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General Purpose Water Accounting Report Macquarie and Cudgegong Catchments

2022-23



Acknowledgement of Country

The Department of Climate Change, Energy, the Environment and Water acknowledges Aboriginal people as Australia's First Peoples practicing the oldest living culture on earth and as the Traditional Owners and Custodians of the lands and waters on which we rely.

We acknowledge the people of the Wiradjuri, Wailwan and Wongaibon Nations and that the land and waters of the New South Wales Macquarie River catchment area is of spiritual, cultural, customary and economic importance.

We recognise the intrinsic connection of Traditional Owners to Country and acknowledge their contribution to the management of the New South Wales Macquarie River catchment landscape and natural resources.

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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
CARM	Computer aided river management
EWA	environmental water 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)
computer aided river management (CARM)	A river operation 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.

Term	Meaning
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
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 Water Management Act 2000 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

Term	Meaning
high-security licence	a category of water access licence implemented under the Water Management Act 2000. 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 Climate Change, Energy, the Environment and Water 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)
regulated river	a river system where flow is controlled via one or more major man-made structures such as dams and weirs For the purposes of the Water Management Act 2000, 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.
share component	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 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.
storage	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
storage reserve	proportion of water in a storage reserved in the resource assessment process for future essential or high-security requirements (e.g. town water)
storage volume	the total volume of water held in storage at a specified time
supplementary water	unregulated river flow available for extraction under a supplementary licence
surface water	all water that occurs naturally above ground including rivers, lakes, reservoirs, creeks, wetlands and estuaries

Term	Meaning
tributary	a smaller river or stream that flows into a larger river or stream Usually several smaller tributaries merge to form a river.
ungauged catchment	a catchment without a flow gauge to accurately record stream flows Modelled estimates must be used to approximate the contribution of ungauged catchments to the main river.
water accounting	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
water assets	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)
water liabilities	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
water sharing plan	a water management plan that defines the rules for sharing of water within a region under the Water Management Act 2000

Director's foreword

This is the 13th 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 2022 to 30 June 2023 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.

We have provided physical groundwater interactions between the regulated river water source and the Lower Macquarie alluvium. However, we have not included detailed groundwater accounting information in this GPWAR.

As Director Water Analytics, NSW Department of Climate Change, Energy, the Environment and Water, I 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 Climate Change, Energy, the Environment and Water 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 Climate Change, Energy, the Environment and Water

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 200,000 people with over half of this population living within the regional cities of Dubbo, Orange and Bathurst with populations of approximately 44,000, 40,000 and 46,000 respectively. 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).

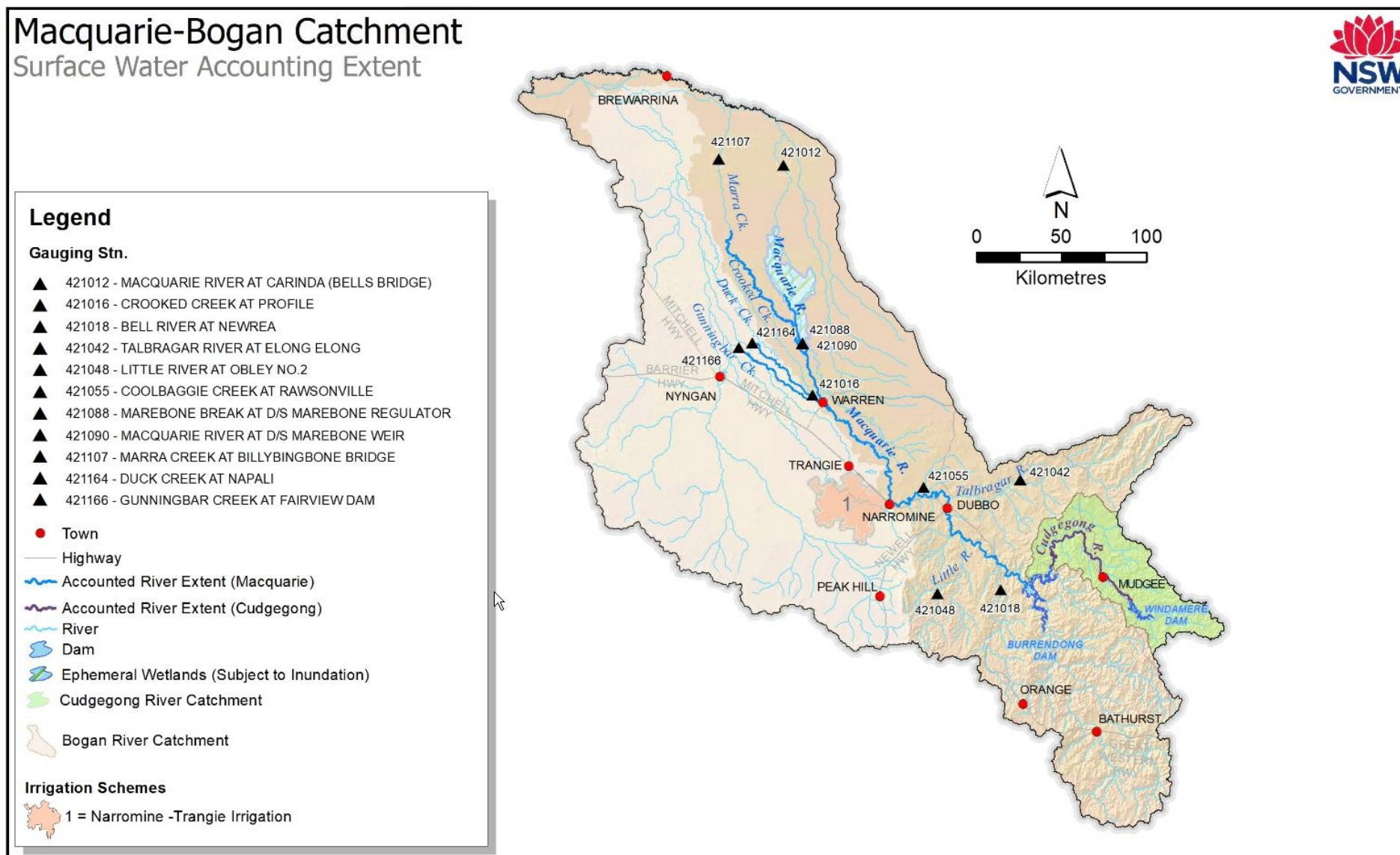
Accounting extent

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.

Groundwater volumes for the Lower Macquarie alluvium that interact with the regulated river are quantified within the GPWAR statements. Any other groundwater interactions with the regulated river are not directly estimated and therefore form a component of the unaccounted difference. Detailed accounting and water resource information for groundwater sources are excluded and published separately on the [NSW Industry website](#).

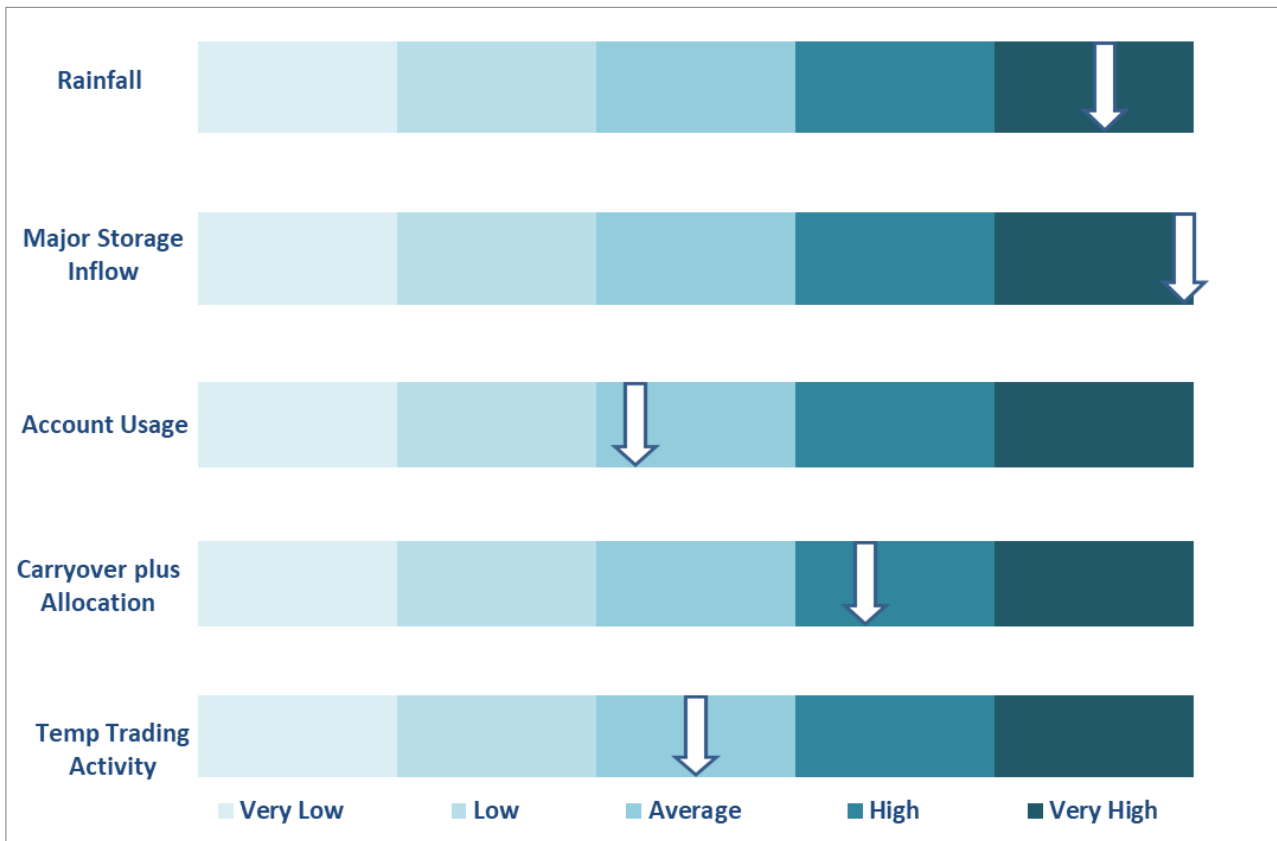
Figure 1: Surface water geographical extent of the accounts



Snapshot

The key indicators for 2022–23 relative to other years under water sharing plan management conditions are presented in Figure 2. Relative to historical information rainfall and major storage inflow were in the very high range, effective allocation (carryover plus allocation) was in the high range, while temporary trading activity and account usage were in the average range.

Figure 2: 2022–23 summary indicators



Climate

- At Bathurst (upper catchment), 663 millimetres of rainfall was recorded for the reporting period (Table 1). Comparatively this volume of rainfall is
 - 105% of the long-term historical median for rainfall at this location.
 - 60% of the highest rainfall on record at this location.
 - The highest monthly rainfall occurred in November 2022 (173 millimetres) and October 2022 (113 millimetres) (Figure 3 and Figure 4).
- At Warren (lower catchment), 573 millimetres of rainfall was recorded for the reporting period (Table 2). Comparatively this volume of rainfall is
 - 121% of the long-term historical median for rainfall at this location.
 - 56% of the highest rainfall on record at this location.
 - The highest monthly rainfall occurred in October 2022 (130 millimetres) and September 2022 (102 millimetres) (refer to 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 above average across the full extent of the Macquarie catchment.

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

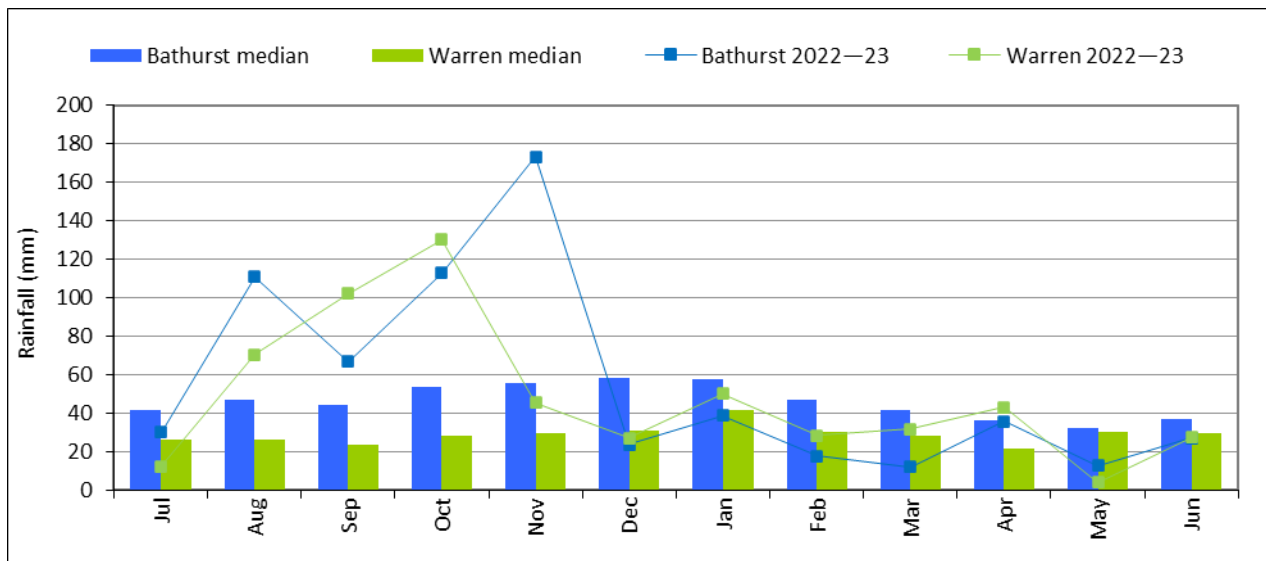


Figure 4: Monthly rainfall historical median deviations at Bathurst and Warren

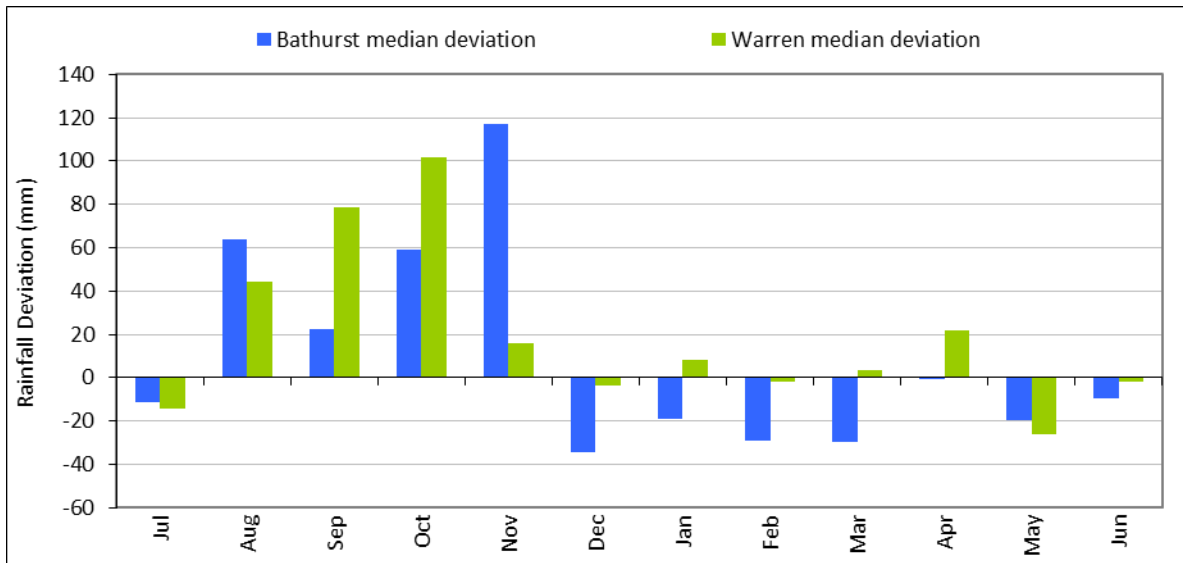


Table 1: 2022–23 monthly rainfall and historic monthly rainfall statistics at Bathurst¹

Bathurst	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Annual
2021–22	30.3	111.0	66.8	113.0	173.4	23.8	38.9	17.8	12.0	35.9	12.9	27.1	662.9
Historical mean	48.2	50.0	47.3	59.3	63.1	65.2	68.4	57.6	53.6	41.8	41.1	43.9	639.4
Historical median	41.7	46.9	44.4	53.9	56.0	58.1	57.9	47.2	41.8	36.5	32.6	36.8	629.1
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	232.0	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	2020-21	2009-10	1977-78	1970-71	1925-26	1989-90	1994-95	1915-16	1949-50

Table 2: 2022–23 monthly rainfall and historic monthly rainfall statistics at Warren¹

Warren	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Annual
2021–22	12.3	70.6	102.2	130.1	45.6	27.2	50.2	28.4	31.9	43.2	4.0	27.6	573.3
Historical mean	33.6	33.6	31.3	40.1	38.6	42.1	56.6	49.6	45.5	38.7	37.5	38.9	485.2
Historical median	26.5	26.6	23.9	28.1	29.6	31.0	42.0	30.5	28.2	21.4	30.3	29.7	472.1
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	234.9	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	2020-21	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 2023 for Bathurst and 1889 to 2023 for Warren.

Figure 5: Macquarie annual rainfall for 2022–23

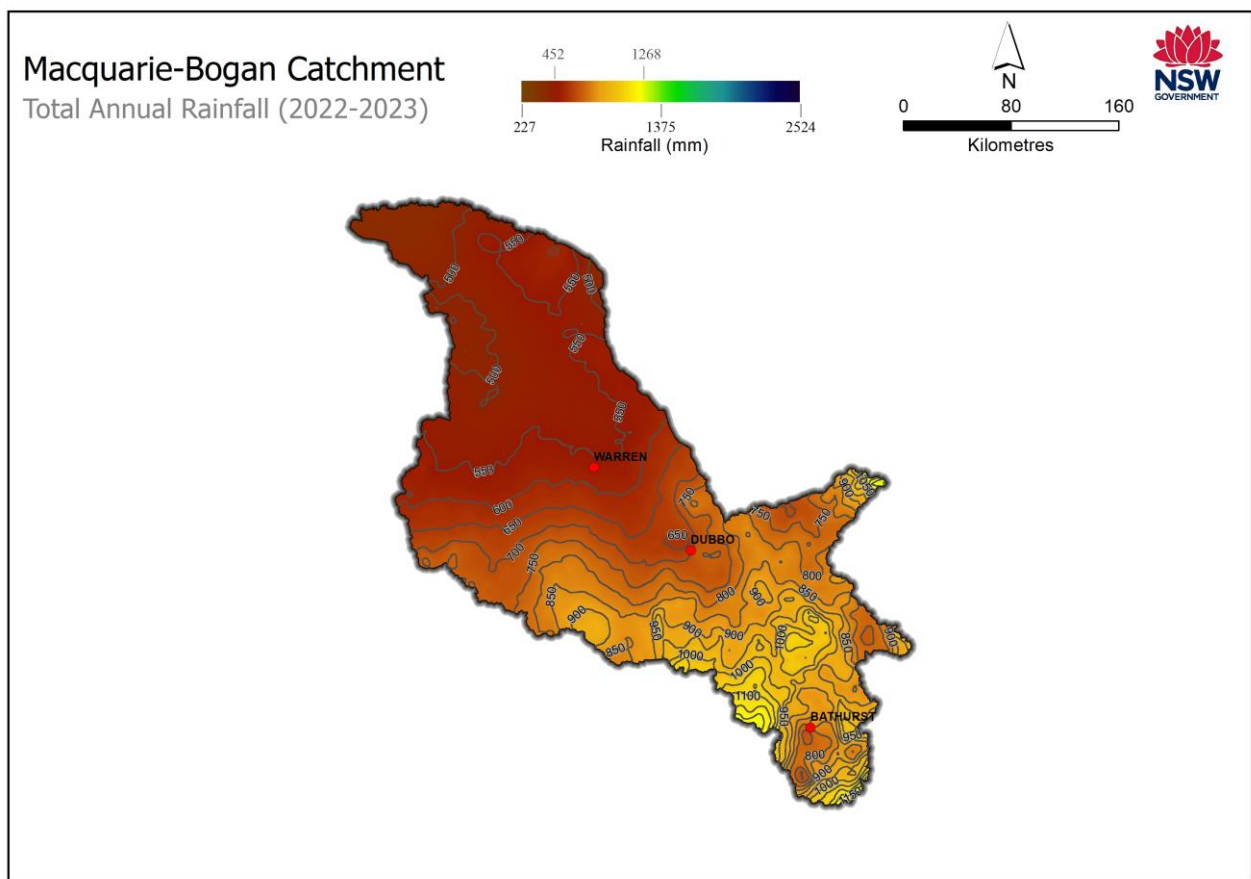
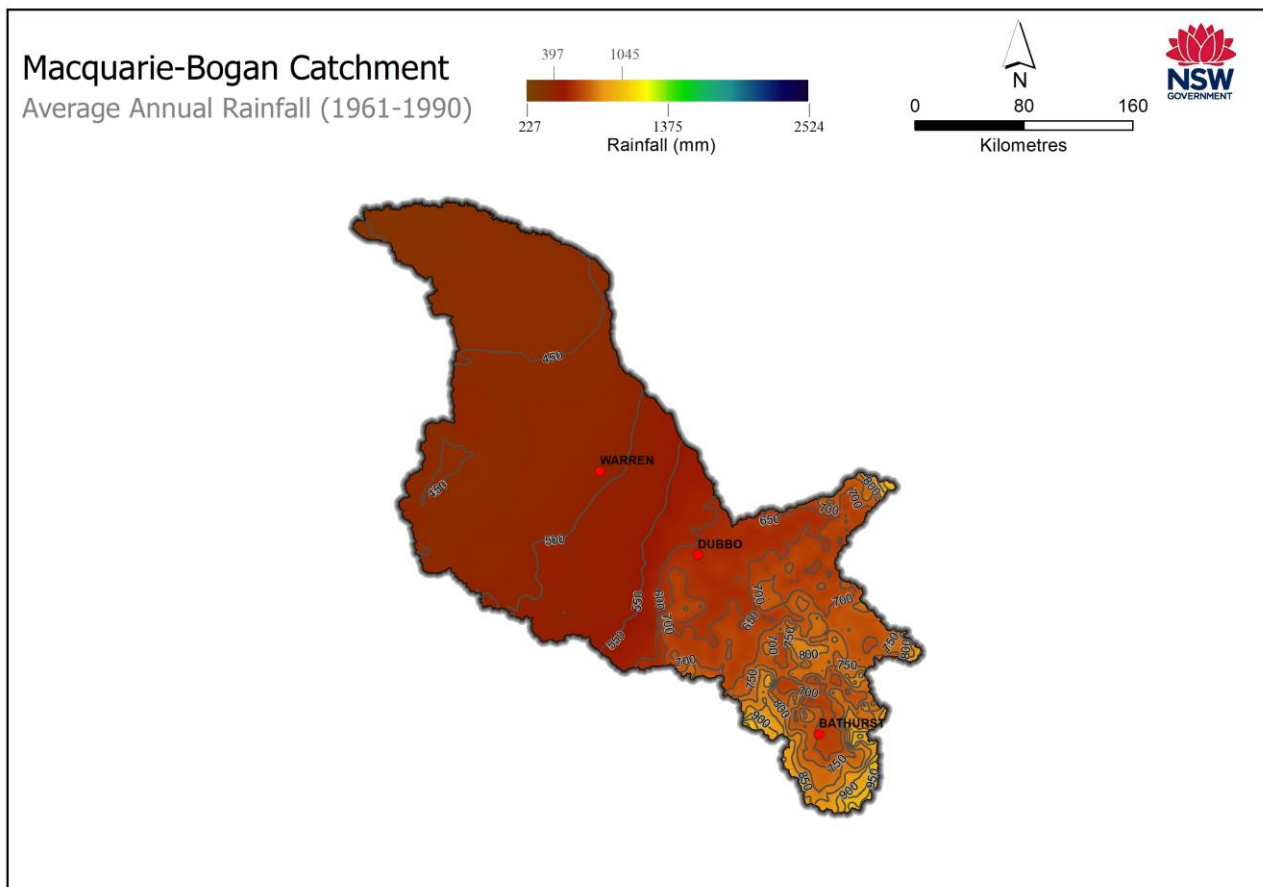


Figure 6: Average annual rainfall in the Macquarie catchment (1961–90)



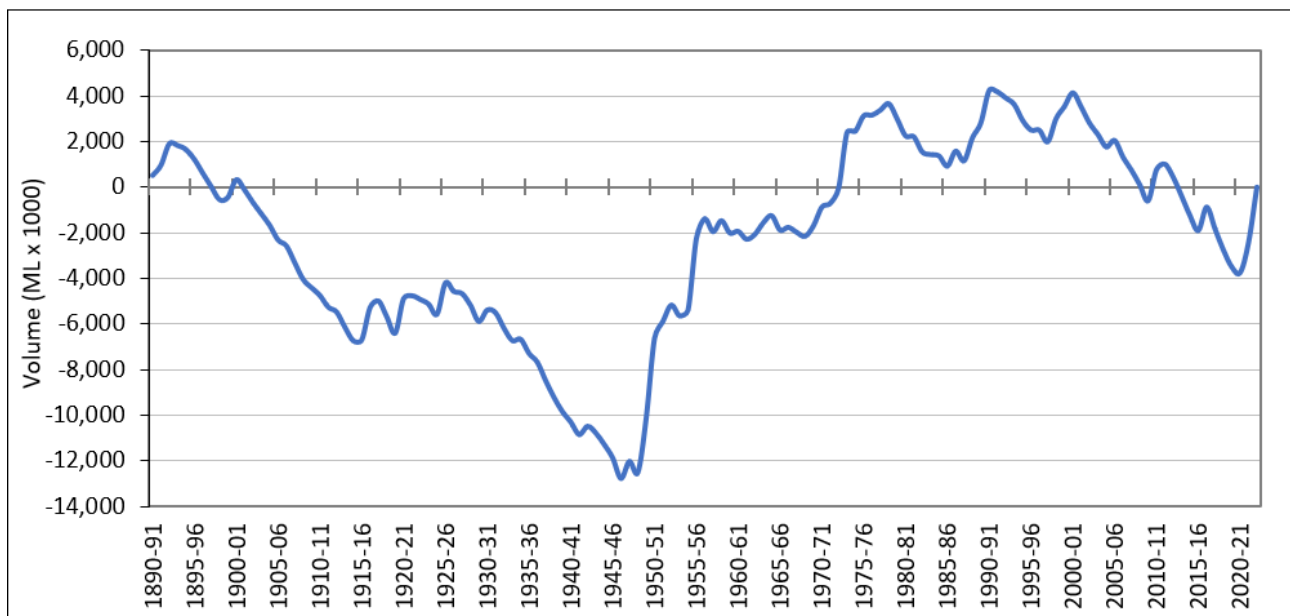
Dam inflows and volume

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:

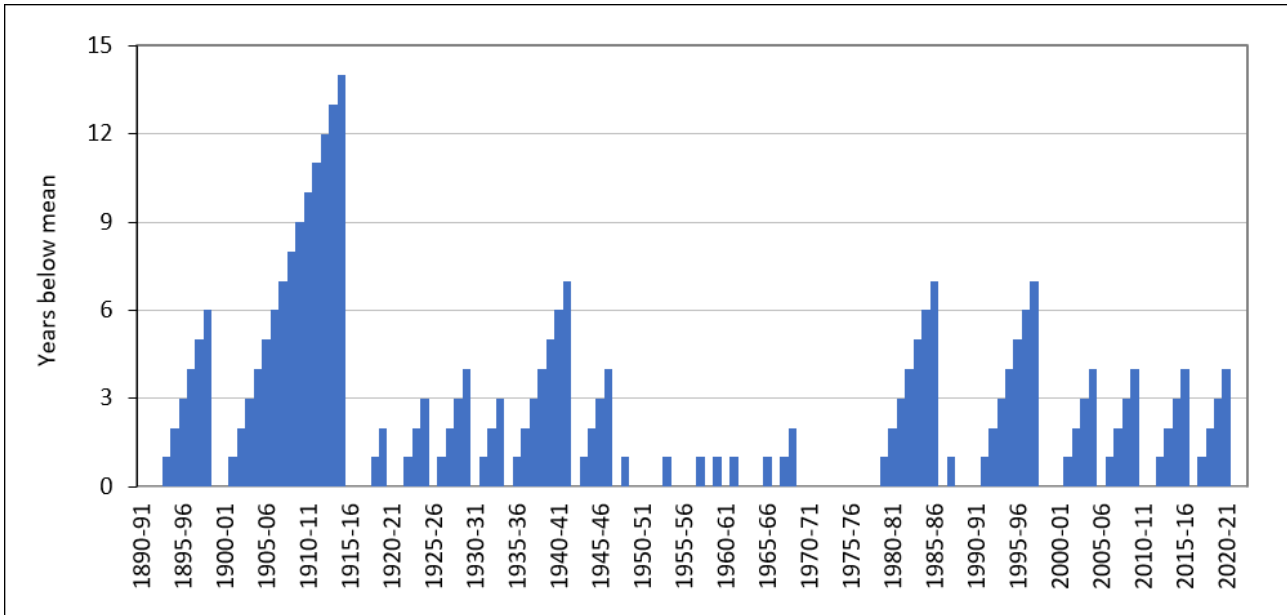
- dry conditions 1900 to 1950
- wet conditions 1950 to 1990
- dry conditions 1990 to 2020
- wet conditions 2020 to present

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



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

Figure 8: Long-term sequence of years below mean inflow



Burrendong Dam

Inflow

For the reporting period, the total inflow to Burrendong Dam was 3,431,990 megalitres (Figure 9), which is:

- 461% of the long-term median annual inflow (744,350 megalitres)
- very high compared to the long-term data set exceeding 98% per cent of years in dataset (1890-91 to 2022-23)
- the 2nd consecutive year of above average inflow

The maximum mean daily inflow rate for the reporting period was 190,948 megalitres, occurring on 9 October 2022 (Figure 10).

