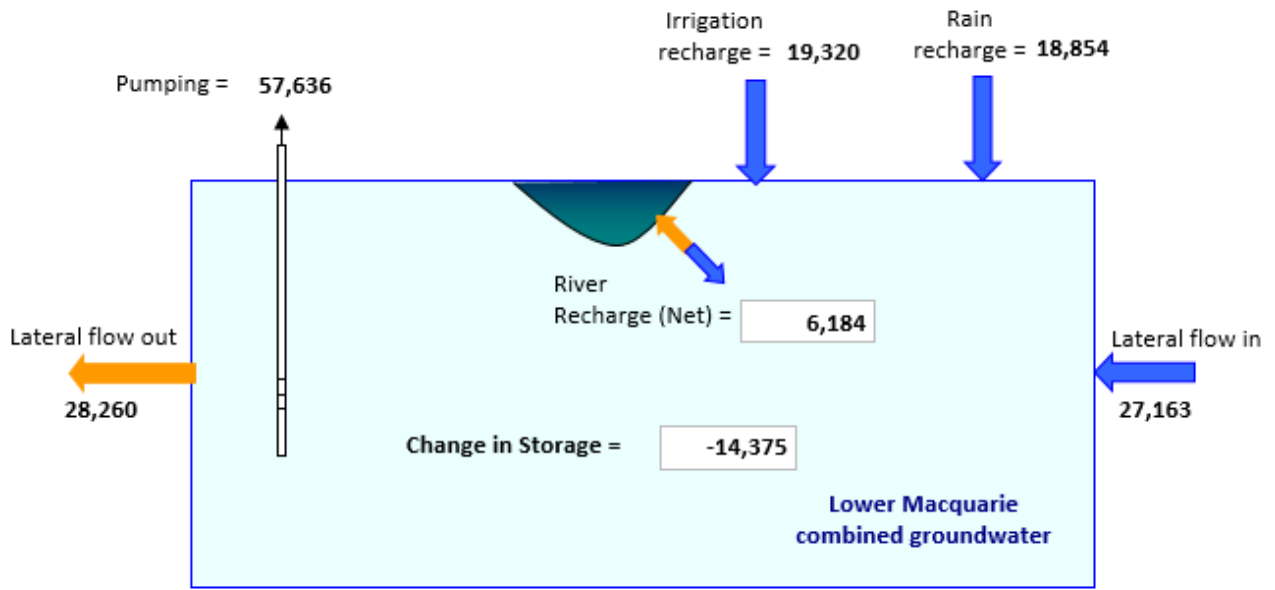
No estimates were made for interactions with the river outside the area covered by the lower Macquarie groundwater source

Additional information

The annual groundwater budget from Method A is summarised in Figure 49²³.

²³ River interaction is illustrated as a net figure. Actual components are presented in the water accounting statements.

Figure 49: Lower Macquarie Groundwater Management Area 2018–19 budget



Note 23—Unaccounted difference

In theory if all the processes of a water balance could be accurately accounted for the unaccounted difference would be zero. In reality due to the large uncertainties in many of the volumes presented in the accounts, the various sources from which the data has been obtained and the fact that not all processes of the water cycle have been accounted, the statements are not balanced at the end of the accounting process. In order to balance the accounts a final balancing entry is required, and this is termed the unaccounted difference. As technology progresses and accuracy improves in the account estimates, it is anticipated that relatively, this figure should reduce in future accounts.

Data type

Not applicable

Policy

Not applicable

Data accuracy

D—Estimated in the range +/- 100%

Providing agency

Not applicable

Data source

Not applicable

Methodology

The unaccounted difference is equal to the amount required to obtain the correct volume in river at the end of the reporting period, after all the known physical inflows and outflows have been accounted. The double-entry accounting process attempted to represent the physical movement of water by creating a river asset. The opening and closing balance of the river volume was estimated according to Note 9.

Surface Water Unaccounted difference

$$UVSW = Rs - Rc + RI - Ro$$

Where:

UVSW = Unaccounted difference for Surface Water

Rs = Opening river volume estimate

Rc = Closing river volume estimate

Ro = Physical outflows from the river (e.g. extractions)

RI = Physical inflows to the river (e.g. runoff, return flows, dam releases)

Note 24—Adjusting entry

This is a line item that is used to correct balances in the accounts. The double entry accounting being applied is a continuous process whereby the closing balance of one year is the opening balance for the following year.

Occasionally corrections will be required for a variety of reasons including when an error is identified in prior year reporting, a balance in the previous year has been since adjusted or when a process that had previously been reported is unable to be supplied and the associated asset or liability must be removed to maintain the integrity of the statements.

This is different to the unaccounted difference component which is a physical volume required to achieve mass balance after all the known processes have been accounted.

Data type

Calculated

Accuracy

A1—Nil inaccuracy +/- 0%

Providing agency

NSW Department of Planning, Industry and Environment.

Data source

Not applicable

Methodology

A journal entry is placed in the comparative (prior) year to ensure correct opening balances are achieved in the reporting year.

Additional information

There were no adjusting entries applicable for the reporting period (Table 41)

Table 41: Account adjustments

Adjustment	Value (ML)
Increase to allocation account balance	0
Decrease to allocation account balance	0

References

WASB 2012, Australian Water Accounting Standard 1 Preparation and Presentation of General Purpose Water Accounting Reports (AWAS 1), Bureau of Meteorology