Figure 9: Long-term inflows to Burrendong Dam against mean and reporting year inflow

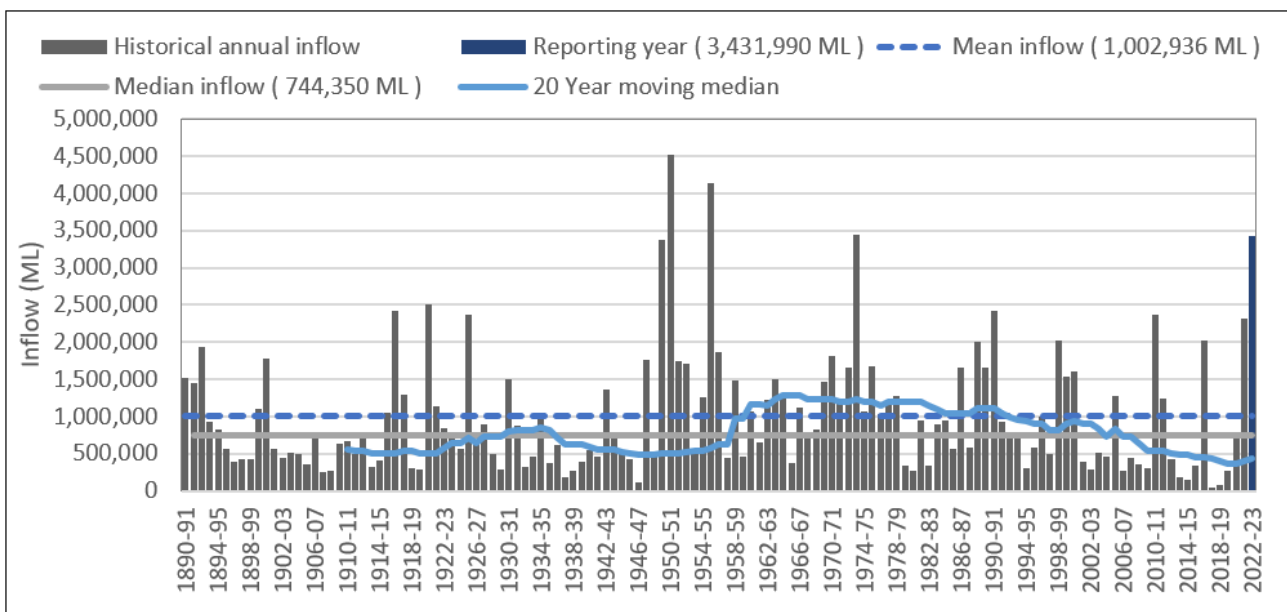
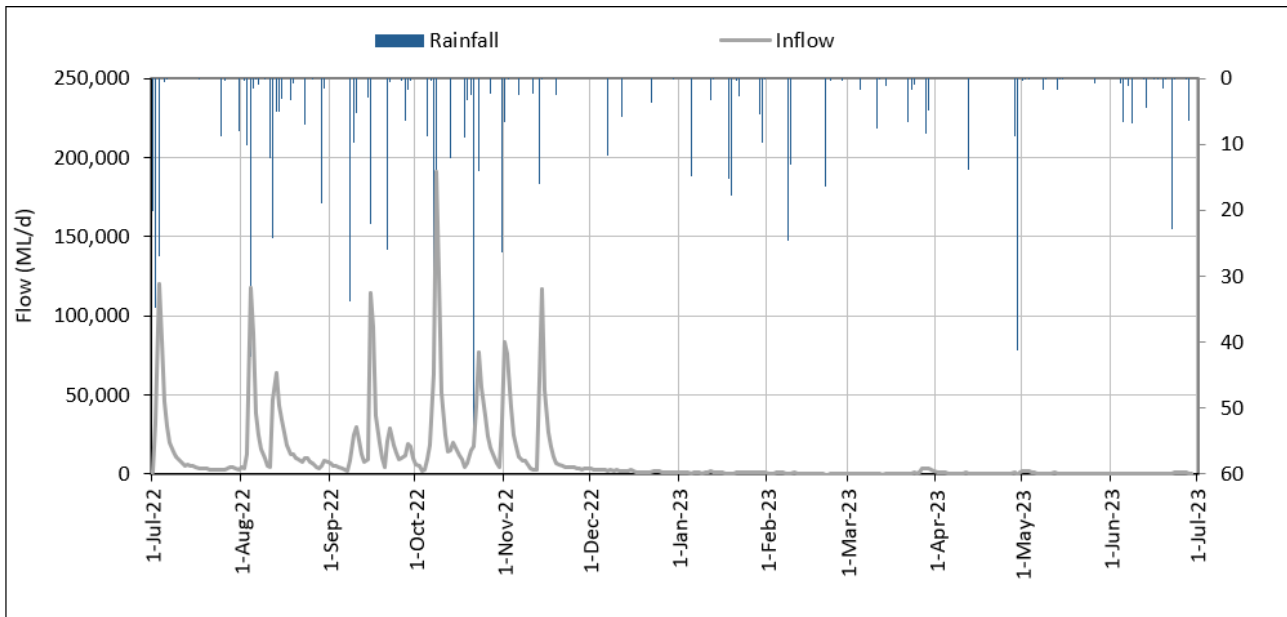


Figure 10: Daily inflows and rainfall at Burrendong



Storage volume

Burrendong storage volume:

- commenced the reporting period at 1,275,183 megalitres or 76% of full supply capacity (Figure 11)
- ended the reporting period at 1,137,302 megalitres or 68% of full supply, a decrease of 8% for the water year
- had a maximum volume during the reporting period of 1,697,823 megalitres or 101% of full supply capacity, occurring on 4 November 2022.

Figure 11: Burrendong Dam volume and percentage full

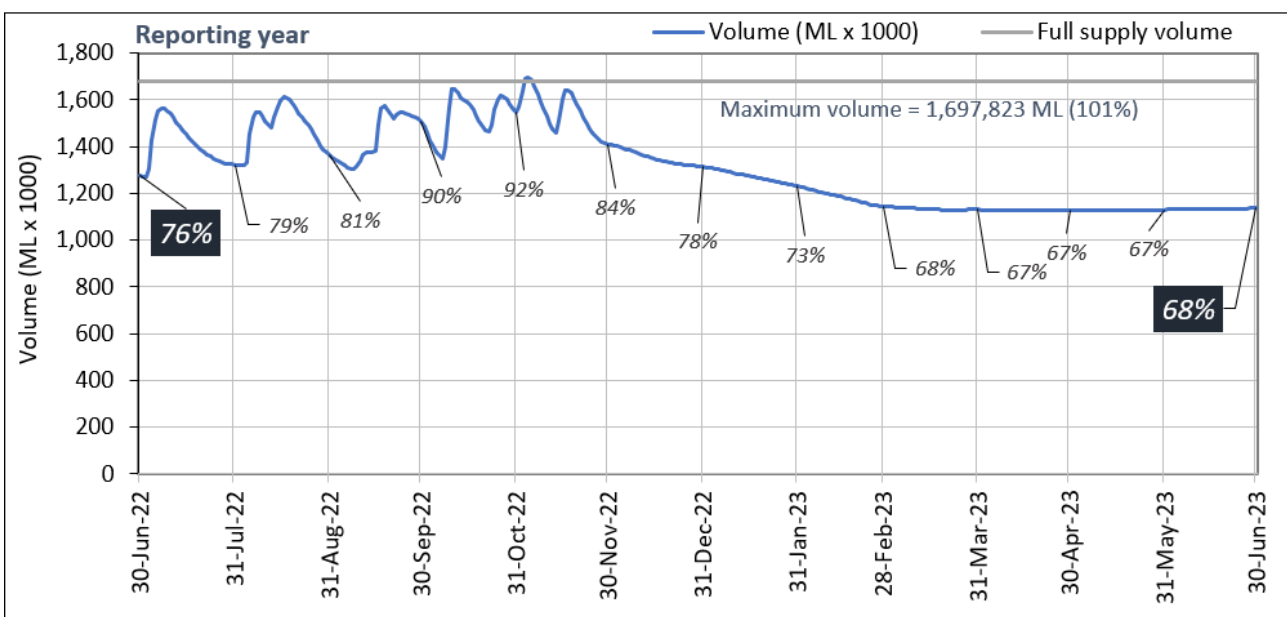
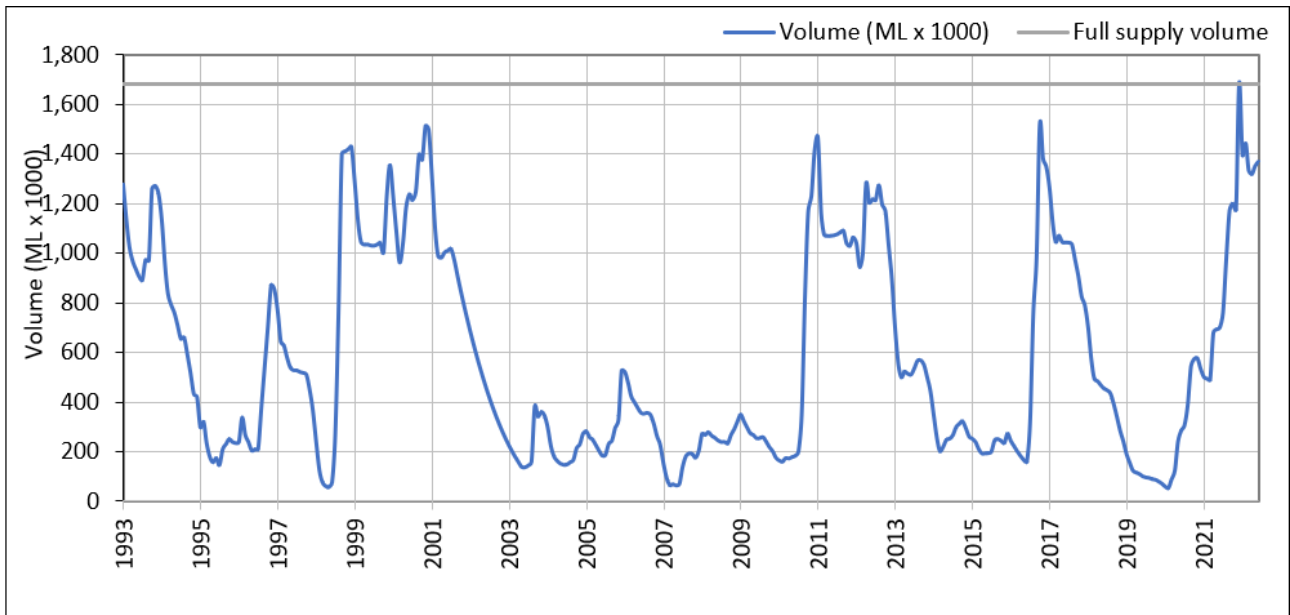


Figure 12: Burrendong Dam historical storage volumes



Windamere Dam

Inflow

- For the reporting period, the total inflow to Windamere Dam was 257,825 megalitres (Figure 13), which is:
- 656% of the long-term median annual inflow (39,307 megalitres)
- very high in comparison to the long-term data set, exceeding 98% of years in dataset (1890-91 to 2022-23)
- the 2nd consecutive year of above average inflow.

The maximum mean daily inflow rate for the reporting period was 26,946 megalitres, occurring on 9 October 2022 (Figure 14).

Figure 13: Long-term inflows to Windamere Dam against mean and reporting year inflow

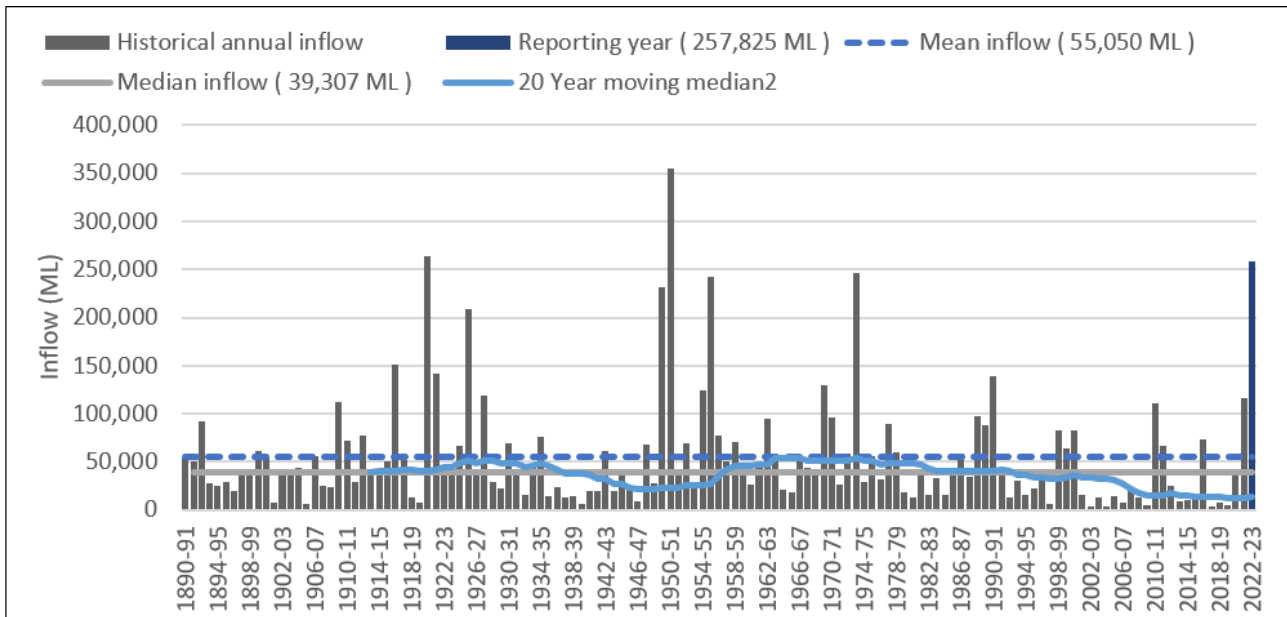
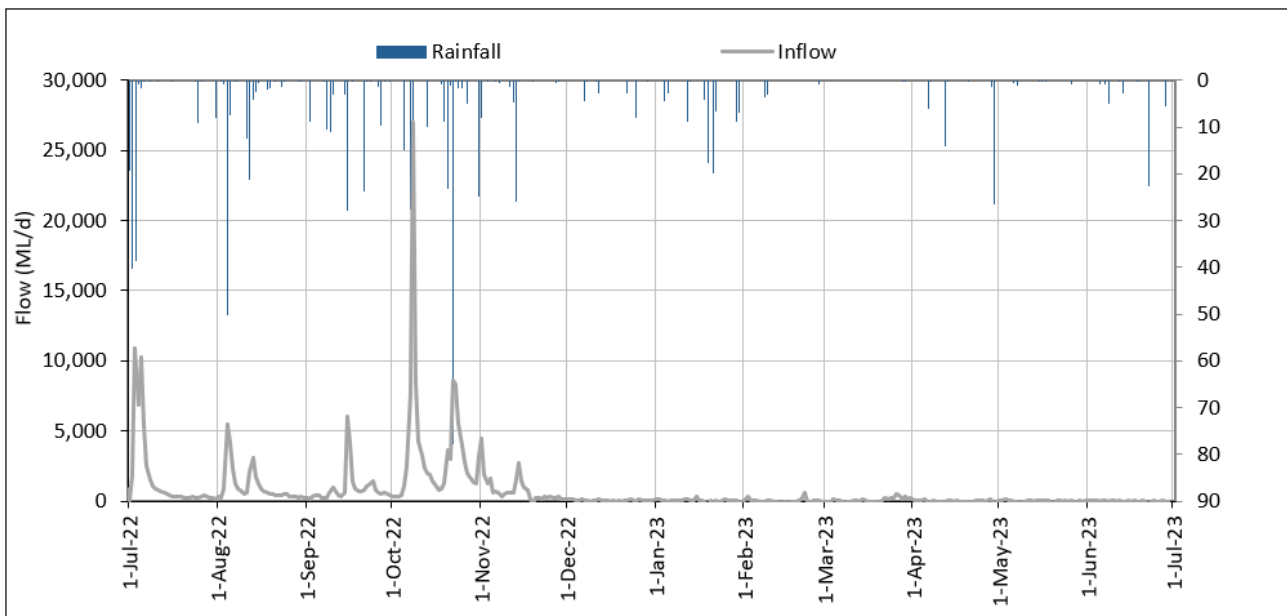


Figure 14: Daily inflows and rainfall at Windamere Dam



Storage volume

Windamere storage volume:

- commenced the reporting period at 219,589 megalitres or 60% of full supply capacity (
- Figure 15)
- ended the reporting period at 358,499 megalitres or 97% of full supply, an increase of 37% for the water year
- had a maximum volume during the reporting period of 379,847 megalitres or 103% of full supply, occurring on 24 October 2022.

Figure 15: Windamere Dam volume and percentage full

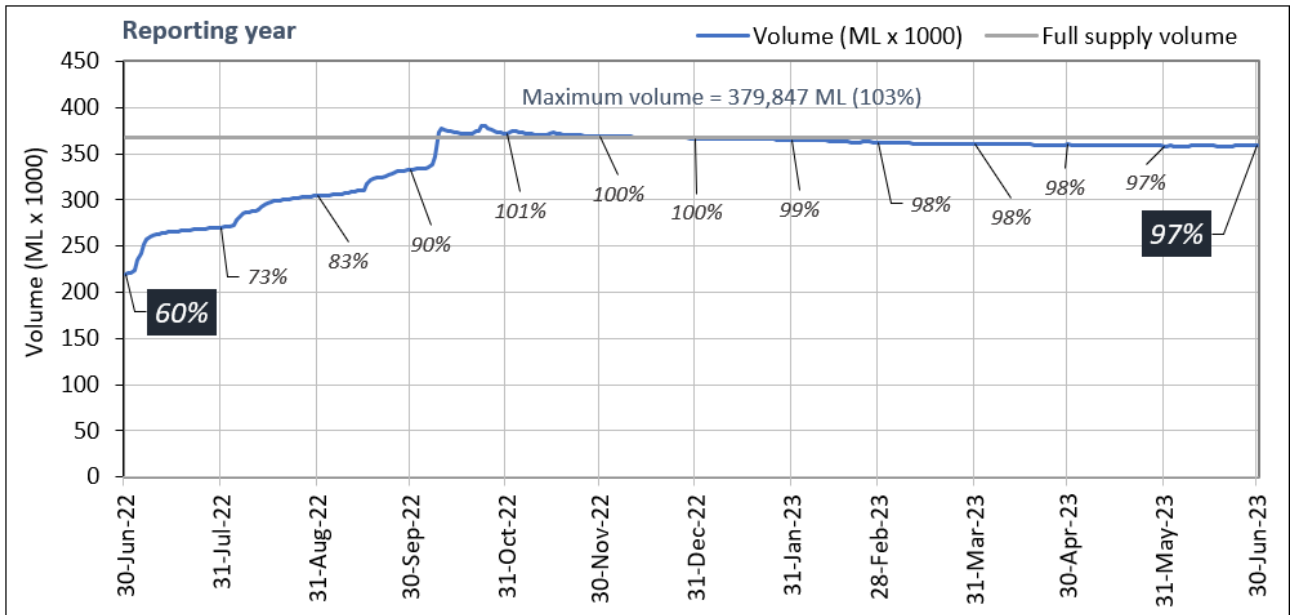
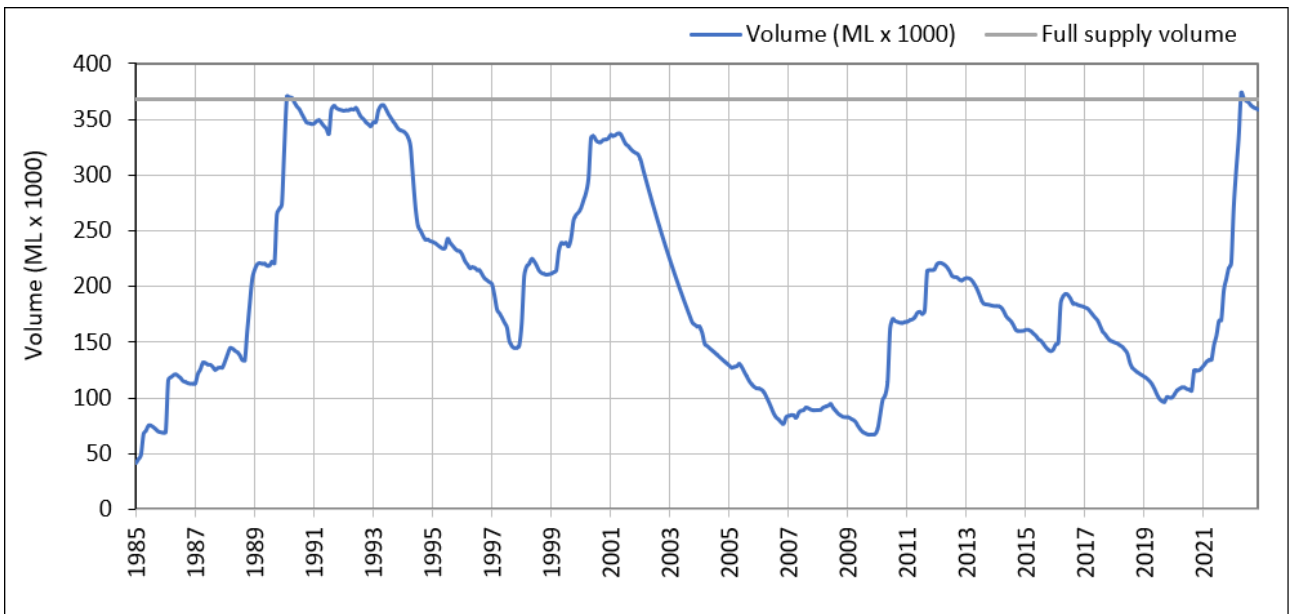


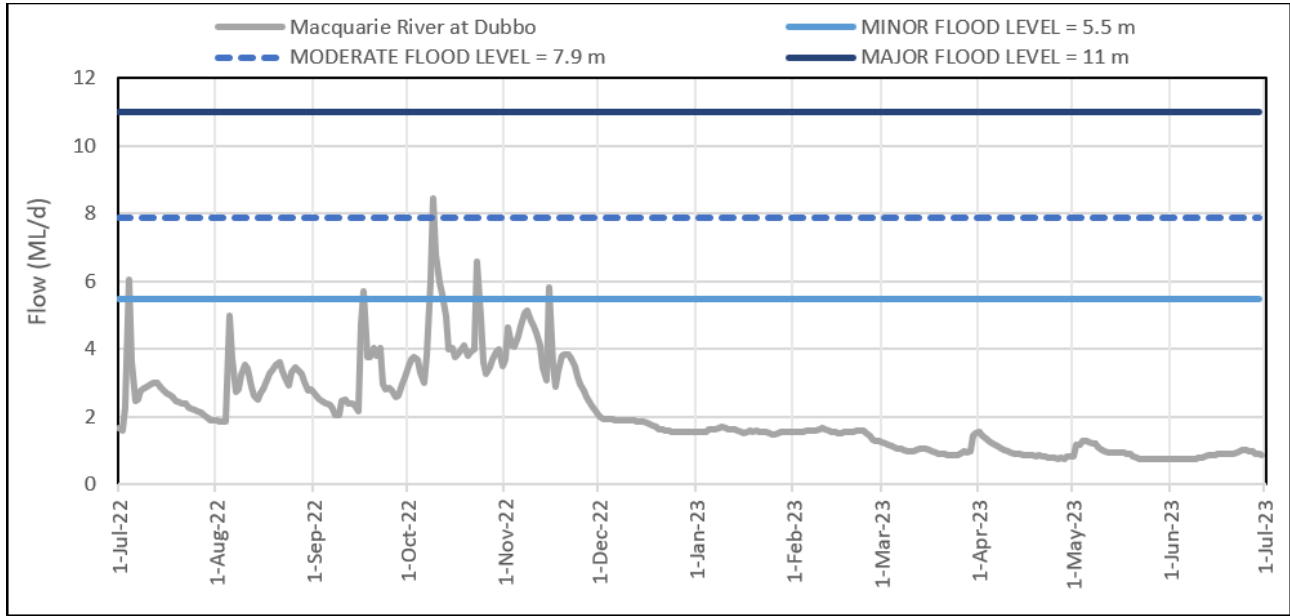
Figure 16: Windamere Dam historical storage volumes



Major high flow events

There was one moderate high flow event in Macquarie River at Dubbo in 2022-23 with the river height reaching the moderate flood level in early October 2022 (Figure 17). The river level at Dubbo reached above minor flood levels 4 times between late July 2022 and mid November 2022. From December 2022 the river remained below 2 metres for the remainder of the reporting period.

Figure 17: 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 or alternatively until a replacement plan is gazetted. The water sharing plan was produced to meet the water management principles outlined in the *NSW 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
Floodplain Harvesting	5 ML/Share	5 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 (Figure 1).

Extreme events stage and temporary water restrictions (Cudgegong)

The NSW Extreme Events Policy was released in October 2018 and update in August 2023 include drought measures with drought stages. The policy provides 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.

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

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: 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

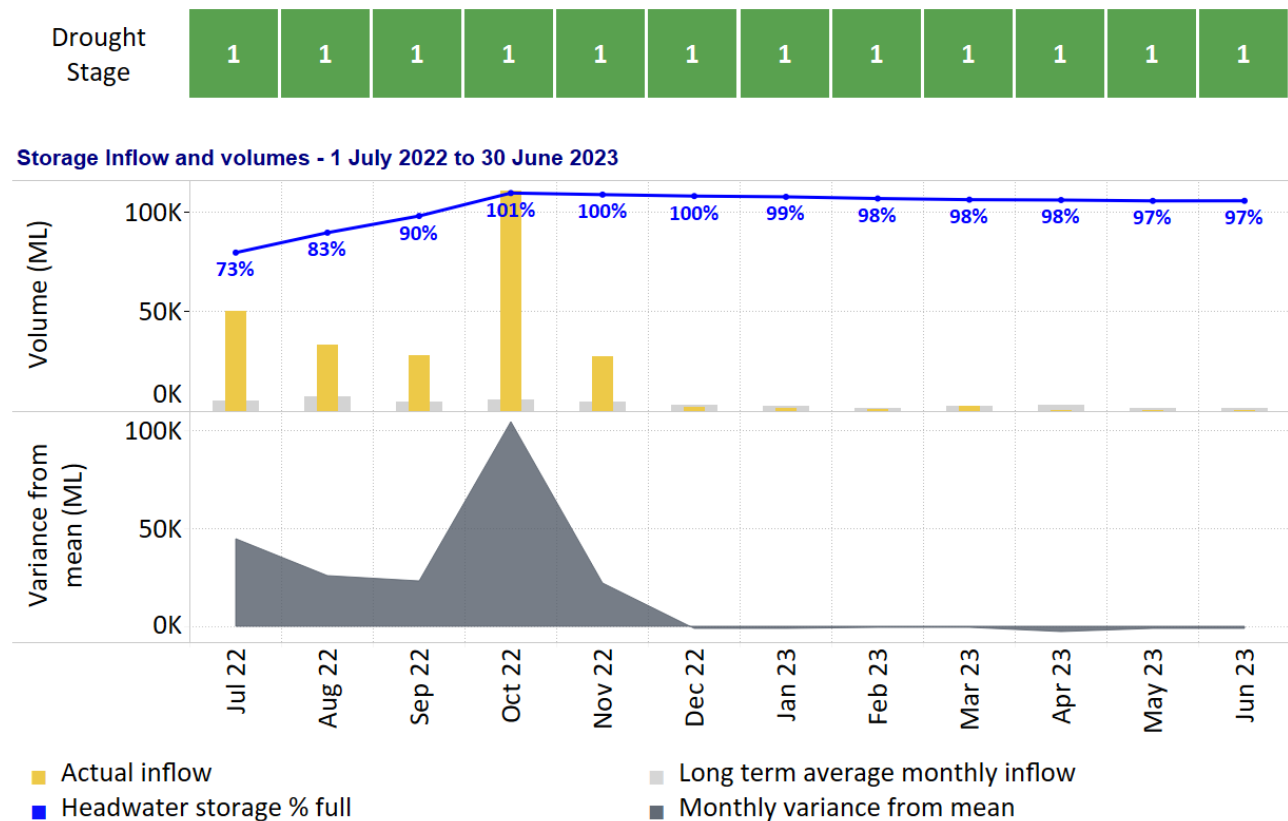
Temporary water restrictions for the reporting period

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

Extreme events stage

- The Cudgegong Regulated River Water Source was in stage 1 (normal management) for the entire reporting period (Figure 18). Windamere Dam started at 60% of capacity (73% by end of July 2022) and with above average inflows from July 2022 to November 2022 Windamere Dam spilled in October 2022 and finished the year at 97% of capacity.

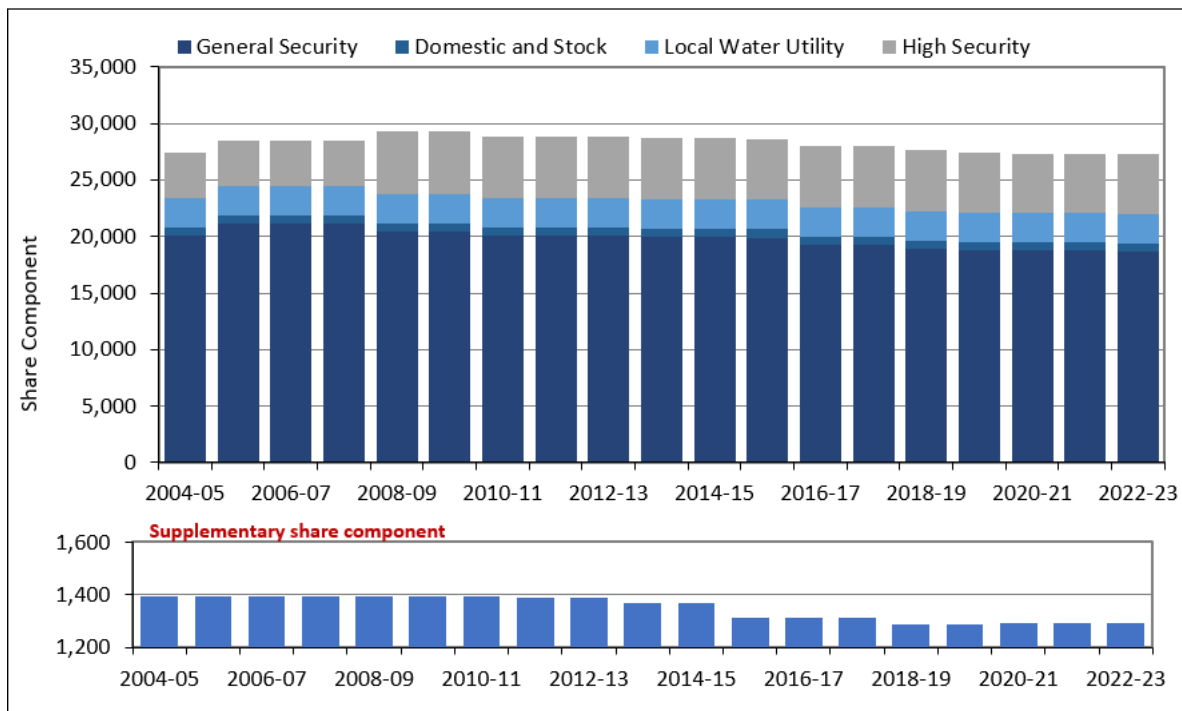
Figure 18: Drought stage for the reporting period referenced with monthly headwater storage inflow and long-term monthly inflow mean (Windamere Storage)



Access rights

- General Security shares decreased by 101 shares in the reporting period. These shares were moved to the Macquarie (Figure 19).
- Domestic and Stock shares decreased by 8 shares in the reporting period due to cancelled licences.
- The total issued shares at the end of the reporting period was 28,529 including 1,290 shares of supplementary access licences.

Figure 19: Cudgegong share component since the commencement of the water sharing plan



Allocation account summary

A summary illustration of the accounting for General Security and High Security access licence categories in the Cudgegong is provide in Figure 20 and

Figure 21 respectively. Detailed information on the water accounts for all categories of licence issued are provided in Note 1 of this report.

Figure 20: Annual water account summary Cudgegong General Security

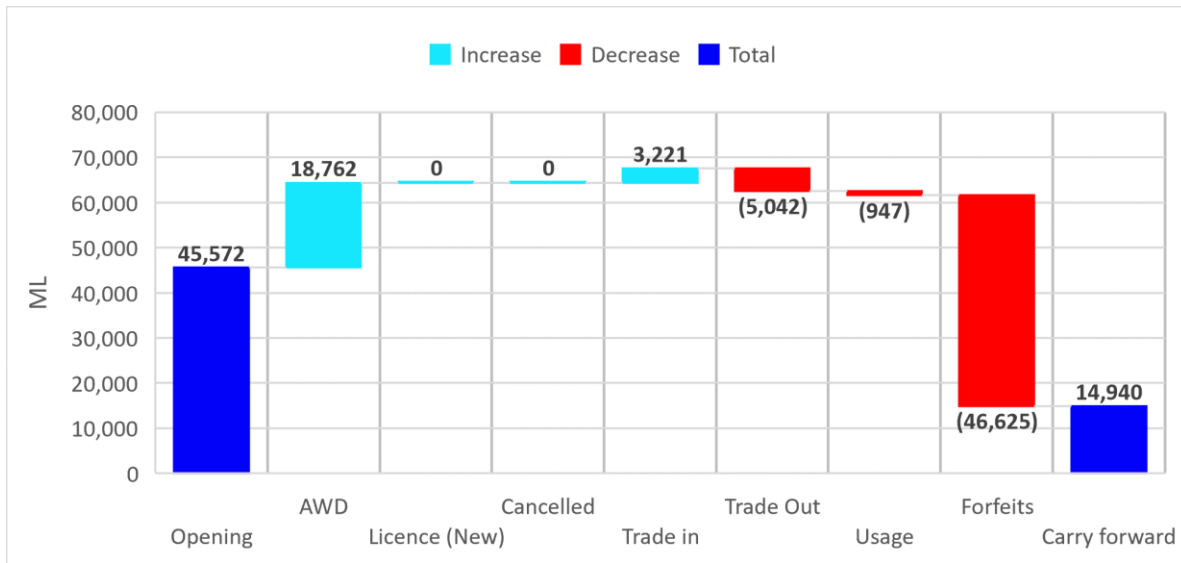
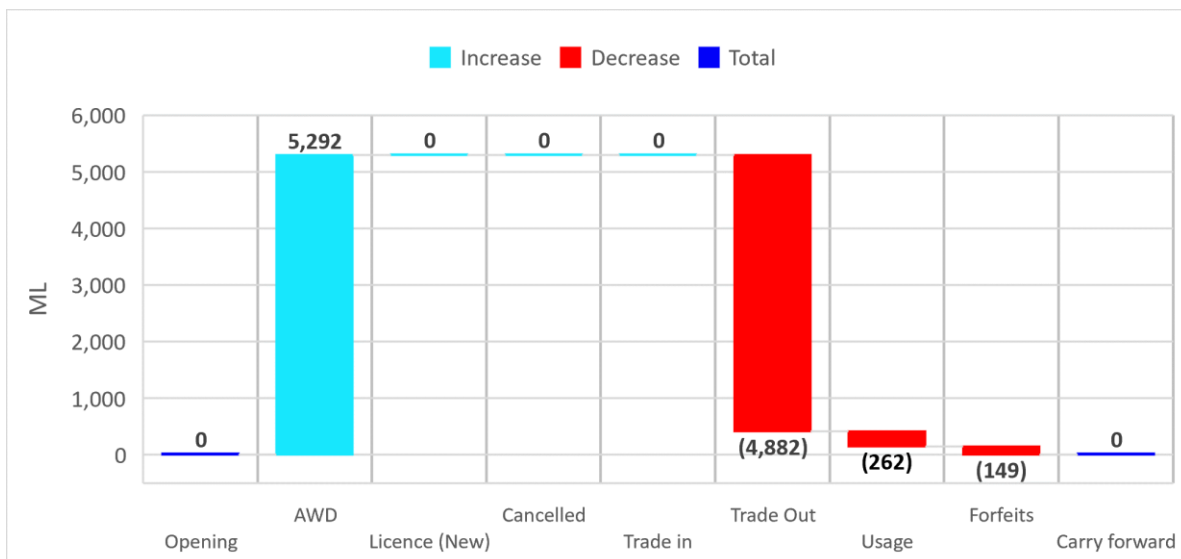


Figure 21: Annual water account summary Cudgegong High Security (includes sub-categories)



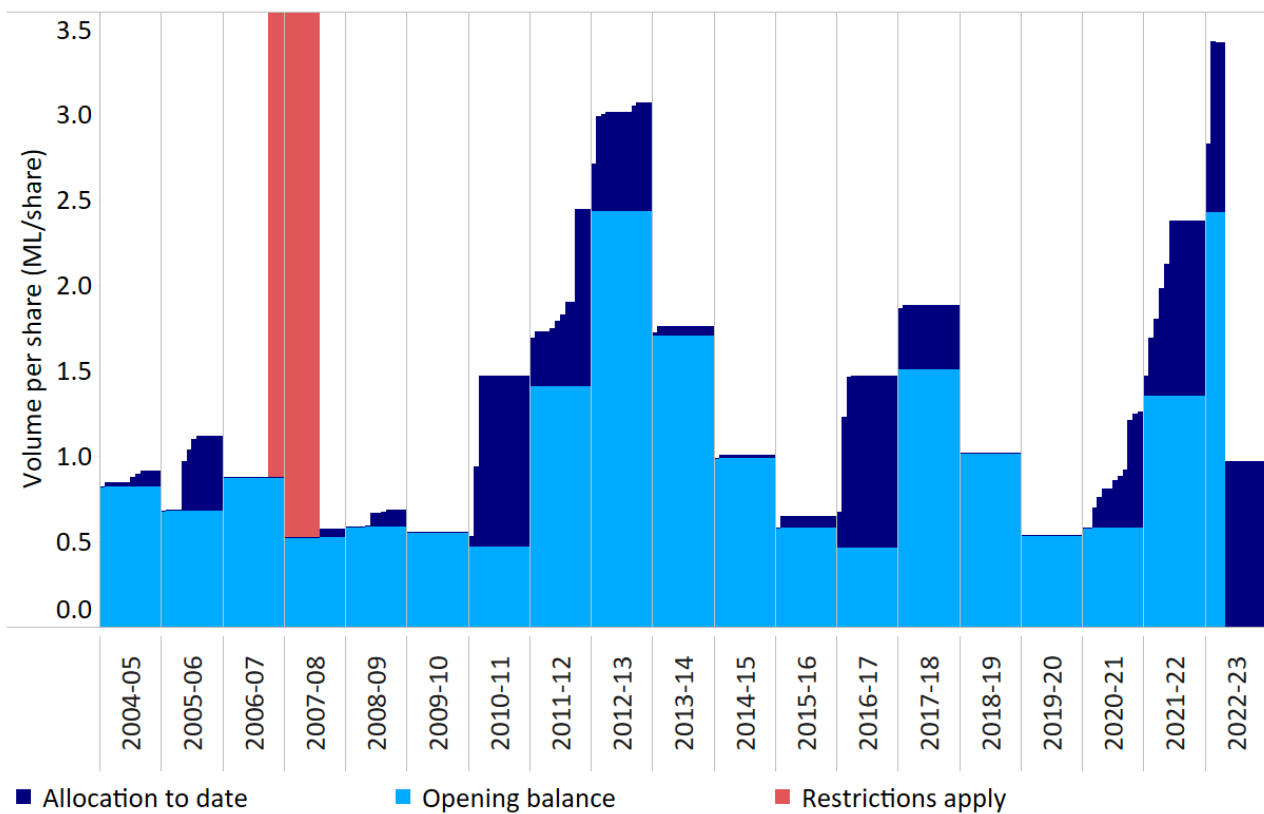
Water availability

- The opening available water determination (AWD) for domestic and stock (including subcategories and local water utility) was the maximum permitted allocation of 100%.
- The opening AWD for the specific purpose high security licence sub-categories of ‘research’ was the maximum permitted allocation of 100%.
- The opening AWD for high security was 1 megalitres per share being the maximum permitted allocations.
- General security access licences had a carryover of 45,572 megalitres into the reporting period, equating to 244% of issued share component for this category (in the Cudgegong).
- General security access licence received an opening available water determination of 0.4 megalitres per share, with a further announcement being made on 10 August 2022 of 0.6 megalitres per share bringing the cumulative total to 1 megalitres per share. A spill allocation reset

on 1 September 2022 had minimal impact on accounts as all accounts were already full. Carryover and AWD allocation as a proportion of share for the reporting period and historical water sharing plan management are illustrated in Figure 22.

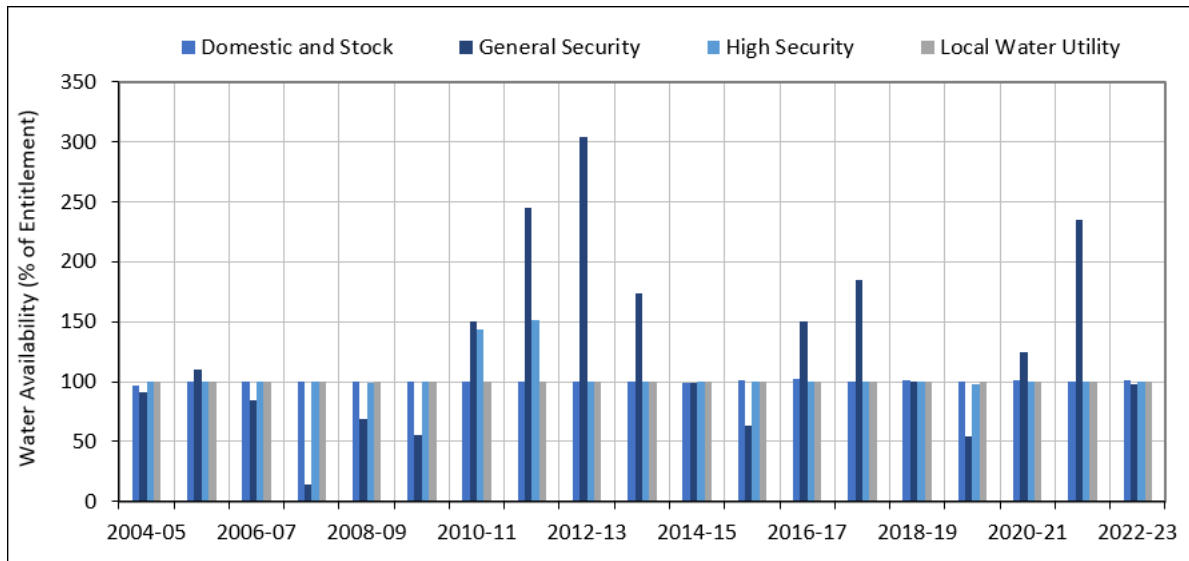
- Supplementary licence holder received an AWD of 1 megalitre per share. Each year of the plan this licence category has been granted an available water determination of 1 megalitre per share, however access to this water is contingent on high flow events available. Actual usage information against this category of licence is available in Note 20 of this GPWAR.
- Total water availability⁴ was the highest since 2012–13 (Figure 23)
- Spill allocation adjustments were applicable in the reporting period. Storage spill allocations adjustments occurred in 2010–11, 2011–12, 2016–17, 2021–22 and 2022-23 (full reset of allocation accounts to 1 megalitre per share). Refer to Note 5 (detailed item notes) for more information on this accounting process.

Figure 22: Incremental available water determination and carryover volumes for Cudgegong General Security as a proportion of share component



⁴ Supplementary licences have been excluded. 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.

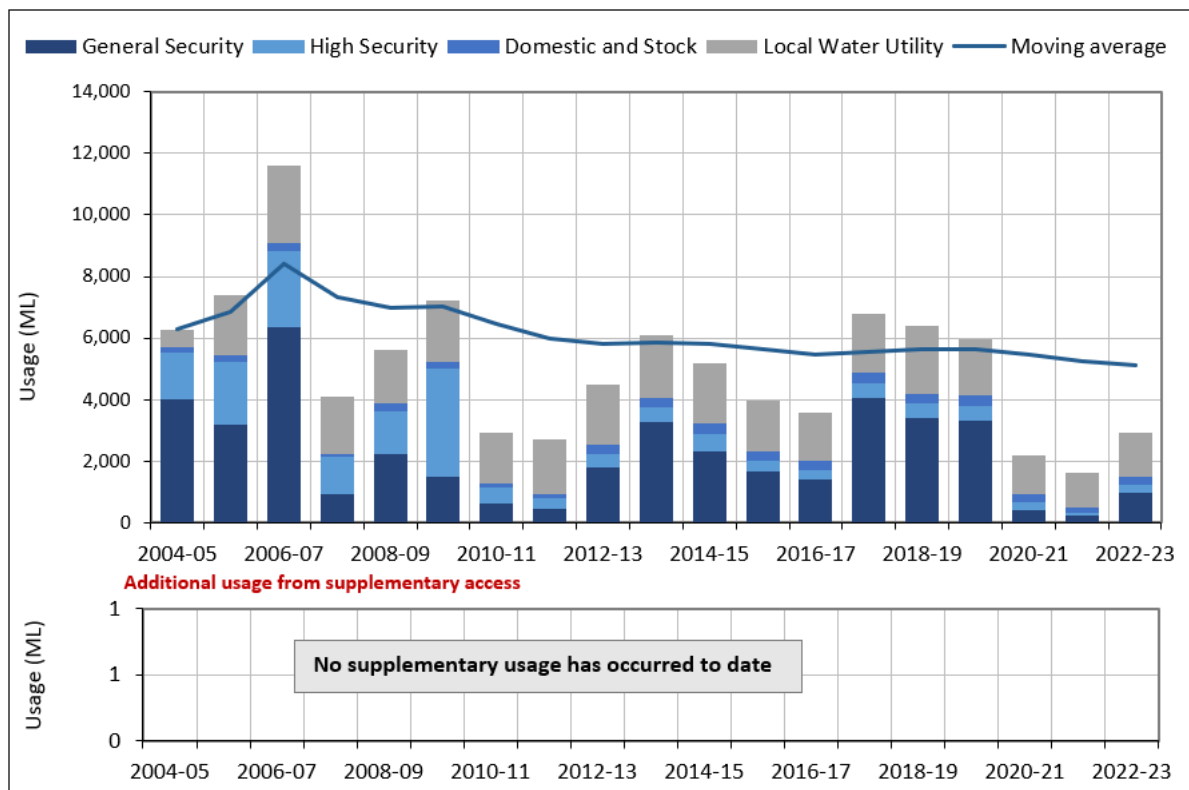
Figure 23: Cudgegong account water availability (carryover + available water determinations)



Account usage

- Water usage in the Cudgegong was 79% greater than previous water year with 2,900 megalitres debited against licence accounts (Figure 24).
- No supplementary usage has occurred in the Cudgegong under water sharing plan management conditions (commencing 2004-05).
- The average usage (since 2004-05) decreased moderately to 5,106 megalitres.

Figure 24: Cudgegong annual usage against moving average usage



Utilisation and inactive share

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.

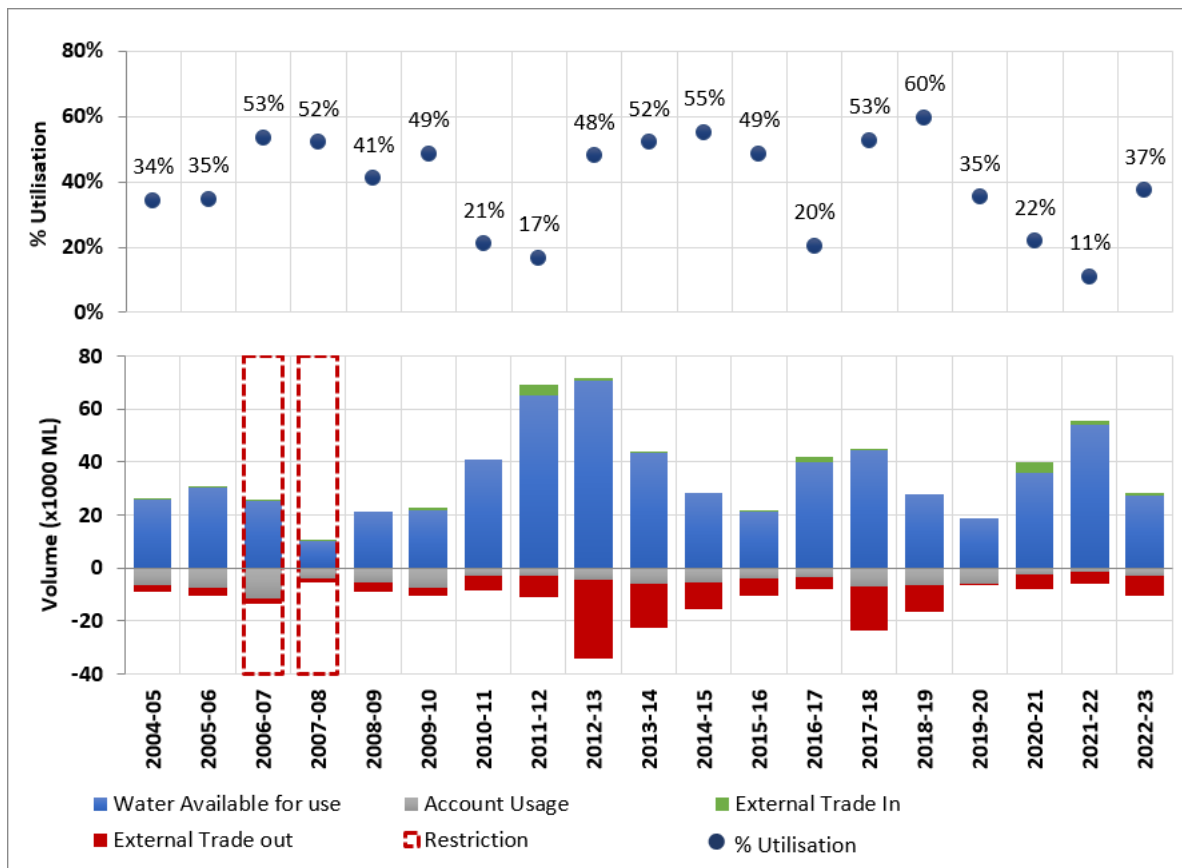
During the reporting period:

- 42% of general security share component was inactive, which is an increase of 35% on the prior reporting period (Table 5).
- Considering all categories of access licences issued 30% of share component was inactive, an increase of 24% on the prior reporting period.
- Utilisation of available water from regulated supplies (excluding supplementary) increased to 37% from 11% (Figure 25).

Table 5: Inactive licence summary Cudgegong

Licence category	Inactive licences (number) 2022–23	Inactive share component 2022–23	Inactive share component % of total 2022–23	Inactive share component % of total prior year 2021–22
Domestic and Stock	29	328	51%	52%
Domestic and Stock [Stock]	3	15	100%	100%
Domestic and Stock [Domestic]	9	23	100%	100%
Local water utility	0	0	0%	0%
Regulated river (General Security)	85	7,788	42%	7%
Regulated river (High Security)	5	102	2%	1%
Regulated river (High Security) [research]	1	1	100%	100%
Total regulated supply	132	8,257	30%	6%
Supplementary water	81	593	46%	54%

Figure 25: Cudgegong percentage utilisation (water availability plus trade in from external water source against account usage and trade out to external water source)

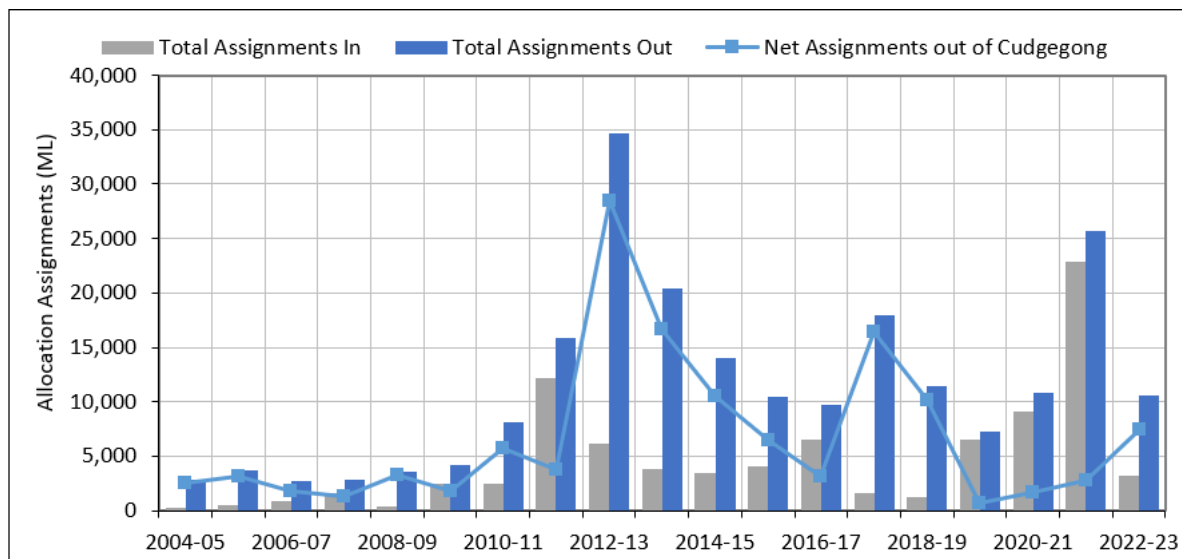


Temporary trading (allocation assignments)

Temporary trading is implemented in this water source under the clause 71T (assignment of water allocations between access licences) of the NSW *Water Management Act 2000*.

- Trade activity by volume was 59% lower than the previous year (Figure 26).
- 3,221 megalitres was traded into Cudgegong access licences and 10,621 megalitres was traded out of access licences, a net assignment out of 7,400 megalitres (to the Macquarie).

Figure 26: Cudgegong allocation assignment (temporary trading) summary



Commercial temporary trading statistics (assignment of allocation)

- Considering commercial temporary trading activity⁵, the average price of water decreased to \$119 per megalitre for the reporting period, a 130% increase on the prior year (Figure 27).
- The maximum price was \$170 per megalitre.
- In total, 38 commercial trades were processed for a total trade value of \$474,968, a 39% decrease on the prior year.

Figure 27: Cudgegong allocation assignments—trade price statistics

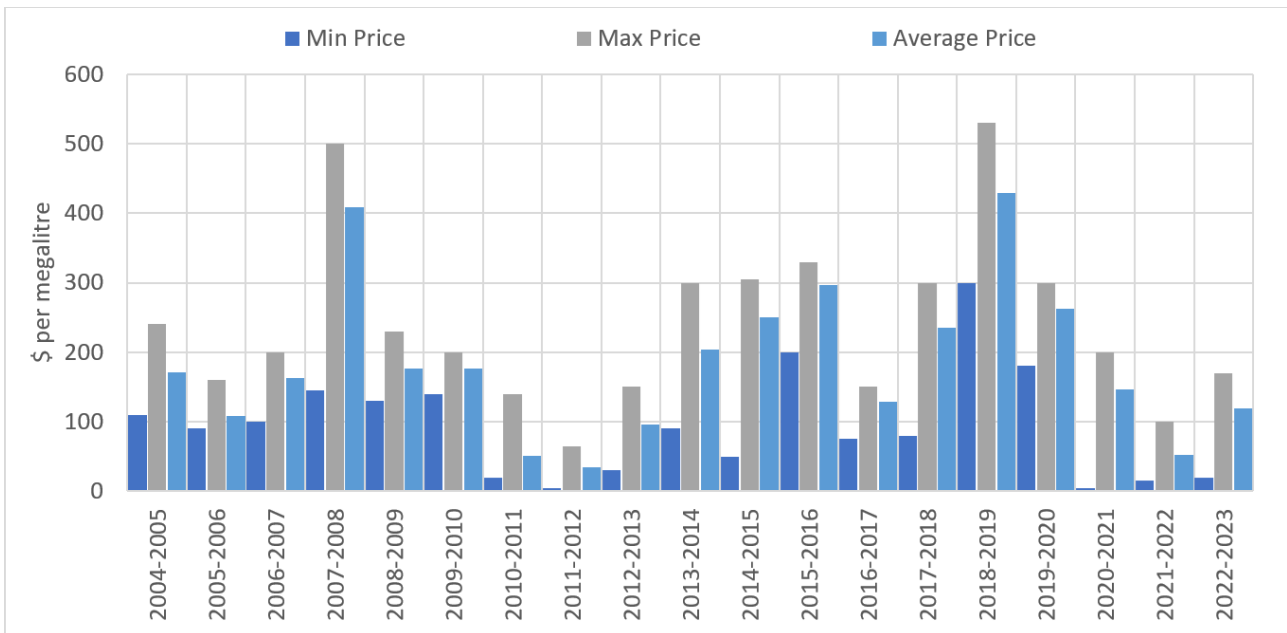
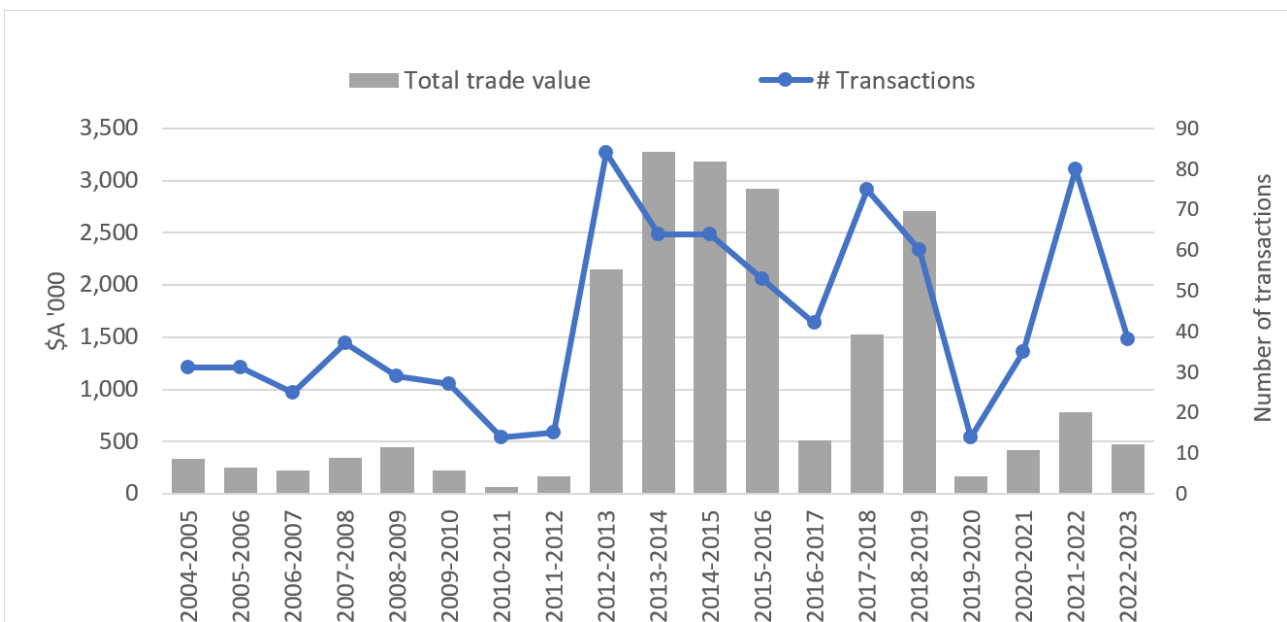


Figure 28: Cudgegong allocation assignments—trade value statistics



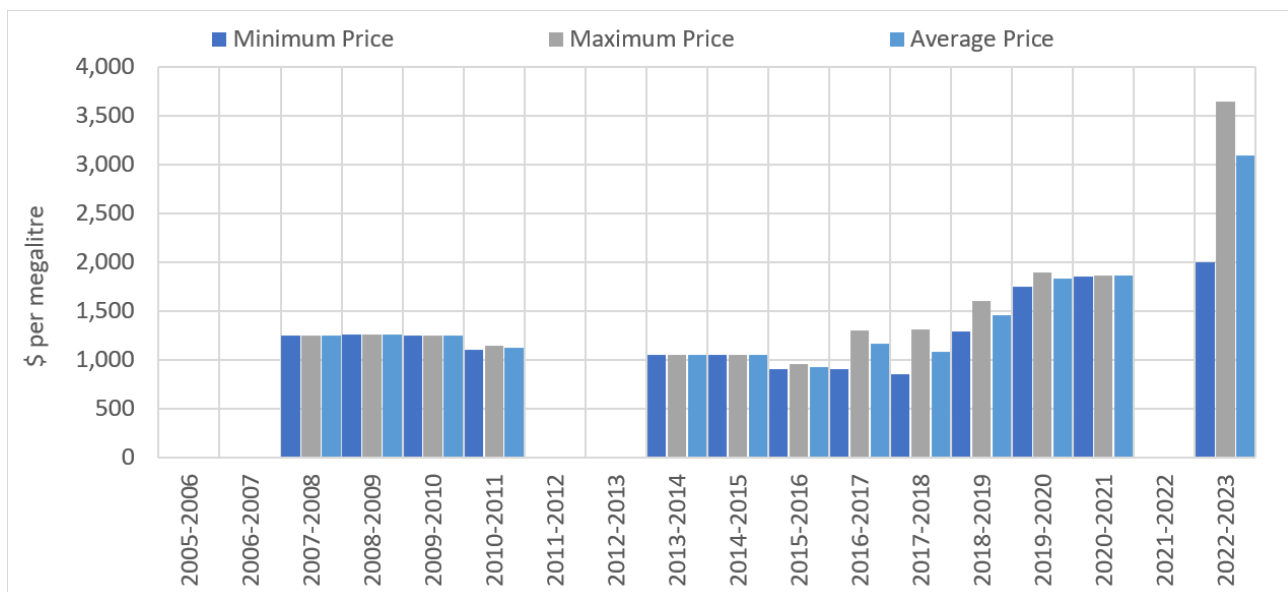
⁵ Allocation assignments with a trade price greater than \$1 per megalitre

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 access licences (clause 71Q) and transfer of access licences (clause 71M). With consideration to these dealing types from a commercial perspective⁶:

- broadly the market is relatively inactive in the Cudgegong, with 71Q dealing never exceeding 5 transactions in any water year
- 3 commercial general security 71Q transactions were processed in the reporting period (Figure 30)
- no commercial high security 71Q transaction were processed (Figure 32)
- a total of 4 (71M) commercial transactions⁷ were processed in the reporting period which moved a total of 1,859 shares to a new holder (Figure 33).

Figure 29: Commercial share assignment price statistics, General Security, Cudgegong



⁶ Considers only those transactions associated with a consideration greater than \$1 per share

⁷ Considers all categories of licence

Figure 30: Commercial share assignment value statistics, General Security, Cudgegong

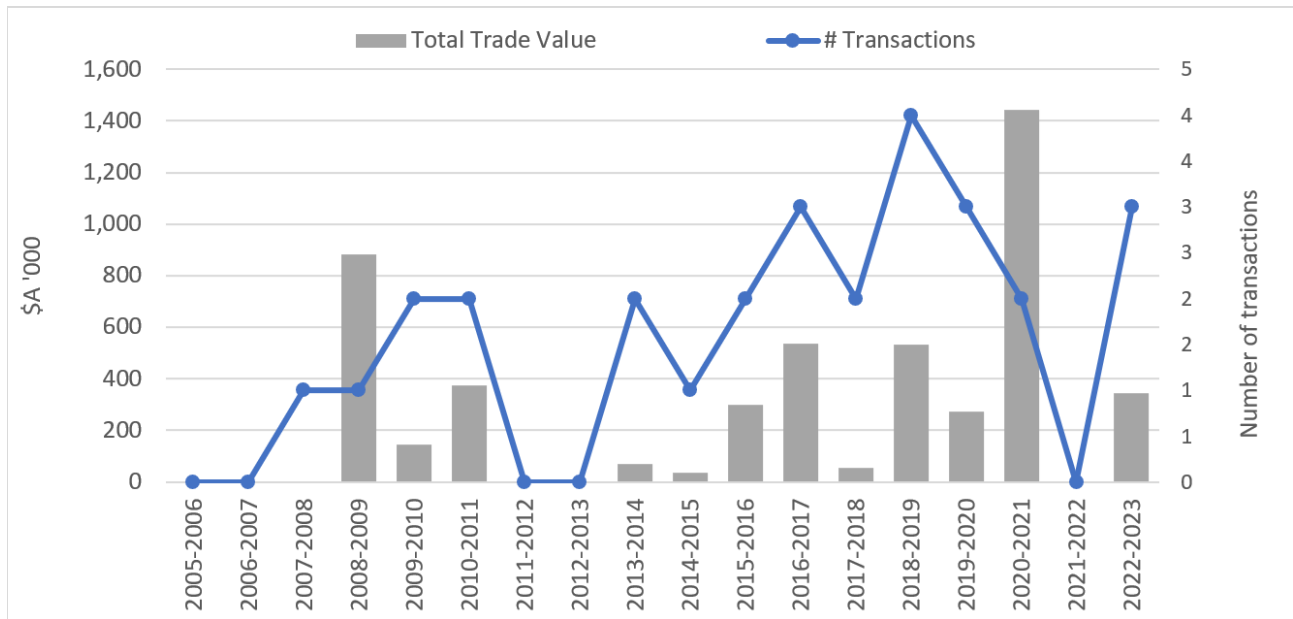


Figure 31: Commercial share assignment price statistics, High Security, Cudgegong



Figure 32: Commercial share assignment value statistics, High Security, Cudgegong

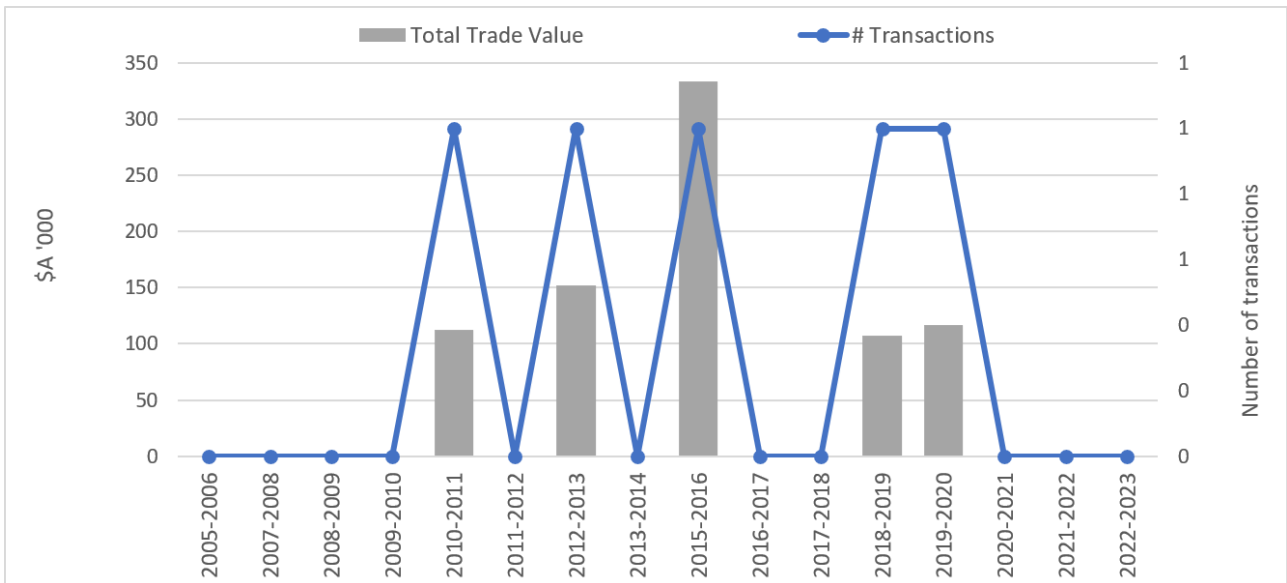
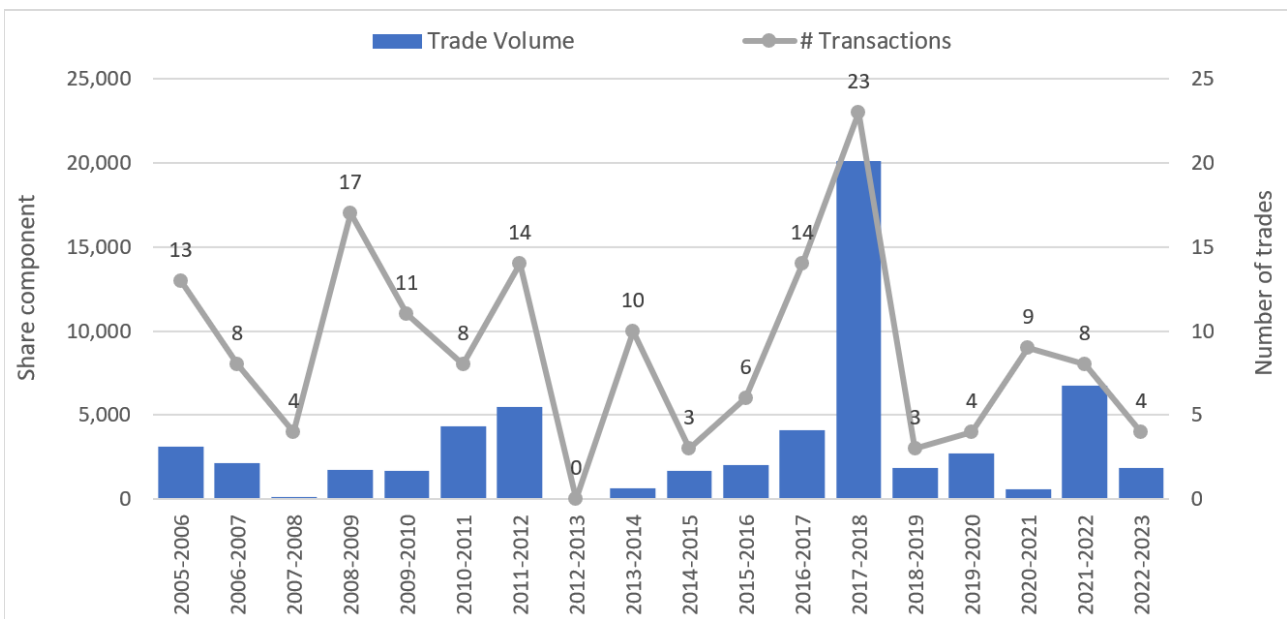


Figure 33: Commercial change of holder transactions—Cudgegong



Macquarie details

The Macquarie is defined as that part of the water source downstream of the upper limit of Burrendong storage (Figure 1).

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.

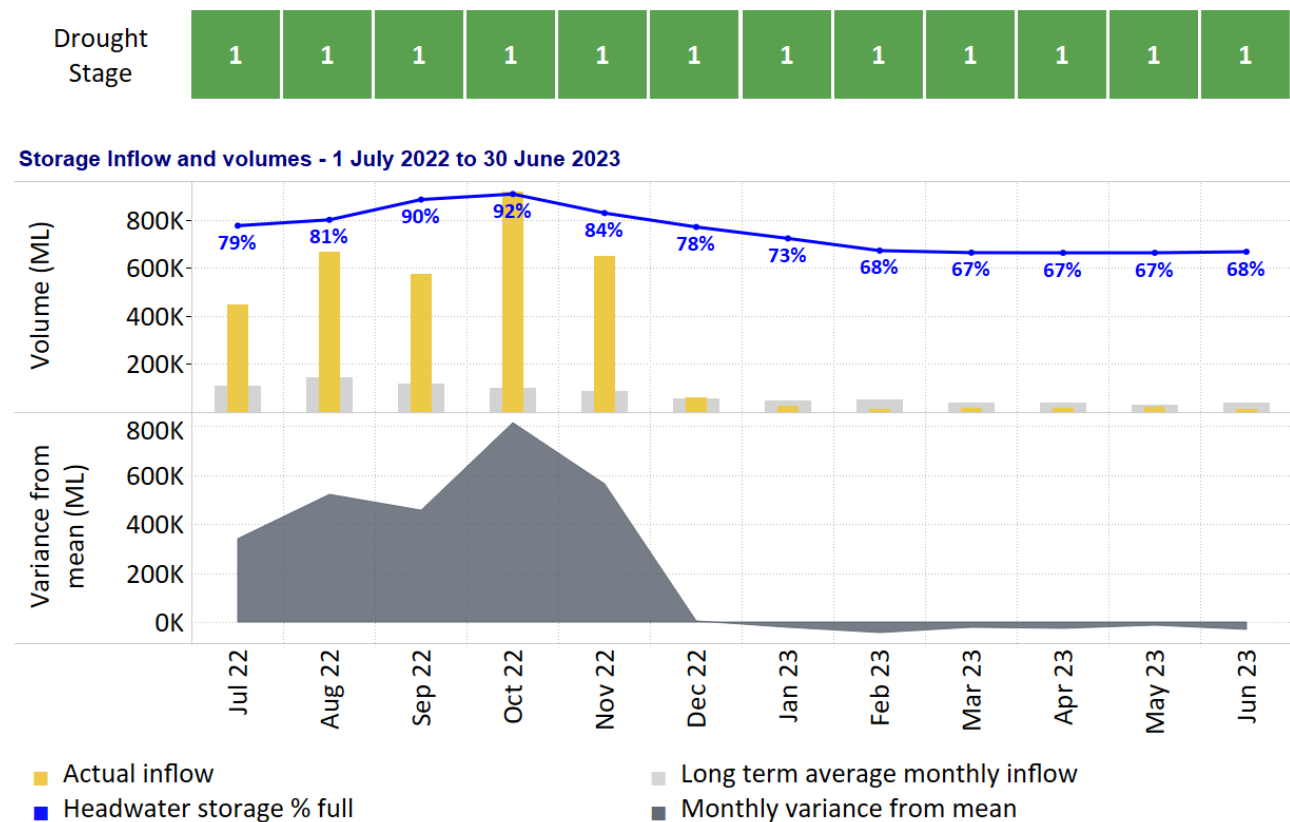
Temporary water restrictions for the reporting period

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

Extreme events stage

- The Macquarie Regulated River Water Source was in stage 1 (normal management) for the entire reporting period (Figure 34). Burrendong Dam started the year at 76% of capacity (79% at end of July) and with above average inflows from July 2022 to November 2022 the dam spilled in November and finished the year at 68% of capacity.

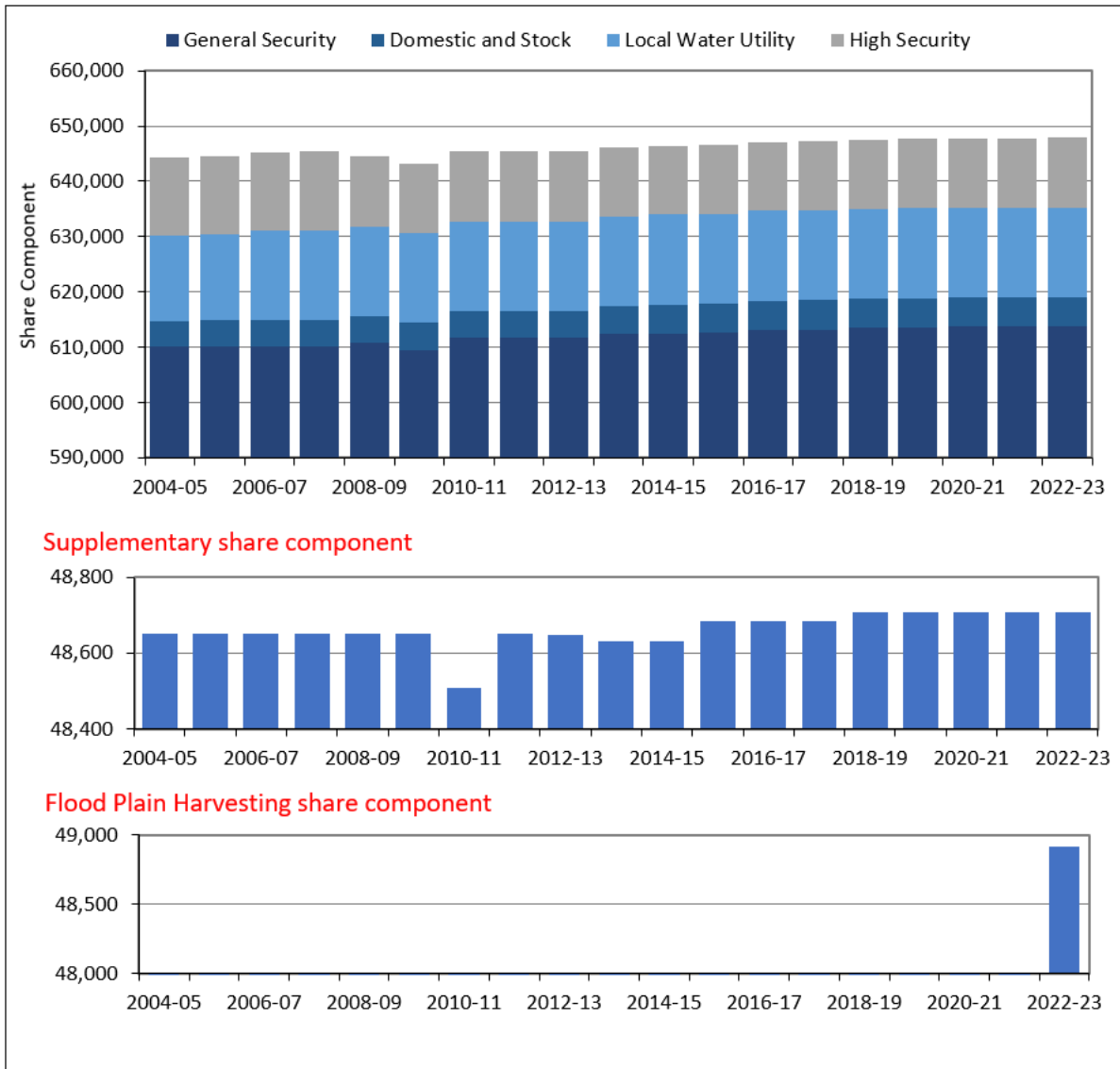
Figure 34: Drought stage for the reporting period referenced with monthly storage inflow for the reporting period and long-term monthly inflow mean



Access rights

- Share component of general security in the Macquarie increased by 101 shares in the reporting period traded in from the Cudgegong (**Error! Reference source not found.**).
- Domestic and Stock shares decreased by 8 shares due to the cancellation of a licence.
- The total issued share at the end of the reporting period was 696,582 including 48,708 shares of supplementary access.
- Floodplain harvesting licences totalling 48,911 shares were issued on 29 July 2022.

Figure 35: Macquarie share components end of reporting period



Allocation account summary

A summary illustration of the accounting for Macquarie General Security and High Security access licence categories is provide in Figure 36 and Figure 37 respectively. Detailed information on the water accounts for all categories of licence issued are provided in Note 1 of this report.

Figure 36: Annual water account summary Macquarie General Security

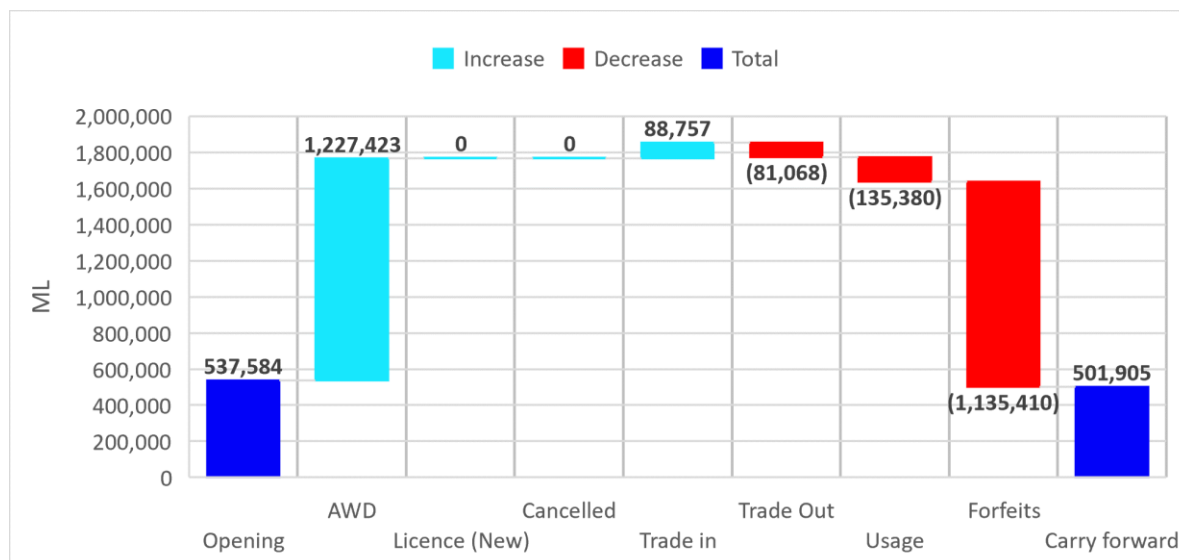
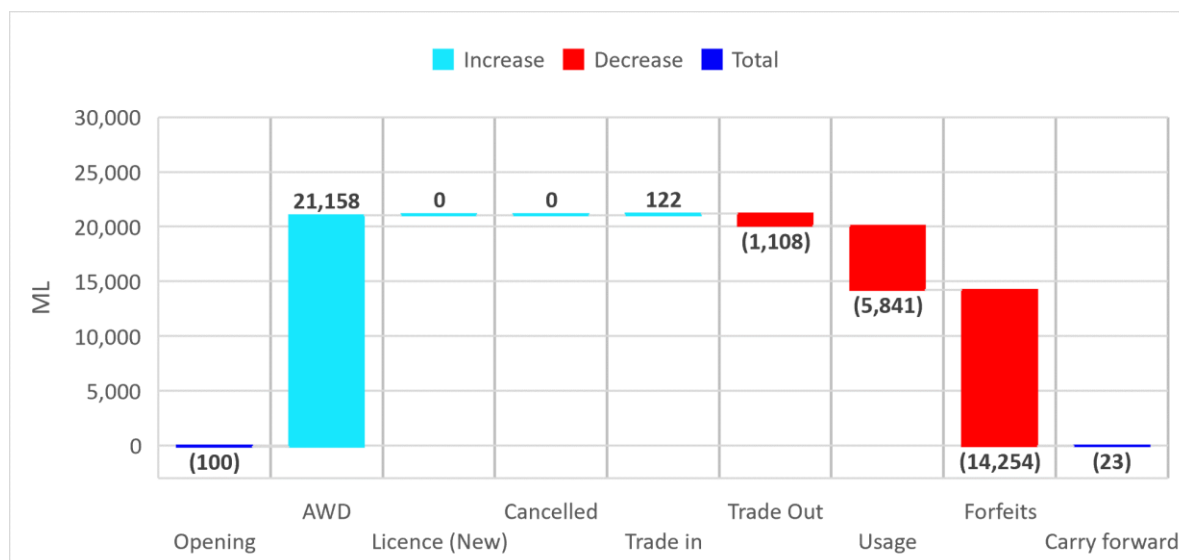


Figure 37: Annual water account summary Macquarie High Security (includes sub-categories)



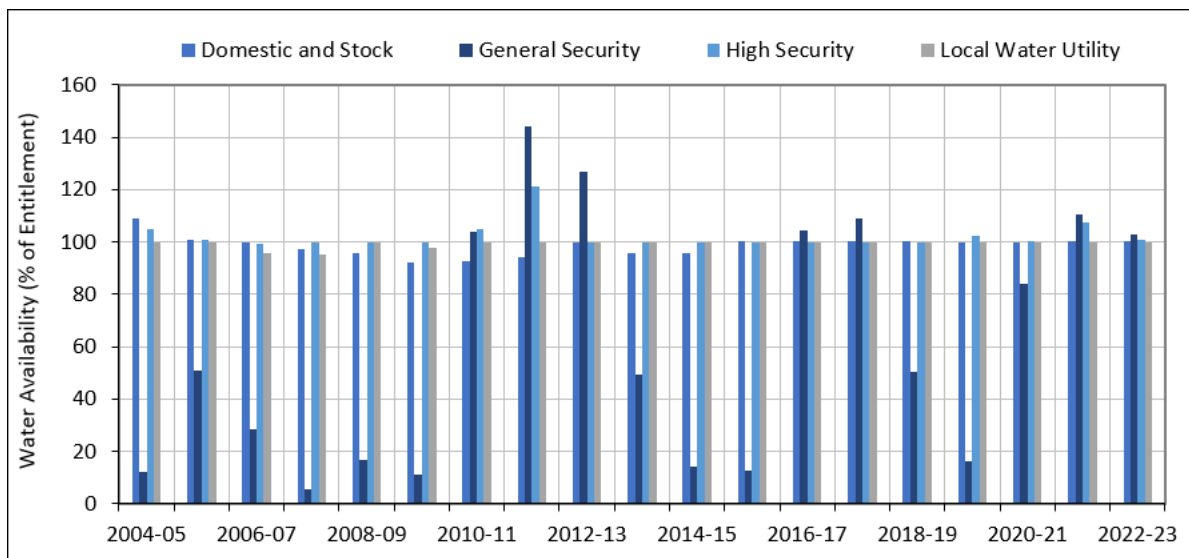
Water availability

- The opening available water determination (AWD) for domestic and stock (including subcategories and local water utility) was 100% being the maximum permitted allocation.
- The opening AWD for the specific purpose High Security licence categories of ‘town water supply’ and ‘research’ was 100% being the maximum permitted allocation.
- The opening AWD for high security was 1 megalitres per share being the maximum permitted allocation. On 1 September 2022 accounts were emptied, following a storage spill, and an AWD of 1 ML/share announced.
- The first AWD for floodplain harvesting was 0.33 ML/Share issued on 1 March 2023.
- General security access licences had a carryover of 537,584 megalitres into the reporting period equating to 88% of issued share component for this category (in the Macquarie). Of the carryover water at the commencement of the water year all was available. As a result of Burrendong Dam

levels entering the flood zone all carryover water was spilled, in accordance with water sharing plan rules, by 1 September 2022.

- General security access licence received an opening available water determination of 0.4 megalitres per share with one further announcement being made reaching a cumulative total of 1.0 ML/share by 10 August 2022. On 1 September 2022 all accounts were emptied, following a storage spill, and an AWD of 1 ML/share was announced. Carryover and AWD allocation as a proportion of share for the reporting period and historical water sharing plan management are illustrated in Figure 38.
- Supplementary licence holder received an AWD of 1 megalitre per share. 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 being available. Actual usage information against this category of licence is available in note 20 of this GPWAR.

At the water source level 168 days of supplementary access was available in the reporting period. Historical and reporting period supplementary access periods are illustrated in



- Figure 40.
- By volume 77% of the 1,095,674 megalitres of tributary inflows to the Macquarie River downstream of Burrendong dam was contributed by the Bell River and Talbragar River (Figure 41).
- Total water availability⁸ was the highest since 2012–13 (**Error! Reference source not found.**).
- Spill allocation reset was applicable in the reporting period. Storage spill allocations resets occurred in 2010–11, 2011–12, 2016–17, 2021-22, 2022-23 (full reset of allocation accounts to 1 megalitre per share). Refer to Note 5 (detailed item notes) for more information on this accounting process.

⁸ Supplementary licences have been excluded. 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 38: Incremental available water determination and carryover volumes for Macquarie General Security as a proportion of share component

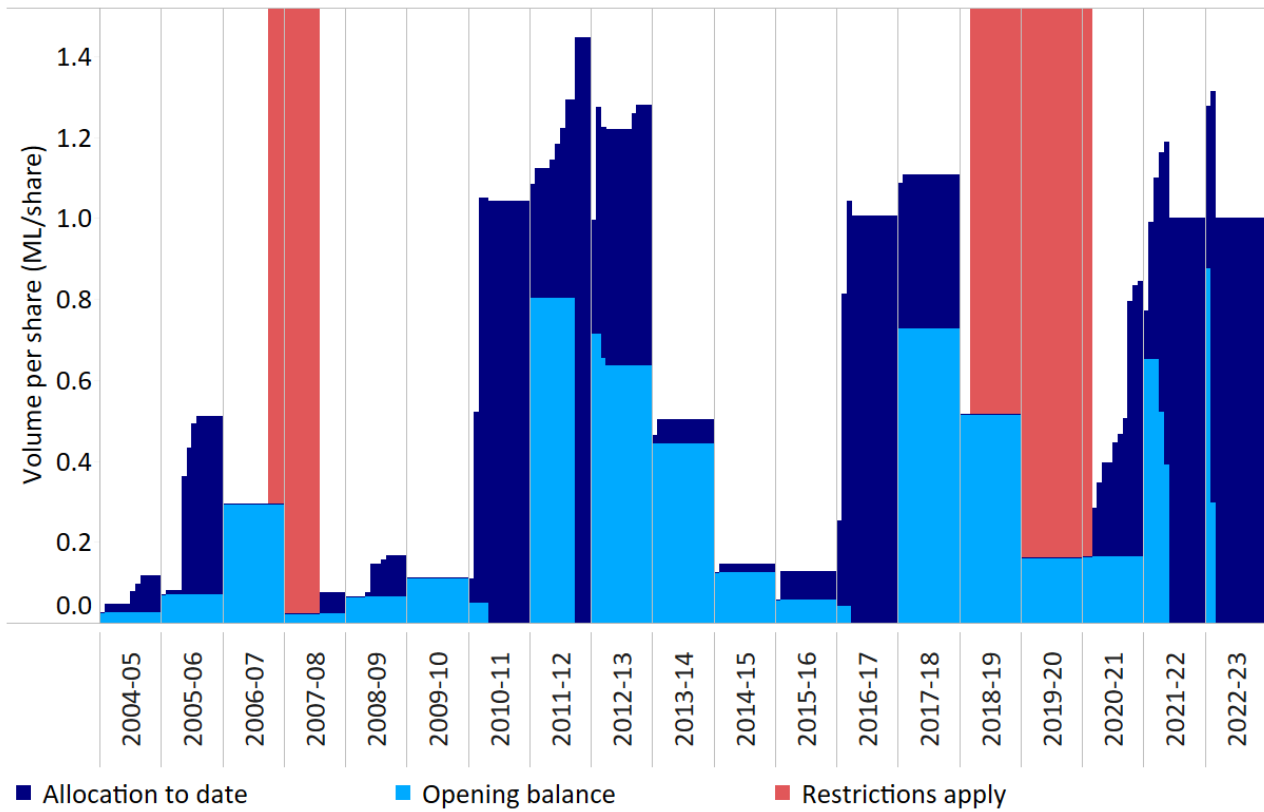


Figure 39: Macquarie account water availability (Carryover + available water determinations)

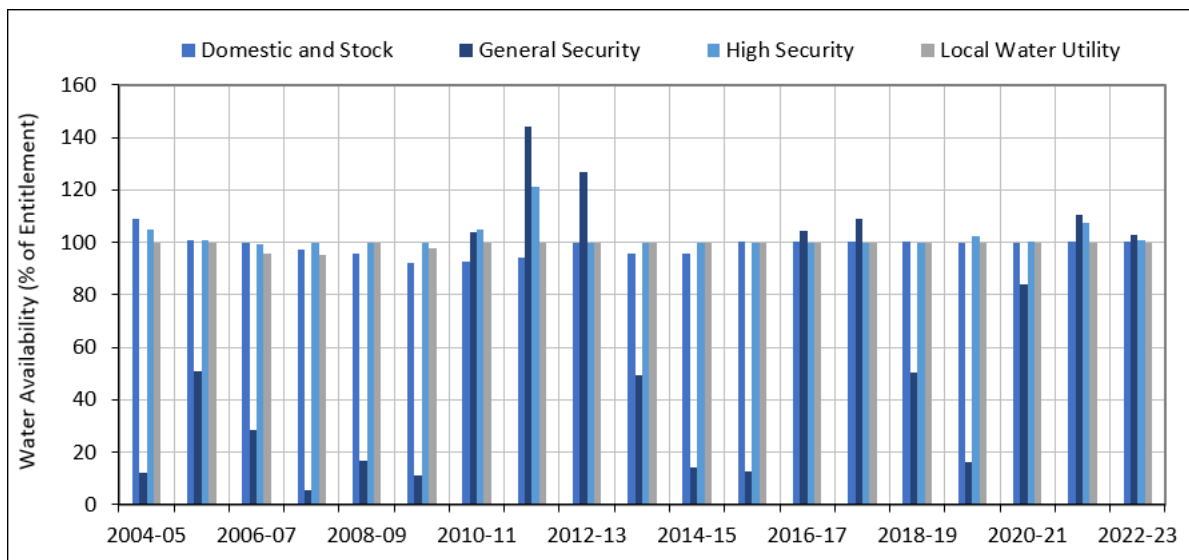


Figure 40: Supplementary event access

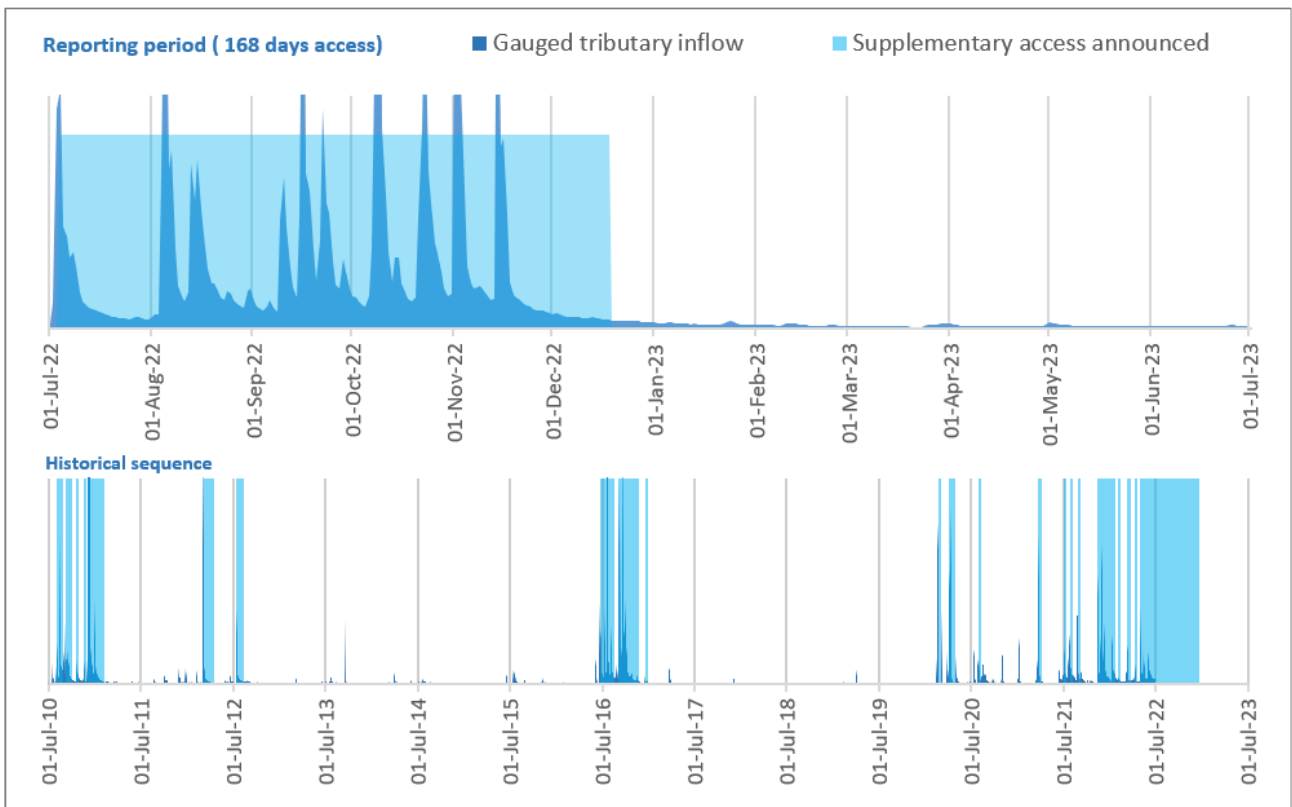
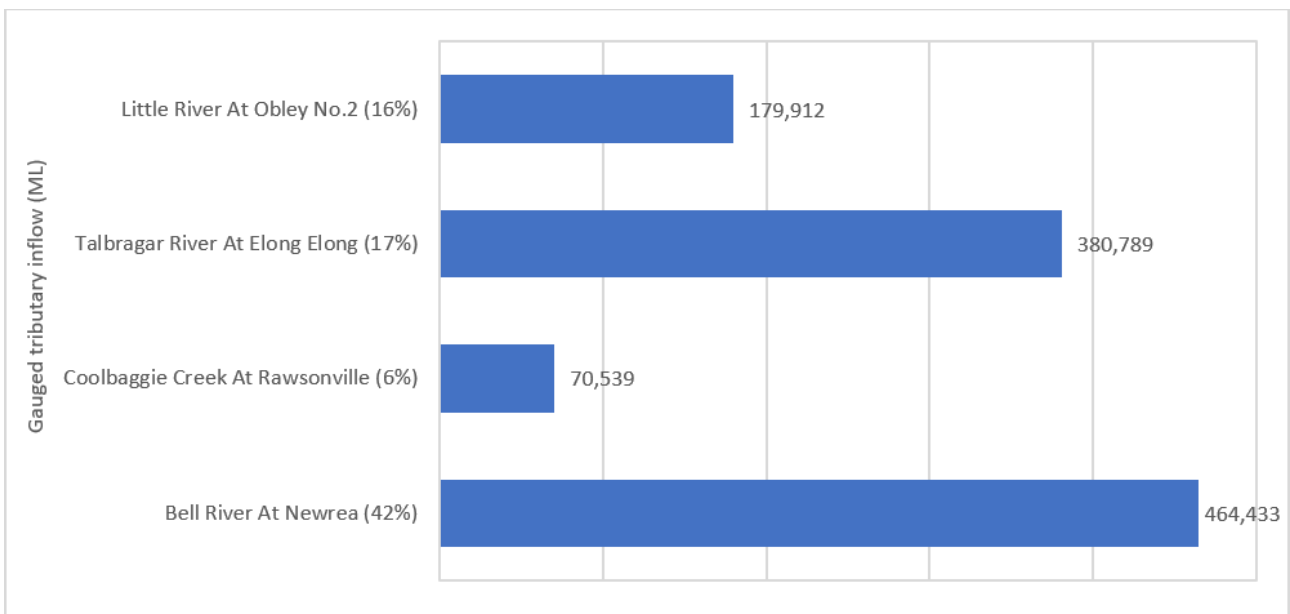


Figure 41: Measured tributary inflow contributions

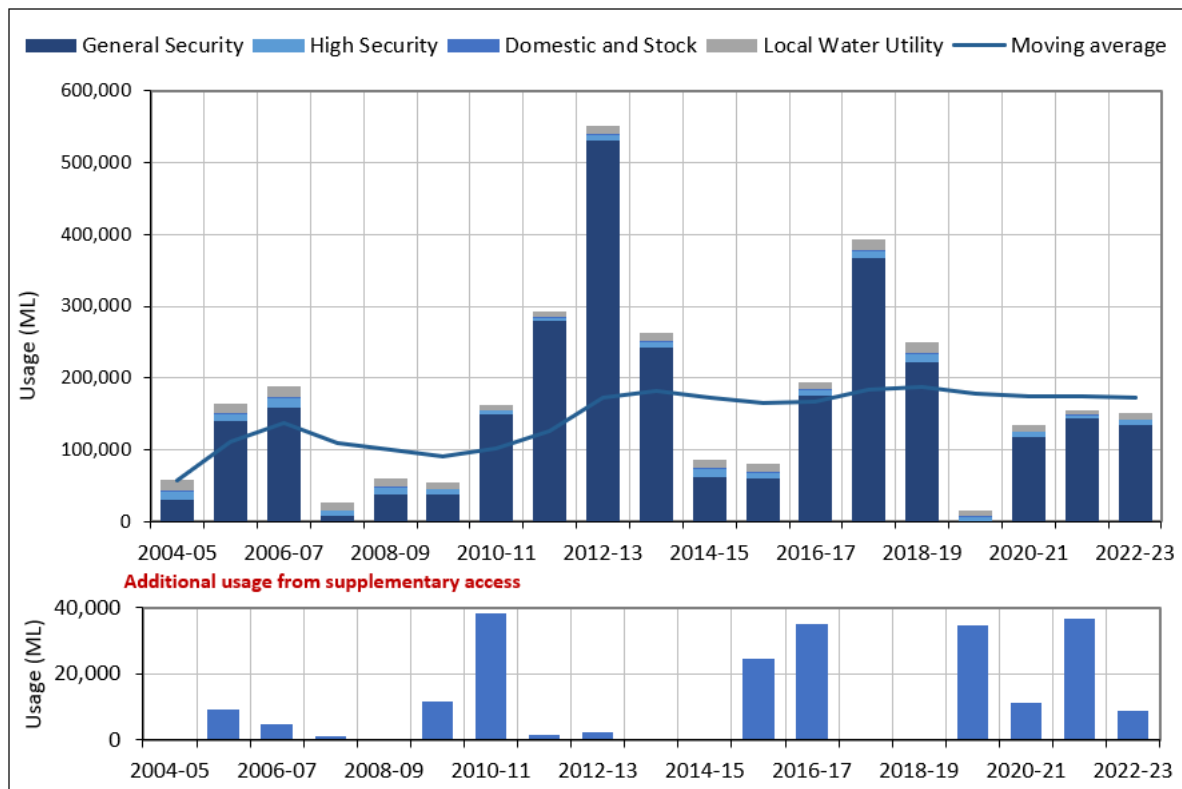


Account usage

- Water usage from regulated supply in the Macquarie remained steady relative to the previous reporting period, with 159,922 megalitres debited against accounts (Figure 42).
- Water usage from general security was 135,380 megalitres while supplementary usage totalled 8,864 megalitres being significantly less than the previous water year.

- Average annual usage (since 2004-05) decreased moderately to 172,562 megalitres (regulated supply) per year, or 184,110 megalitres per year including access to supplementary water.

Figure 42: Macquarie annual usage against moving average usage



Floodplain harvesting

NSW is at an early stage of implementing floodplain harvesting measurement requirements and compliant measurement equipment (which includes telemetry) was not required to be installed during the reporting period.

While alternative methods for determining the volume of take under floodplain harvesting access licences for are being looked at there were no results available at the time of writing.

The reported volume of take under floodplain harvesting access licences for the 2022-23 reporting period is 0 ML.

Utilisation and inactive share

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.

During the reporting period:

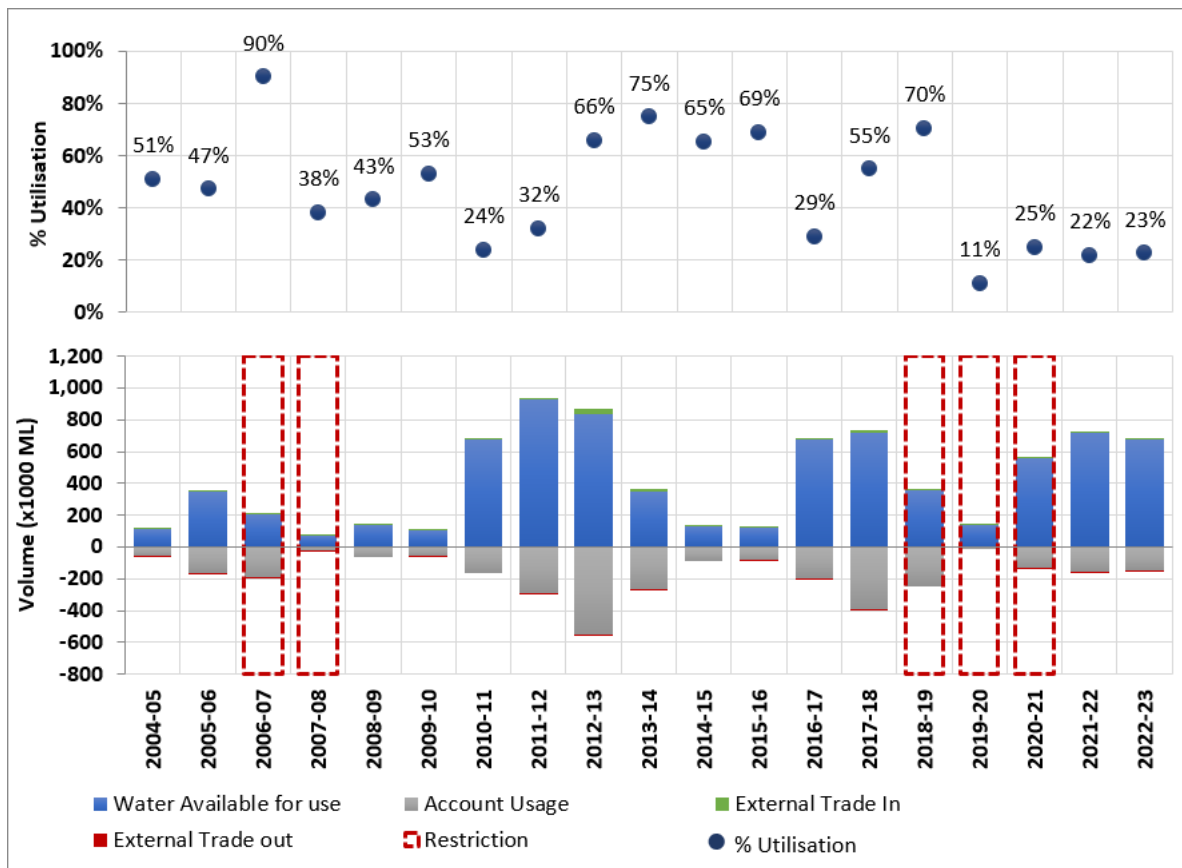
- 21% of general security share component was inactive, an increase of 3% on the prior reporting period (Table 6).
- Considering all categories of access licences issued 21% of share component was inactive, an increase of 3% on the prior reporting period.

- Utilisation of available water from regulated supplies (excluding supplementary) increased to 23% from 22% (Figure 43).

Table 6: Inactive licence summary Macquarie

Licence category	Inactive licences (number) 2022–23	Inactive share component 2022–23	Inactive share component % of total 2022–23	Inactive share component % of total prior year 2021–22
Domestic and Stock	124	2,078	49%	50%
Domestic and Stock [Stock]	22	125	76%	79%
Domestic and Stock [Domestic]	63	386	48%	76%
Local water utility	0	0	0%	4%
Regulated river (General Security)	366	129,031	21%	18%
Regulated river (High Security)	17	294	3%	5%
Regulated river (High Security) [research]	2	344	9%	9%
Total regulated supply	596	133,498	21%	17%
Supplementary Water	364	21,431	44%	14%

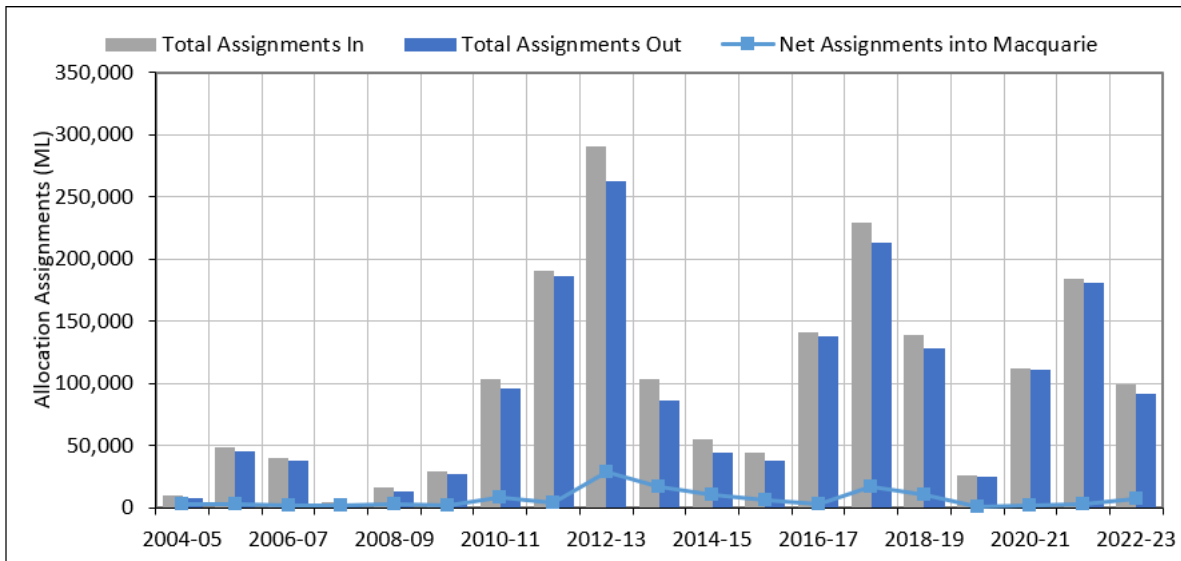
Figure 43: Macquarie percentage utilisation (water availability plus trade in from external water source against account usage and trade out to external water source)



Temporary trading (allocation assignments)

- By volume allocation assignments were 50% lower than the previous water year with 98,750 megalitres traded into Macquarie access licences, including supplementary trading (Figure 44).
- A total of 91,350 megalitres was traded out of Macquarie access licences resulting in a net assignment into the Macquarie (from the Cudgegong) of 7,400 megalitres (including supplementary).
- Regulated trade (excluding supplementary) totalled 7,419 megalitres into Macquarie from Cudgegong with 716 megalitres out from Macquarie to Cudgegong.
- Trade into the Macquarie exceeds trade out in all years under water sharing plan operation.

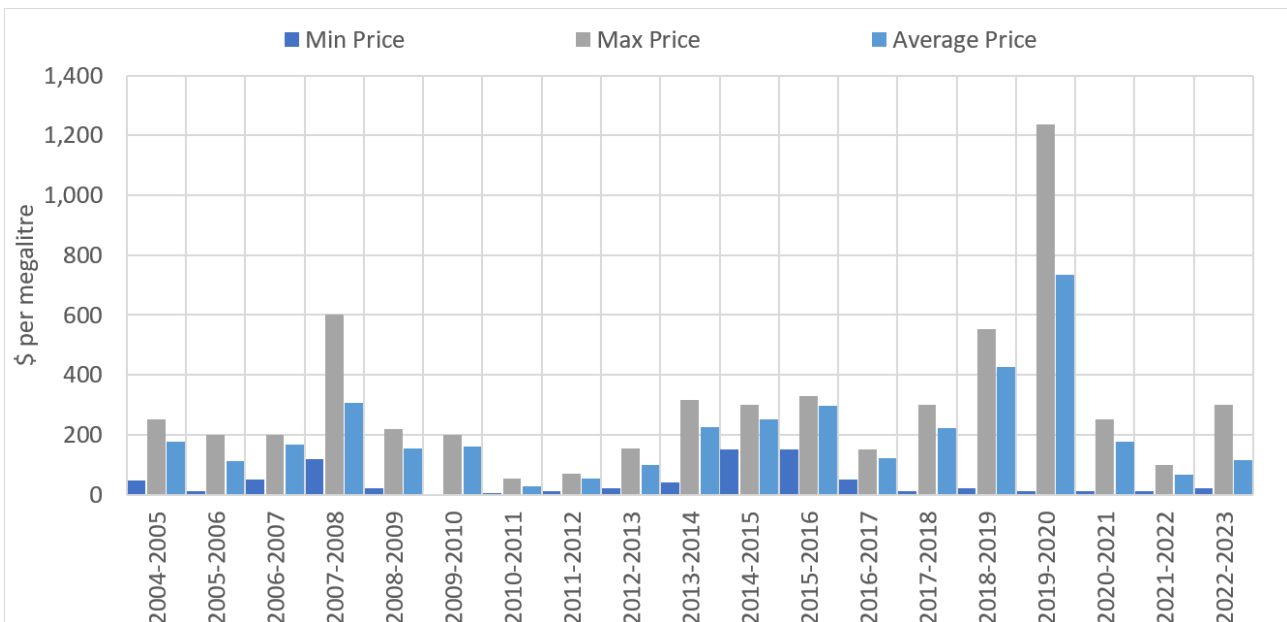
Figure 44: Macquarie allocation assignment (temporary trading) summary



Commercial temporary trading statistics (assignment of allocation)

- Considering commercial temporary trading activity⁹, the average price of water was \$114 per megalitre a 67% increase on the prior year (Figure 45).
- The maximum price was \$300 per megalitre.
- In total, 89 commercial trades were processed for an exchange of \$1,324,714, a 286% increase on the prior year (Figure 46).

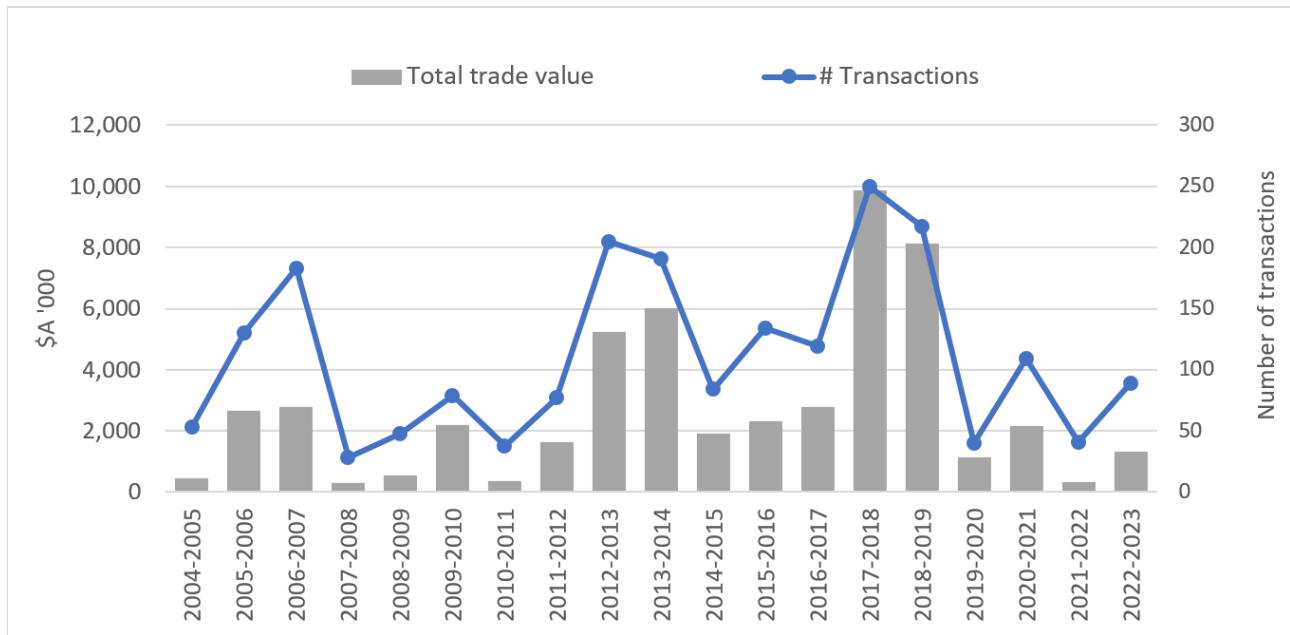
Figure 45: Macquarie allocation assignments—trade price statistics¹⁰



⁹ Allocation assignments with a trade price greater than \$1 per megalitre

¹⁰ Trade prices are all greater than \$1 per megalitre. A maximum limit is applied equal to the mean plus 3 times the standard deviation of the trade price. Supplementary licence allocation assignments are excluded.

Figure 46: Macquarie allocation assignments—trade value statistics



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

- A total of 9 commercial general security 71Q transactions were processed in the reporting period (Figure 48).
- The average price was \$2,967 per general security share (weighted average an 41% increase on the prior year, and a continuation of the rising cost to buy entitlement).
- The general security sale price within the Macquarie relative to other NSW regulated river water sources selling share in the reporting period is provided in Figure 49.
- No commercial share assignments of high security have occurred since 2013–14.
- In addition to share assignment dealings, a total of 28 (change of holder 71M) commercial transactions 11 were processed in the reporting period, which moved a total of 206,623 shares to a new holder (Figure 50).

¹¹ Considers all categories of licence

Figure 47: Commercial share assignment price statistics, General Security, Macquarie

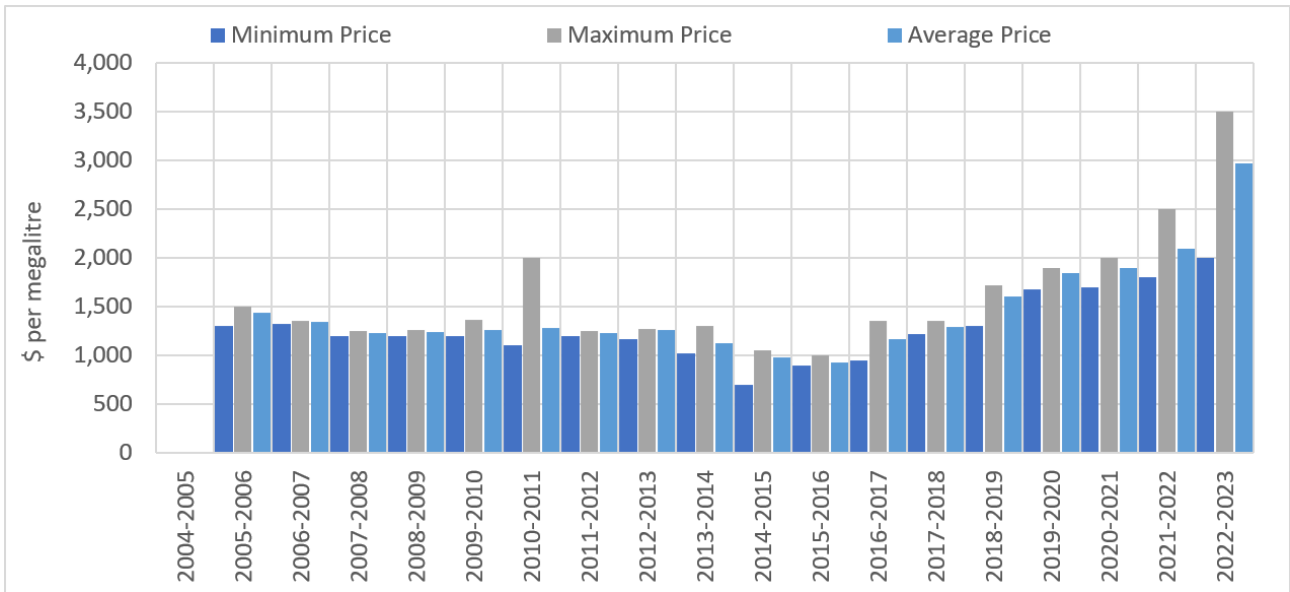


Figure 48: Commercial share assignment value statistics, General Security, Macquarie

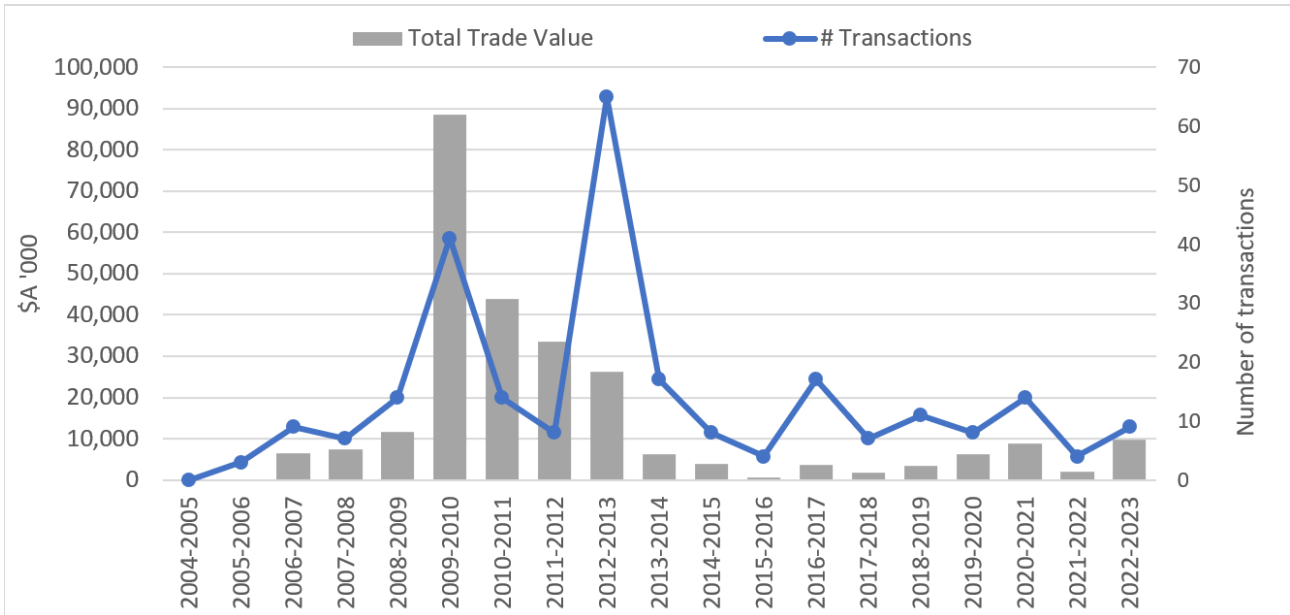


Figure 49: General Security average share price relative comparison for reporting period

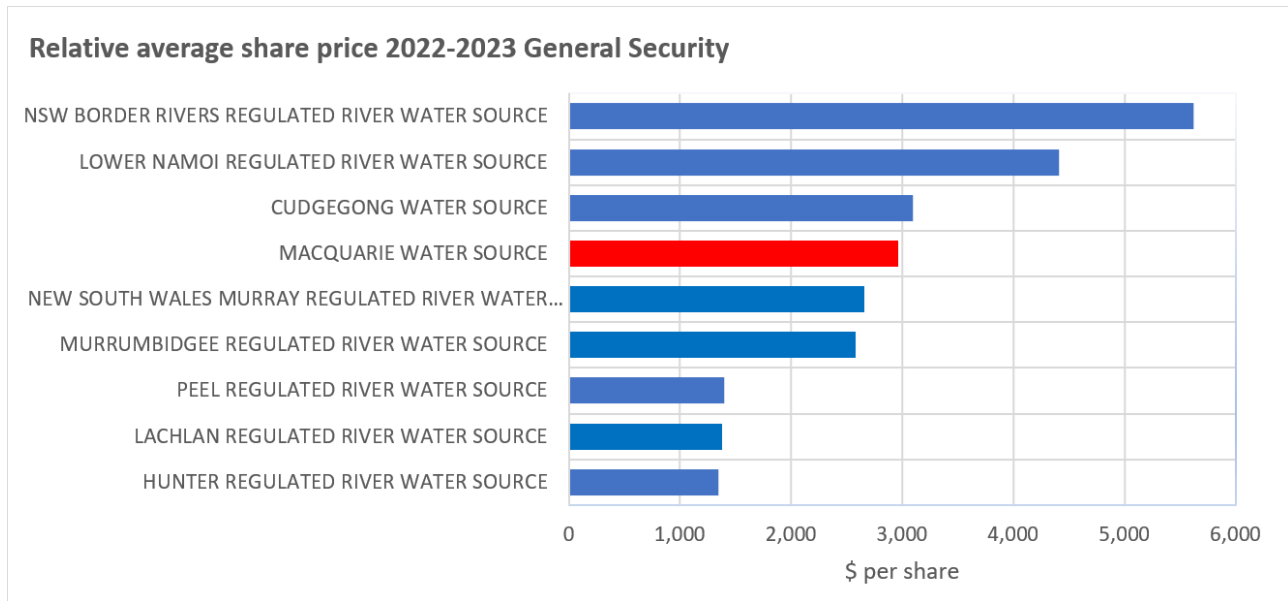
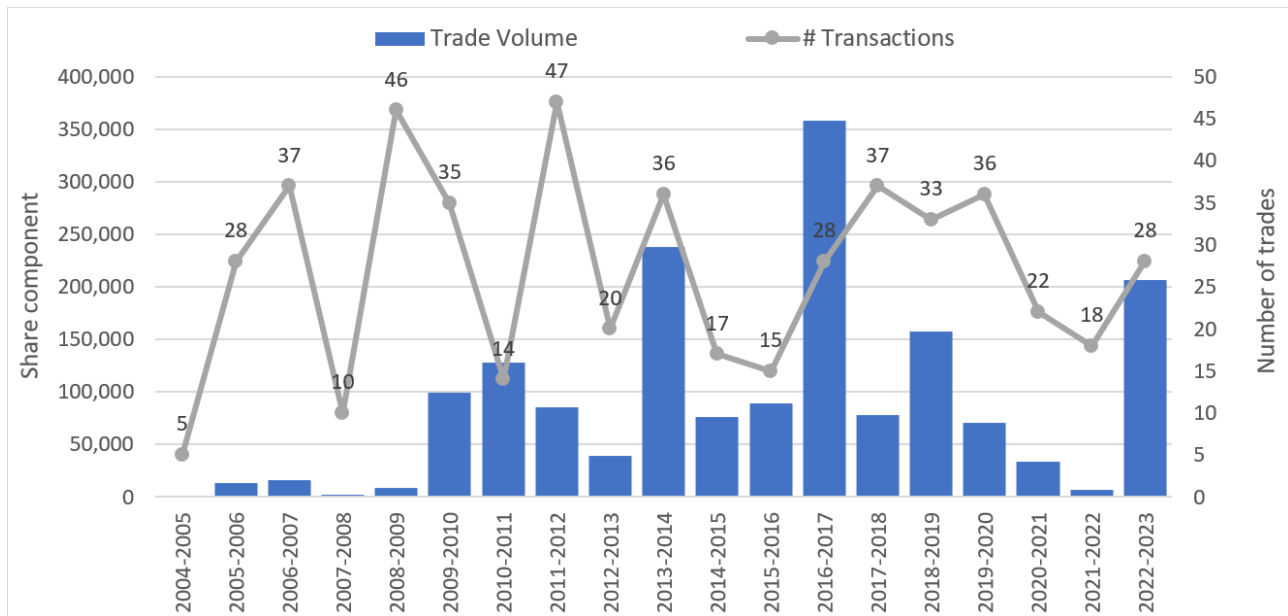


Figure 50: Commercial change of holder transactions—Macquarie



Replenishment flows

The replenishment flow requirements of the water sharing plan were delivered by rainfall runoff events (not sourced from storage) in the lower catchment at varying times throughout the reporting period. The replenishments flow volumes delivered are estimated as:

- Gum Cowal – Terrigal Creek system: 246,653 megalitres
- Crooked Creek below Mumblebone: 43,722 megalitres

- Bogan River between Nyngan and Gunningbar Creek Confluence: >1,000 megalitres
- Belaringar Creek downstream of Albert Priest channel: >1,000 megalitres
- Belaringar Creek upstream Albert Priest channel: 209,058 megalitres
- Ewanmar Creek (Reddenville Break): > 996,759 megalitres
- Marra Creek: 366,696 megalitres
- Lower Bogan River: 167,731 megalitres
- Macquarie River downstream of Macquarie Marshes 1,465,990 megalitres¹²

All the above systems were fully replenished following the deliveries. All deliveries were sourced from local runoff and tributary inflows downstream of storage. For details on replenishment flow events refer to Note 21.

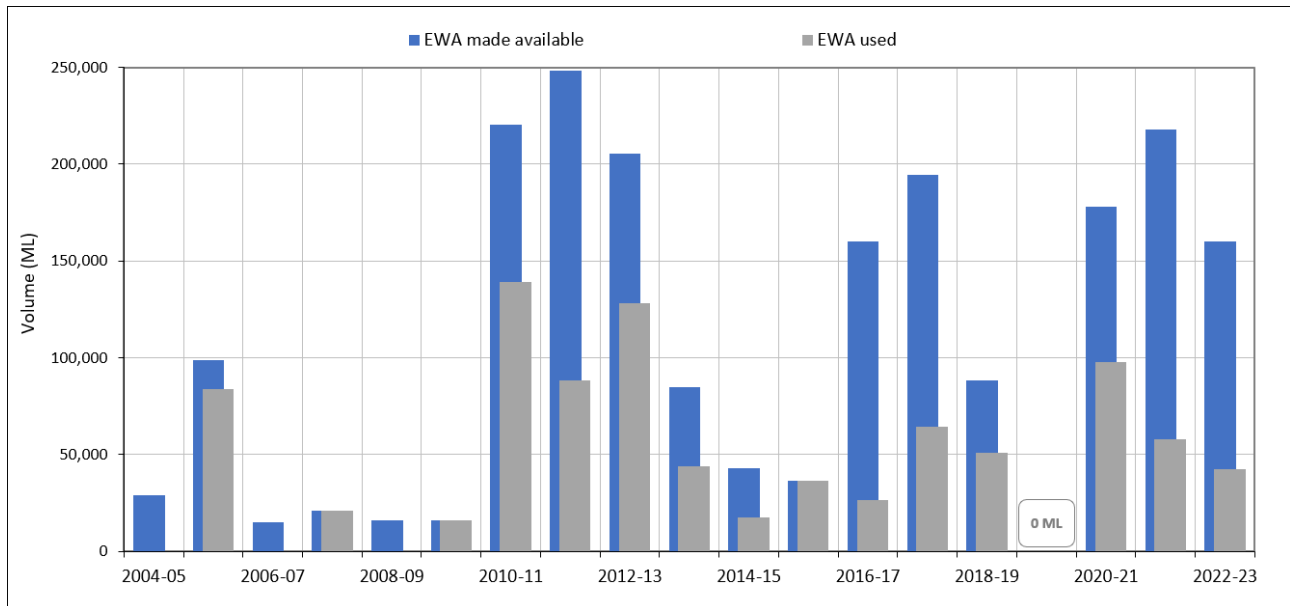
Environmental water

Planned environmental water

- The environmental water allowance (active plus translucent sub-accounts) had an opening balance of 160,000 megalitres for the reporting period.
- A total of 64,000 megalitres was allocated to the account during the reporting period.
- Usage for the reporting period was 42,590 megalitres (25,865 active sub-account and 16,725 translucent sub-account).
- A total of 160,000 megalitres of water was forfeited as a result of evaporation and storage spill.
- Historical use of the environmental water allowance is presented in Figure 51.
- The end of year balance (carry forward) totalled 117,410 megalitres (38,135 active sub-account and 79,275 translucent sub-account).
- There were 6 translucent environmental flow events delivered from Windamere Dam (into Cudgegong River) in 2022–23 with the water sharing plan delivery targets being triggered. A total of 3,791 megalitres was released.
- Further details on planned environmental water are available in Note 7 of this GPWAR.

¹² The replenishment flow requirement below the Macquarie Marshes requires that (at least) two deliveries of up to 50 megalitres per day from Miltara to achieve a visible flow at Glenacre for 5 or more days. Operationally the flow is managed through monitoring flows at the Pillicawarrina gauging station (421127), which reflects the volume stated here. There is high interception within the Marshes between Pillicawarrina and Miltara.

Figure 51: Environmental water allowance summary since commencement of plan



Held environmental water

Cudgegong

- There was no increase to the held environmental water portfolio share in the reporting period.
- A total of 901 general security shares were managed for environmental purposes as of 30 June 2023 (Figure 52).
- 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 held environmental water portfolio share in the reporting period.
- A total of 183,486 shares were managed for environmental purposes as of 30 June 2023, consisting of 173,742 general security and 9,744 supplementary (Figure 53).
- A total of 18,118 megalitres of general security and 0 megalitres of supplementary water was used in the reporting period (Figure 54).
- Held environmental water account utilisation from regulated supply (excluding supplementary) remains unchanged at 4%. Historical utilisation figures are provided in Figure 55.
- Details on environmental watering targets and outcomes are available from the NSW Department of Climate Change, Energy, the Environment and Water—Environment Energy and Science website.
- For additional details on held environmental water refer to Note 6.

Figure 52: Held environmental water share component in the Cudgegong catchment

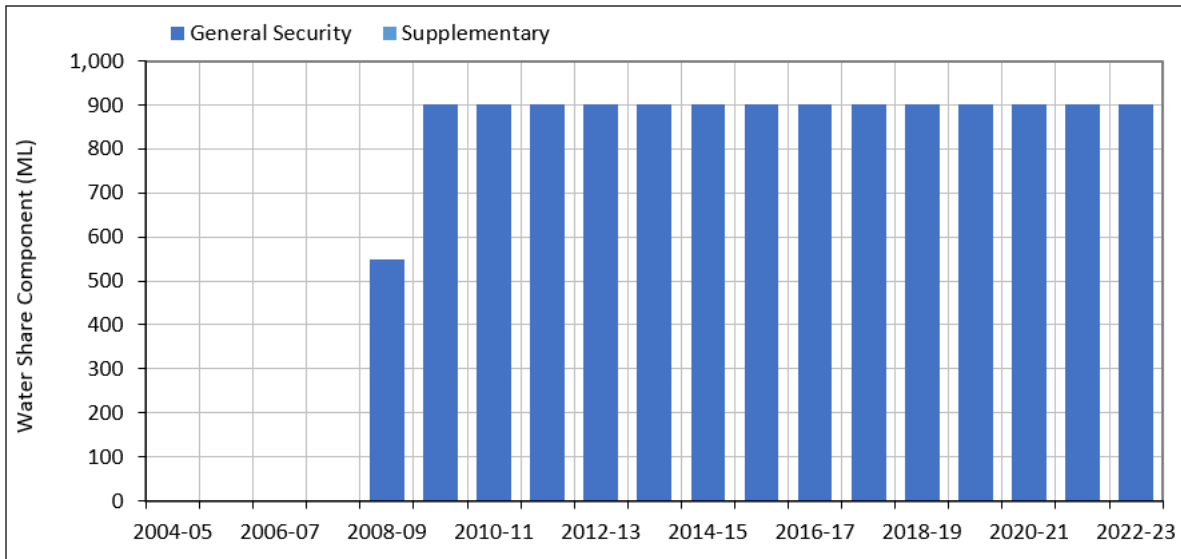


Figure 53: Held environmental water share component in the Macquarie catchment

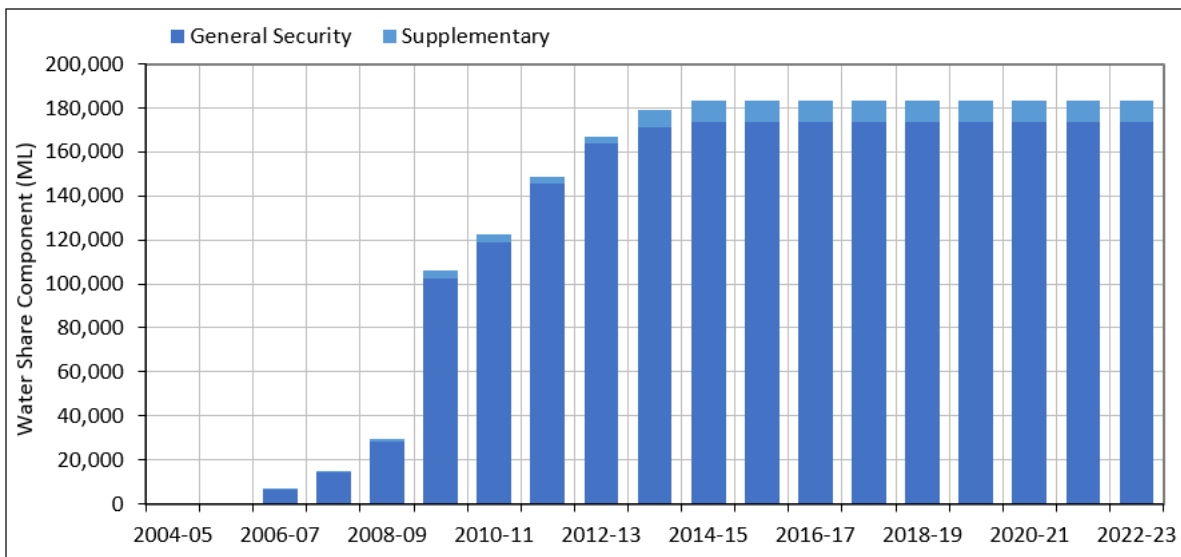


Figure 54: Held environmental usage in the Macquarie catchment

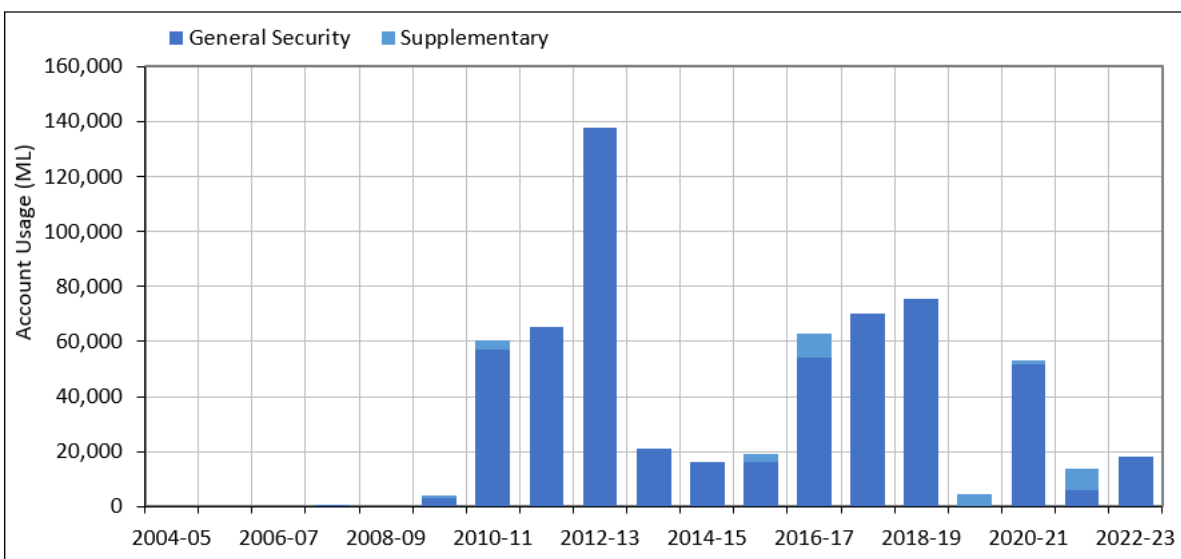
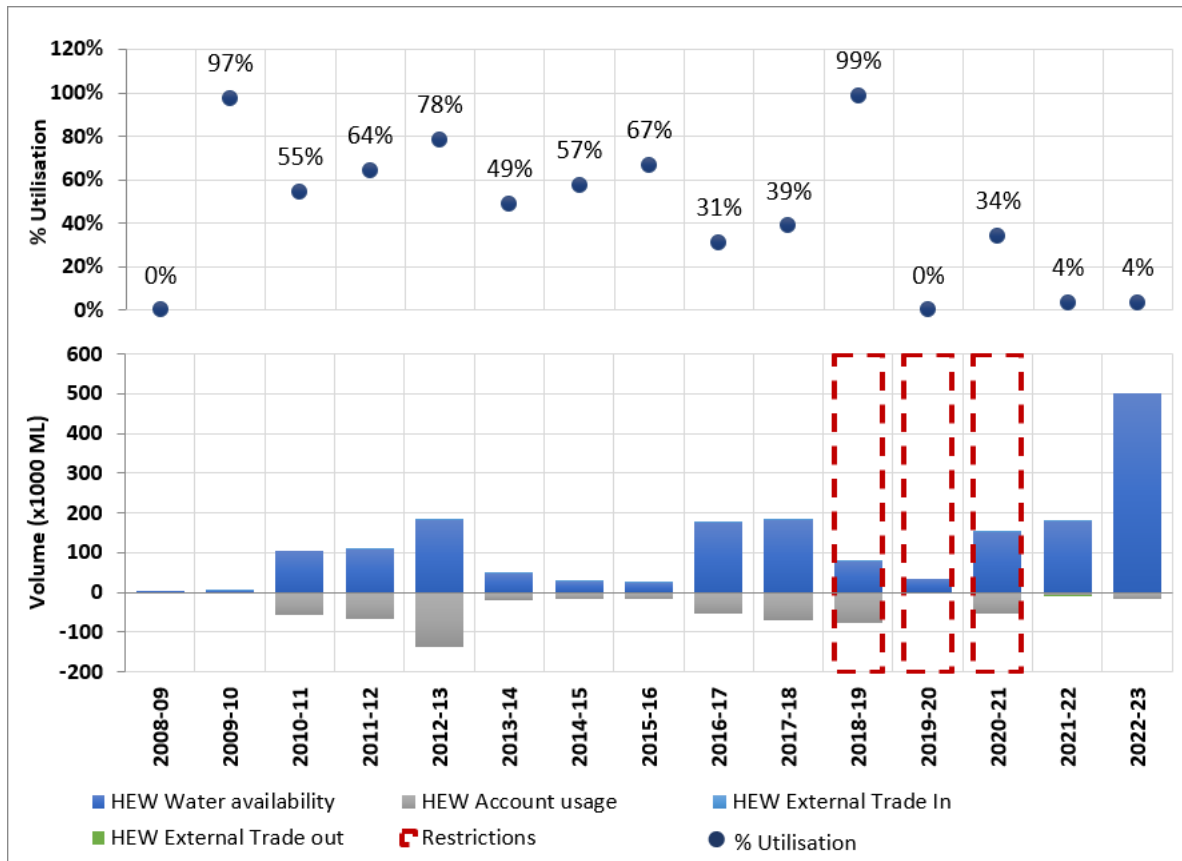


Figure 55: Held environmental utilisation Macquarie catchment (excludes supplementary holdings)



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 Climate Change, Energy, the Environment and Water water accounting statements refer to the Guide to General Purpose Water Accounting Reports available for download from the NSW Department of Climate Change, Energy, the Environment and Water website at www.industry.nsw.gov.au/water

Quantification of data

Data accuracy

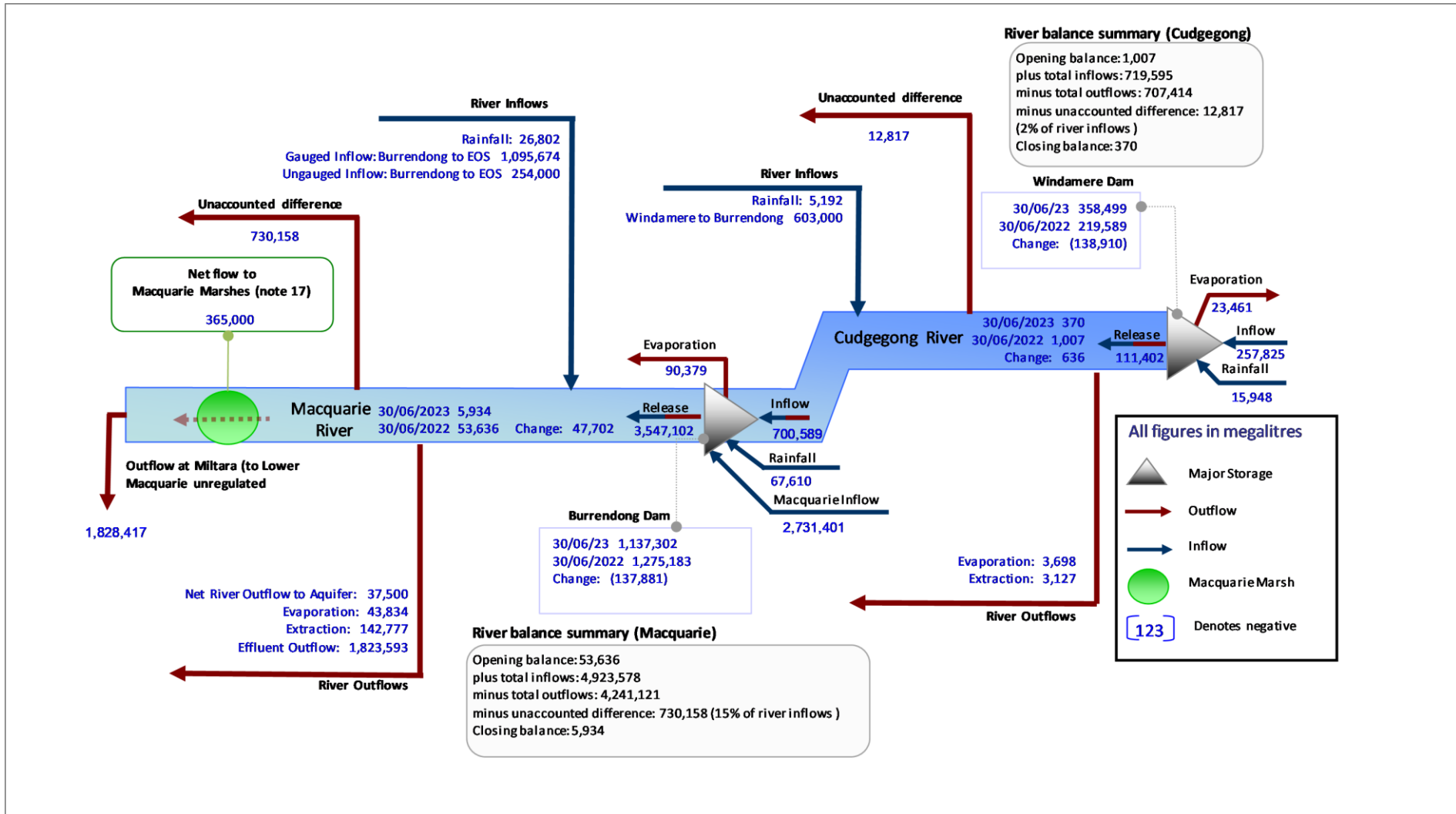
It is important to recognise that the data used to account for water movement and management in the reporting entity has been obtained from a variety of sources and systems. The data ranges from observed values where a high accuracy would be anticipated through to modelled results and estimates where 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 Climate Change, Energy, the Environment and Water corporate database

2022–23 physical flows mass balance diagram



Statement of water assets and water liabilities

For the year ended 30 June 2023

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

Surface water assets

1. Surface water storage	Accuracy	Notes	30 June 2023	30 June 2022
Windamere Dam	A	8	358,498	219,589
Burrendong Dam	A	8	1,137,302	1,275,183
River (Cudgegong)	B	9	370	1,007
River (Macquarie)	B	9	5,935	53,636
Total surface water storage (Asws)			1,502,106	1,549,415
Change in surface water storage			(47,309)	646,118

Surface water liabilities

2. Allocation account balance	Accuracy	Notes	30 June 2023	30 June 2022
Cudgegong	A1	1	-	-
High Security	-	-	0	0.0
General Security	-	-	14,940	45,572
Macquarie	A1	1	-	-
Domestic and Stock	-	-	0	0
General Security	-	-	501,905	537,584
High Security (HS)	-	-	(23)	(100)
Local Water Utility	-	-	0	0
Total allocation account balance (Lsws)			516,822	583,055
Change in allocation account balance			(66,233)	158,120

3. Planned Environmental Water Provisions	Accuracy	Notes	30 June 2023	30 June 2022
Environmental water allowance	A1	7	117,410	160,000
Total ECA balances(LPEW)			117,410	160,000
Change in planned environmental water balances			(42,590)	79,704

Surface water net changes

4. Net change	30 June 2023	30 June 2022
Net surface water assets (Asws – Lsws - LPEW)	867,874	806,359
Change in net water assets	61,514	408,294

Changes in water assets and water liabilities

For the year ended 30 June 2023 (1 of 3)

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

Surface water storage inflows	Accuracy	Notes	2022-23	2021-22
Burrendong Dam	-	-	-	-
Inflow	A	10	3,431,990	2,318,789
Rainfall	B	11	67,610	81,240
Windamere Dam	-	-		
Inflow	A	10	257,825	116,575
Rainfall	B	11	15,948	11,026
Cudgegong River	-	-		
Rainfall	C	12	5,192	3,306
Ungauged Inflow	C	14	603,000	252,500
Inflow from Windamere	A	15	111,402	21,662
Macquarie River	-	-		
Rainfall	C	12	26,802	24,467
Gauged inflow	A	13	1,095,674	583,428
Ungauged inflow	C	14	254,000	122,800
Inflow from Burrendong Dam	A	15	3,547,102	1,796,756
Total surface water storage increases (Isws)			9,416,545	5,332,551

Surface water storage outflows	Accuracy	Notes	2022-2023	2021-2022
Burrendong	-	-	-	-
Evaporation	B	11	90,379	85,076
Releases	A	15	3,547,102	1,796,756
Windamere	-	-		
Evaporation	B	11	23,461	13,015
Releases	A	15	111,402	21,662
Cudgegong River	-	-		
Evaporation	C	12	3,698	3,124
Flow to Burrendong	A	10	700,589	270,009
Basic Rights extractions	C	19	227	227
Licensed extractions from river	A	18	2,900	1,620
Unaccounted Difference	A1	23	12,817	2,483
Macquarie River	-	-	-	-
Evaporation	C	12	43,834	39,933

Surface water storage outflows	Accuracy	Notes	2022-2023	2021-2022
Basic Rights extractions	C	19	973	973
Licensed extractions from river	A	18	141,804	178,684
End of system flow	A	16	2,584,753	897,325
Flow to Macquarie Marsh	-	-	365,000	697,000
Net outflow to aquifer ¹⁴	D	22	37,500	21,000
Other Outflows (Ewenmar Creek)	A	16	1,067,257	275,000
Unaccounted Difference	A1	23	730,158	382,546
Total surface water storage decreases (Dsws)			9,463,854	4,686,433
Net surface water storage inflow (Isws – Dsws)			(47,309)	646,118

¹⁴ This figure has changed from previous years (pre 2021-22) combining the movements of water between the river and the groundwater to a single Net Outflow to aquifer figure..

2. Changes in allocation accounts

Allocation account increases	Accuracy	Notes	2022-2023	2021-2022
Cudgegong	-	-	-	-
Available water determinations				
Domestic and Stock	A1	2	656	656
Domestic And Stock (Domestic)	A1	2	23	23
Domestic And Stock (Stock)	A1	2	15	15
General Security	A1	2	18,762	18,903
High Security	A1	2	5,291	5,291
High Security (Research)	A1	2	1	2
Local Water Utility	A1	2	2,600	2,600
Unregulated flow demand				
Supplementary water demand	A1	20	0	0
Internal trade—buyers			3,221	22,857
Macquarie	-	-	-	-
Available water determinations				
Domestic and Stock	A1	2	4,283	4,291
Domestic And Stock (Domestic)	A1	2	804	804
Domestic And Stock (Stock)	A1	2	165	165
General Security	A1	2	1,227,423	1,086,258
High Security	A1	2	17,074	17,074
High Security (Research)	A1	2	4,044	8,088
High Security (TWS)	A1	2	40	80
Local Water Utility	A1	2	16,205	16,205
Unregulated flow demand				
Supplementary water demand	A1	20	8,864	36,721
Internal trade—buyers			88,879	165,674
Adjusting increases to water liabilities	A1	24	0	0
Total allocation account increases (Iaa)	-	-	1,398,349	1,385,705

Allocation account decreases	Accuracy	Notes	2022-2023	2021-2022
Cudgegong				
Account usage	-	-	-	-
Domestic and Stock	A1	3	279	154
General Security	A1	3	947	236
High Security	A1	3	262	96
Local Water Utility	A1	3	1,413	1,135
Account forfeiture		-		
Domestic and Stock	A1	1	370	502
Domestic And Stock (Domestic)	A1	1	23	23
Domestic And Stock (Stock)	A1	1	15	15
General Security	A1	1	46,626	1,329
High Security	A1	1	148	77
High Security (Research)	A1	1	1	2
Local Water Utility	A1	1	1,188	1,465
Licence cancelled				
Domestic and Stock	A1	1	8	0
Internal trade—sellers	A1	4	9,924	25,096
Macquarie				
Account Usage	-	-	-	-
Domestic and Stock	A1	3	1,162	929
Domestic And Stock (Domestic)	A1	3	190	70
Domestic And Stock (Stock)	A1	3	39	24
General Security	A1	3	135,380	143,814
High Security	A1	3	5,041	3,115
High Security (Research)	A1	3	800	1,378
High Security (Town Water Supply)	A1	3	0	1
Local Water Utility	A1	3	8,447	6,349
Supplementary water	A1	3	8,864	36,721
Account forfeiture				
Domestic and Stock	A1	1	3,113	3,354
Domestic And Stock (Domestic)	A1	1	614	734
Domestic And Stock (Stock)	A1	1	126	141
General Security	A1	1	1,135,410	807,990
High Security	A1	1	10,970	12,749
High Security (Research)	A1	1	3,244	6,710
High Security (Town Water Supply)	A1	1	40	79
Local Water Utility	A1	1	7,758	9,856
Licence cancelled				
Domestic and Stock	A1	1	8	8
General Security	A1	1	0	0
Internal trade—sellers	A1	4	82,176	163,435
Adjusting account entry—decrease	A1	24		
Total allocation account decreases (Daa)			1,464,582	1,227,585

Net change in allocation accounts	2022-2023	2021-2022
Net allocation account balance increase (Iaa – Daa)	(66,233)	158,120

3. Changes in planned environmental water provisions (PEW)

PEW increases	Accuracy	Notes	2022-2023	2021-2022
Account Increases	A1	7	160,000	161,584
Total PEW account increases (Ipew)			160,000	161,584

PEW decreases	Accuracy	Notes	2022-2023	2021-2022
Account usage	A1	7	42,590	57,795
Other account decreases	A1	7	160,000	24,086
Total PEW account decreases (Dpew)			202,590	81,880
Net environmental water allowance increase (Ipew - Dpew)			(42,590)	79,704

Change in net surface water assets (Isws-Dsws-Usws-Iaa+Daa-Ipew+Dpew)	61,514	408,294
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Note disclosures

Reconciliation and future prospect descriptions

Reconciliation of change in net water asset to net change in physical water storage ¹⁵	2022–23 ML	2021–22 ML
Change in net surface water assets	61,514	408,294
Non-physical adjustments		
Net change in allocation accounts	(66,233)	158,120
Net change in claims to water: EWA	(42,590)	79,704
Total non-physical adjustments	(108,823)	237,823
Net change in physical surface water storage	(47,309)	646,118

Reconciliation of closing water storage to total surface water assets	30 June 2023 ML	30 June 2022 ML
Closing water storage		
Surface water storage	1,502,106	1,549,415
Total surface water assets	1,502,106	1,549,415

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.

¹⁵ 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 2022–23 available water determinations, on the NSW Department of Climate Change, Energy, the Environment and Water webpage at [Allocations | Water \(nsw.gov.au\)](https://www.nsw.gov.au/allocations-water)

You can also subscribe to receive the latest updates.

Significant events since 2022–23

No significant events have occurred up until the time of publication of this report.

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 season¹⁶.

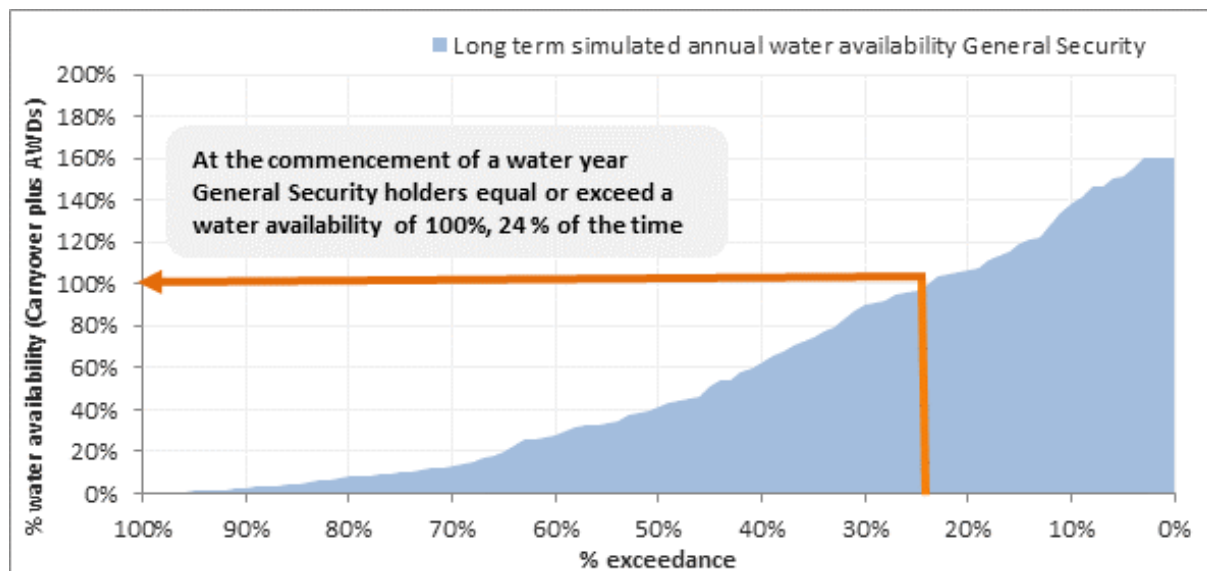
In any given year, the simulation indicates high security entitlements are likely to have full allocation 100% of the time for Macquarie–Cudgegong system.

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 56).

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 (

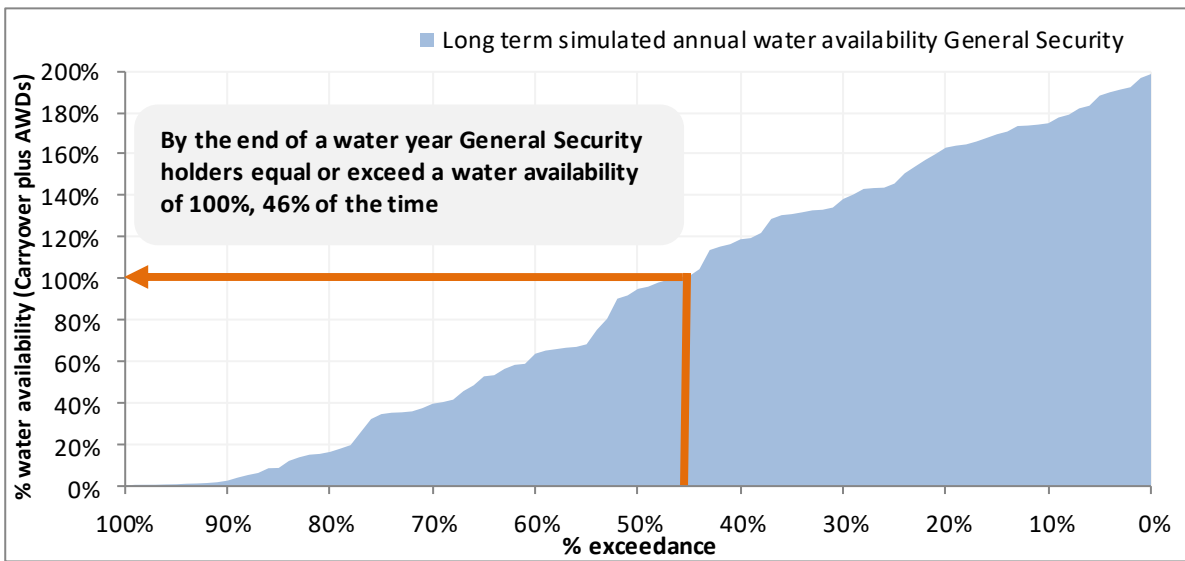
Figure 57).

Figure 56: Macquarie–Cudgegong start of water year simulated availability for General Security access licences



¹⁶ Modelled data simulated as July to June water year. Simulation period 1 June 1892 to 30 June 2018. As model's are conditionally revised to reflect changes in water management rules, and improved understanding of system behaviour (data), information is guiding only and may not reflect the latest modelling information available.

Figure 57: Macquarie–Cudgegong end of water year simulated availability for General Security access licences



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 Climate Change, Energy, the Environment and Water website at www.industry.nsw.gov.au/water

Data accuracy

A1—Nil inaccuracy +/- 0%

Providing agency

NSW Department of Climate Change, Energy, the Environment and Water

Data source

WaterNSW/NSW Department of Climate Change, Energy, the Environment and Water—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

Table 9 and Table 10 on the following page provide a balanced summary of the water allocation accounts for each category of access licence. Table 8 gives a description of each of the table components.

Table 8: Explanatory information for account summary tables (Table 9 and Table 19)

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.
Lic New	Licences – New: Increase in account water as a result of the issuing of a new licence.
Lic Can	Licences – Cancelled: Decrease in account water as a result of a licence cancellation where account balance has not been traded to another licence.
Asn In	Assignment – In: Increase in account water as a result of temporary trade in.
Asn – Out	Assignment – Out: Decrease in account water as a result of temporary trade out.
Usage	Volume of water that is extracted or diverted from the river and is accountable against the access licence allocation
Drought sus In	Drought suspension – In: Temporary water restriction applied, reducing account water available for use in reported water year

Heading	Description
Drought sus Out	Drought suspension – Out: Temporary water restriction re-credit increasing account water available for use in reported water year
During Year forfeit	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. Included in this figure are net forfeitures resulting from storage spills resets which brings accounts back to 100% capacity. This includes the forfeiture of carryover water being the volume in the flood mitigation zone until all the carryover water has been forfeited.
EoY forfeit	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.
EoY Avail	End of year balance – Available: Account balance that is available to be taken at the conclusion of the water year.
EoY NA	End of year balance – Not 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 fwd	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. See Table 8 for explanation of headings.

Category	Share 30 June 2023	Opening balance	AWD	Lic New	Lic Can	Asn In	Asn Out	Usage	During year forfeit	EoY Avail	EoY NA	EoY forfeit	Carry fwd
Domestic and Stock	648	0	656	0	8	0	0	279	0	370	0	370	0
Domestic and Stock [Domestic]	23	0	23	0	0	0	0	0	0	23	0	23	0
Domestic and Stock [Stock]	15	0	15	0	0	0	0	0	0	15	0	15	0
Local Water Utility	2,600	0	2,600	0	0	0	0	1,413	0	1,188	0	1,188	0
General Security	18,661	45,572	18,762	0	0	3,221	5,042	947	46,057	15,509	0	568	14,940
High Security	5,291	0	5,291	0	0	0	4,882	262	(0)	148	0	148	(0)
High Security [Research]	1	0	1	0	0	0	0	0	0	1	0	1	0
Supplementary Water	1,290	0	1,290	0	0	0	697	0	0	593	0	593	0

Table 10: Macquarie account balance summary for the reporting period

Category	Share 30 June 2023	Opening balance	AWD	Lic New	Lic Cancel	Drought Sus In	Drought Sus Out	Asn In	Asn Out	Usage	During year forfeit	EoY Avail	EoY NA	EoY forfeit	Carry fwd
Domestic and Stock	4,275	0	4,283	0	8	0	0	0	0	1,162	0	3,113	0	3,113	0
Domestic and Stock [Domestic]	803	0	804	0	0	0	0	0	0	190	0	614	0	614	0
Domestic and Stock [Stock]	165	0	165	0	0	0	0	0	0	39	0	126	0	126	0
Local Water Utility	16,205	0	16,205	0	0	0	0	0	0	8,447	0	7,758	0	7,758	0
General Security	613,805	537,584	1,227,423	0	0	0	0	88,757	81,068	135,380	1,134,615	502,700	0	795	501,905
High Security	8,537	(100)	17,074	0	0	0	0	122	1,108	5,041	8,317	2,630	0	2,653	(23)
High Security [Research]	4,044	0	4,044	0	0	0	0	0	0	800	0	3,244	0	3,244	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	0	0	9,872	9,174	8,864	0	40,542	0	40,542	0
Floodplain Harvesting	48,911	0	16,141	0	0	0	0	0	0	0	0	16,141	0	0	16,141

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 NSW *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 Climate Change, Energy, the Environment and Water website at www.industry.nsw.gov.au/water

Data accuracy

A1—Nil inaccuracy +/- 0%

Providing agency

NSW Department of Climate Change, Energy, the Environment and Water.

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 ¹⁷	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. Table 12 provides a description of the relevant elements in these reports.

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

¹⁷ 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
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.
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.
Floodplain Harvesting	Floodplain harvesting licences define the volume of water that users can legally harvest from floodplains.

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-22	Opening	656			0.0%	0.0%	0	0	0	0.0%	0.0%
1-Jul-22	AWD 100.0%	656	656	656	100.0%	100.0%	656	0	656	100.0%	100.0%
Domestic and stock[domestic]											
1-Jul-22	Opening	23			0.0%	0.0%	0	0	0	0.0%	0.0%
1-Jul-22	AWD 100.0%	23	23	23	100.0%	100.0%	23	0	23	100.0%	100.0%
Domestic and stock[stock]											
1-Jul-22	Opening	15			0.0%	0.0%	0	0	0	0.0%	0.0%
1-Jul-22	AWD 100.0%	15	15	15	100.0%	100.0%	15	0	15	100.0%	100.0%
Local water utility											
1-Jul-22	Opening	2,600			0.0%	0.0%	0	0	0	0.0%	0.0%
1-Jul-22	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-22	Opening	18,762			0.0%	0.0%	45,572	0	45,572	242.9%	242.9%
1-Jul-22	AWD 0.4 ML per Share	18,762	7,505	7,505	40.0%	40.0%	53,077	0	53,077	282.9%	282.9%
10-Aug-22	AWD 0.6 ML per Share	18,762	11,257	18,762	60.0%	100.0%	64,334	0	64,334	342.9%	342.9%
1-Sep-22	Spillage Account Reset	18,747	(165)	18,597	(0.9)%	99.2%	64,169	0	64,169	342.3%	342.3%
1-Nov-22	Carryover Spill Reduction 100.0 %	18,747					18,277	0	18,277	97.5%	97.5%
Regulated river (high security)											
1-Jul-22	Opening	5,291			0.0%	0.0%	0	0	0	0.0%	0.0%
1-Jul-22	AWD 1.0 ML per Share	5,291	5,291	5,291	100.0%	100.0%	5,291	0	5,291	100.0%	100.0%
1-Sep-22	Spillage Account Reset	5,291	0	5,291	0.0%	100.0%	5,291	0	5,291	100.0%	100.0%
1-Nov-22	Carryover Spill Reduction 100.0%	5,291					5,291	0	5,291	100.0%	100.0%
Regulated river (high security) [research]											
1-Jul-22	Opening	1			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-22	AWD 100.0%	1	1	1	100.0%	100.0%	1	0	1	100.0%	100.0%
Supplementary water											
1-Jul-22	Opening	1,290			0.0%	0.0%	0	0	0	0.0%	0.0%
1-Jul-22	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%

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 (%)
Floodplain Harvesting (Regulated River)											
1-Jul-22	Opening				0.0%	0.0%	0	0	0	0.0%	0.0%
1-Mar-23	AWD 0.33 ML per Share	48,911	16,141	16,141	33.0%	33.0%	16,141	0	16,141	33.0%	33.0%
Domestic and stock											
1-Jul-22	Opening	4,283			0.0%	0.0%	0	0	0	0.0%	0.0%
1-Jul-22	AWD 100.0 %	4,283	4,283	4,283	100.0%	100.0%	4,283	0	4,283	100.0%	100.0%
Domestic and stock[domestic]											
1-Jul-22	Opening	803			0.0%	0.0%	0	0	0	0.0%	0.0%
1-Jul-22	AWD 100.0 %	803	804	804	100.1%	100.1%	804	0	804	100.1%	100.1%
Domestic and stock[stock]											
1-Jul-22	Opening	165			0.0%	0.0%	0	0	0	0.0%	0.0%
1-Jul-22	AWD 100.0%	165	165	165	100.0%	100.0%	165	0	165	100.0%	100.0%
Local water utility											
1-Jul-22	Opening	16,205			0.0%	0.0%	0	0	0	0.0%	0.0%
1-Jul-22	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-22	Opening	613,704			0.0%	0.0%	537,584	0	537,584	87.6%	87.6%
1-Jul-22	AWD 0.4 ML per Share	613,704	245,482	245,482	40.0%	40.0%	783,065	0	783,065	127.6%	127.6%
1-Aug-22	Carryover Spill Reduction 66.01 %	613,704					438,804	0	438,804	71.5%	71.5%
10-Aug-22	AWD 0.6 ML per Share	613,704	368,222	613,704	60.0%	43.9%	807,026	0	807,026	131.5%	131.5%
1-Sep-22	Carryover Spill Reduction 100.0 %	613,719					630,014	0	630,014	102.7%	102.7%
1-Sep-22	Storage Spill	613,704					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-Sep-22	AWD for Storage Spill 1.0 ML per Share	613,704	613,704	613,704	100.0%	100.0%	613,704	0	613,704	100.0%	100.0%
1-Nov-22	Carryover Spill Reduction 100.0 %	613,704					613,704	0	613,704	100.0%	100.0%
Regulated river (high security)											
1-Jul-22	Opening	8,537			0.0%	0.0%	(100)	0	(100)	(1.2)%	(1.2)%
1-Jul-22	AWD 1.0 ML per Share	8,537	8,537	8,537	100.0%	100.0%	8,437	0	8,437	98.8%	98.8%
1-Aug-22	Carryover Spill Reduction 66.01 %	8,537					8,437	0	8,437	98.8%	98.8%
1-Sep-22	Carryover Spill Reduction 100.0 %	8,537					8,437	0	8,437	98.8%	98.8%
1-Sep-22	Storage Spill	8,537					0	0	0	0.0%	0.0%
1-Sep-22	AWD for Storage Spill 1.0 ML per Share	8,537	8,537	8,537	100.0%	100.0%	8,535	0	8,535	100.0%	100.0%
1-Nov-22	Carryover Spill Reduction 100.0 %	8,537					8,535	0	8,535	100.0%	100.0%
Regulated river (high security)[research]											
1-Jul-22	Opening	4,044			0.0%	0.0%	0	0	0	0.0%	0.0%
1-Jul-22	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]											
1-Jul-22	Opening	40			0.0%	0.0%	0	0	0	0.0%	0.0%
1-Jul-22	AWD 100.0%	40	40	40	100.0%	100.0%	40	0	40	100.0%	100.0%
Supplementary water											
1-Jul-22	Opening	48,708			0.0%	0.0%	0	0	0	0.0%	0.0%
1-Jul-22	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%

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 Climate Change, Energy, the Environment and Water

Data source

WaterNSW/NSW Department of Climate Change, Energy, the Environment and Water— 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.

These are:

- 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	1,162	279
Domestic and Stock [Domestic]	190	0
Domestic and Stock [Stock]	39	0
Local Water Utility	8,447	1,413
General Security	135,380	947
High Security	5,041	262
High Security (Research)	800	0
High Security (Town Water Supply)	0	N/A
Supplementary Water	8,864	0
Total usage	159,922	2,900

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 this water source
 - Available on the NSW Department of Climate Change, Energy, the Environment and Water website at www.industry.nsw.gov.au/water

Data accuracy

A1—Nil inaccuracy +/- 0%

Providing agency

NSW Department of Climate Change, Energy, the Environment and Water

Data source

WaterNSW/NSW Department of Planning 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

From	To Macquarie General security	To Macquarie High security	To Macquarie Supplementary water	To Cudgegong General security	To Cudgegong High security	Total
Macquarie General security	80,437	122	-	509	-	81,068
Macquarie High security	901	-	-	207	-	1,108
Macquarie Supplementary water	-	-	9,174	-	-	9,174
Cudgegong General security	2,846	-	-	-	-	2,846
Cudgegong High security	4,573	-	-	-	-	4,573
Cudgegong Supplementary water	-	-	697	-	-	697
Total	88,757	122	9,873	716	0	99,466

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 sub-account limits and withdrawal of water allocations that have been carried over
- 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 Climate Change, Energy, the Environment and Water website at www.industry.nsw.gov.au/water

Data accuracy

A1—Nil inaccuracy +/- 0%

Providing agency

NSW Department of Climate Change, Energy, the Environment and Water

Data source

WaterNSW/NSW Department of Planning 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 for the reporting period

Catchment	Licence type	Spill forfeiture	Spill AWD reset
Cudgegong	General Security	45,892	0
Cudgegong	High Security	0	0
Macquarie	General Security	1,134,615	613,704
Macquarie	High Security	8,317	8,535
Macquarie	EWA	160,000	96,000

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 and are subject to the same operating rules. 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—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 providing water to or supplementing water requirements of specific environmental events or incidents.

Data type

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 Climate Change, Energy, the Environment and Water website at www.industry.nsw.gov.au/water

Data accuracy

A1—Estimated in the range +/- 10%

Providing agency

NSW Department of Climate Change, Energy, the Environment and Water

Data source

WaterNSW/NSW Department of Climate Change, Energy, the Environment and Water— Water Accounting System (Joint ownership of System).

Available Water Determination Register—NSW Department of Climate Change, Energy, the Environment and Water 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

Explanatory information for Environmental Account Summaries is provided at Table 8. Details of held environmental water accounting are provided in the summaries provided at Table 19, Table 20,

Table 21 and Table 22. Details about the Macquarie and Cudgegong held environmental water temporary trading is provided in Table 23.

Table 19: Environmental account balance summary for reporting period—Macquarie. See Table 8 for explanation of headings.

Category	Share 30 June 2023	Opening balance	AWD	Lic New	Lic Can	Drought sus In	Drought sus Out	Asn In	Asn Out	Usage	During year forfeit	EoY Avail	EoY NA	EoY forfeit	Carry fwd
General Security	173,742	172,973	347,484	0	0	0	0	57,567	57,567	18,118	346,715	155,624	0	528	155,096
Supplementary Water	9,744	0	9,744	0	0	0	0	8,292	8,292	0	0	9,744	0	9,744	0

Table 20: Environmental account balance summary for reporting period—Cudgegong. See Table 8 for explanation of headings.

Category	Share 30 June 2023	Opening balance	AWD	Lic New	Lic Can	Drought sus In	Drought sus Out	Asn In	Asn Out	Usage	During year forfeit	EoY Avail	EoY NA	EoY forfeit	Carry fwd
General Security	901	901	901	0	0	0	0	0	0	0	901	901	0	0	901
Supplementary Water	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Table 21: Annual change in held environmental water—Macquarie.

Category	Volume 30 June 2022	Volume 30 June 2023	Volume difference	No. licences 30 June 2021	No. licences 30 June 2022	No. licence difference
General Security	173,742	173,742	0	10	10	0
Supplementary Water	9,744	9,744	0	4	4	0

Table 22: Annual change in held environmental water—Cudgegong

Category	Volume 30 June 2022	Volume 30 June 2023	Volume difference	No. licences 30 June 2021	No. licences 30 June 2022	No. licence difference
General Security	901	901	0	4	4	0
Supplementary Water	0	0	0	1	1	0

Table 23: Macquarie and Cudgegong environmental temporary trading summary. See Table 8 for explanation of headings

FROM	TO Consumptive Macquarie General security	TO Consumptive Macquarie High security	TO Consumptive Macquarie Supplementary water	TO Consumptive Cudgegong General security	TO Consumptive Cudgegong High security	TO Environmental Macquarie General security	TO Environmental Macquarie Supplementary water	Total
Consumptive Macquarie General security	22,870	122		509				23,501
Consumptive Macquarie High security	901			207				1,108
Consumptive Macquarie Supplementary water			882					882
Consumptive Cudgegong General security	2,846							2,846
Consumptive Cudgegong High security	4,573							4,573
Consumptive Cudgegong Supplementary water			697					697
Environmental Macquarie General security						57,567		57,567
Environmental Macquarie Supplementary water							8,292	8,292
Total	31,190	122	1,579	716	0	57,567	8,292	99,466

Component summaries

- **Environment to environment trade:** 65,859
- **Environment to consumptive trade:** 0
- **Consumptive to environment trade:** 0
- **Consumptive to consumptive trade:** 33,607

Note 7—Environmental provisions

There are 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

All NSW water sharing plans include a long term average annual extraction limit (LTAAEL), reserving volumes above this for environmental health. In the Macquarie-Cudgegong regulated river water source the LTAAEL is assessed as either the average annual extractions resulting from the Murray Darling basin cap modelling scenario or, the average annual extractions resulting from the 1999-2000 water year scenario (whichever scenario is lowest). The results of LTAAEL compliance assessments are published at water.dpie.nsw.gov.au

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 Climate Change, Energy, the Environment and Water website at www.industry.nsw.gov.au/water

Data accuracy

A1—Nil inaccuracy +/- 0%

Providing agency

NSW Department of Climate Change, Energy, the Environment and Water

Data source

WaterNSW/NSW Department of Climate Change, Energy, the Environment and Water—Water Accounting System (Joint ownership of System).

WaterNSW annual compliance report (internal document)

Additional information

Table 24: 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
2019-20	69,372	0	0	0	0	0	69,372
2020-21	69,372	108,800	0	0	334	97,542	80,296
2021-22	80,296	124,784	36,800	23,803	283	57,795	160,000
2022-23	160,000	64,000	96,000	160,000	0	42,590	117,410

Table 25: 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

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
2017-18	64,232	75,623	0	50,415
2018-19	51,072	41,623	0	27,749
2019-20	0	41,623	0	27,749
2020-21	44,794	61,902	52,748	18,394
2021-22	17,802	96,000	39,993	64,000
2022-23	25,865	38,135	16,725	79,275

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 Climate Change, Energy, the Environment and Water

Data source

NSW Department of Climate Change, Energy, the Environment and Water— 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 26: Storage summary table

Name	Capacity (ML)	Dead storage (ML)
Windamere Dam	368,120	1,130
Burrendong Dam	1,190,060 ¹⁸	33,730

For plots of storage behaviour for the reporting period, including volumes and percentages, see Figure 15 and Figure 11 in this report.

¹⁸ 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 Climate Change, Energy, the Environment and Water

Data sources

NSW Department of Climate Change, Energy, the Environment and Water: 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 27: 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 are 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 Climate Change, Energy, the Environment and Water

Data sources

NSW Department of Climate Change, Energy, the Environment and Water: 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.

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

Table 28: 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 14 and Figure 10 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 Climate Change, Energy, the Environment and Water

Data source

NSW Department of Climate Change, Energy, the Environment and Water— 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 29: 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 Climate Change, Energy, the Environment and Water

Data source

NSW Department of Climate Change, Energy, the Environment and Water: 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.

$$\text{Area (m}^2\text{)} = \text{Average W (m)} \times \text{L (m)}$$

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 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	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 Climate Change, Energy, the Environment and Water

Data sources

NSW Department of Climate Change, Energy, the Environment and Water: 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

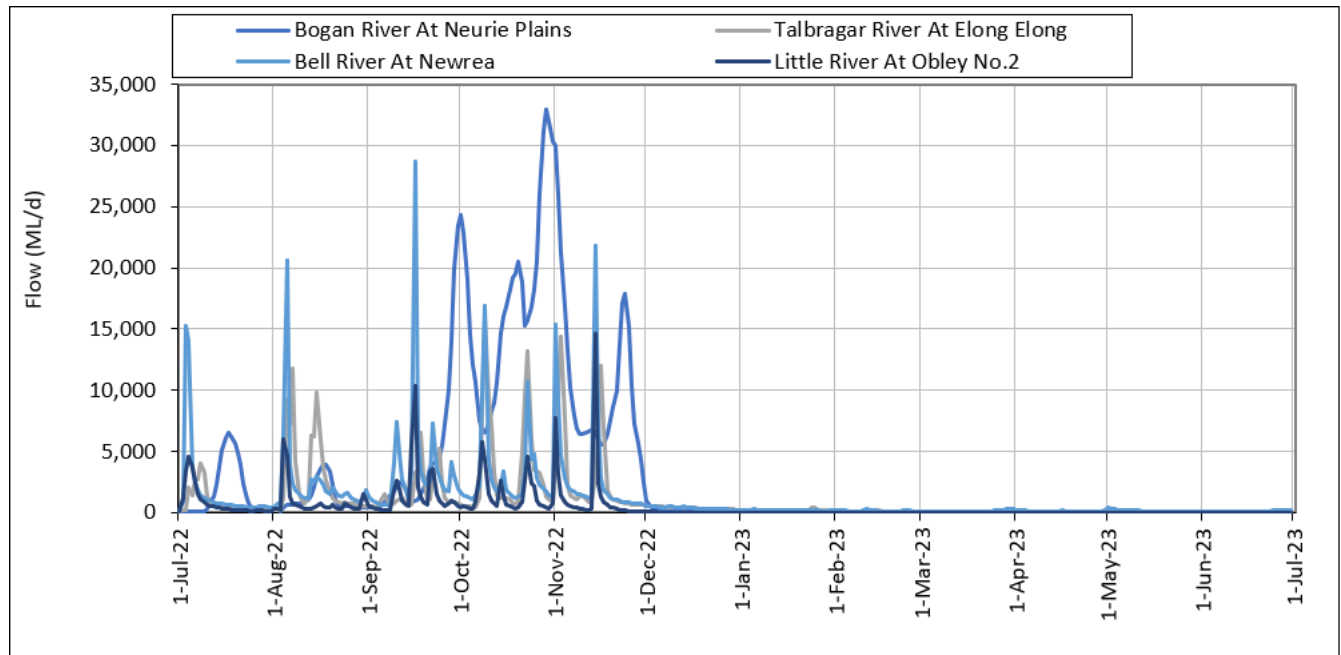
The total gauged inflow for the reporting period is the sum of the inflows for the gauged tributaries defined in the table below.

The daily flows for the reporting period for each of the gauged tributaries is shown in Figure 58 below.

Table 31: Summary of gauged tributary inflow for the reporting period

Station	Station Name	Area (km2)	Flow (ML)
421018	Bell River At Newrea	1,620	464,433
421055	Coolbaggie Creek At Rawsonville	626	70,539
421042	Talbragar River At Elong Elong	3,050	380,789
421048	Little River At Obley No.2	612	179,912
		Total Gauged Inflow	1,095,674

Figure 58: Macquarie gauged daily tributary inflow for the reporting period



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 Climate Change, Energy, the Environment and Water

Data sources

NSW Department of Climate Change, Energy, the Environment and Water

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 – assumed to be 10% of the measured (gauged flow plus storage releases) entering the system for the Cudgegong and 50% for the Macquarie. The very high loss estimate for the Macquarie (50%) was assumed based on high overbank flows, effluent flows and flood runners resulting in large quantities of water being lost to the Macquarie system during flood events.

Table 32: Summary of ungauged inflow estimates for reporting period

Catchment	Volume (ML)
Cudgegong	605,000
Macquarie	255,000

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 Climate Change, Energy, the Environment and Water

Data sources

NSW Department of Climate Change, Energy, the Environment and Water: 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 59: Burrendong Dam releases during reporting period

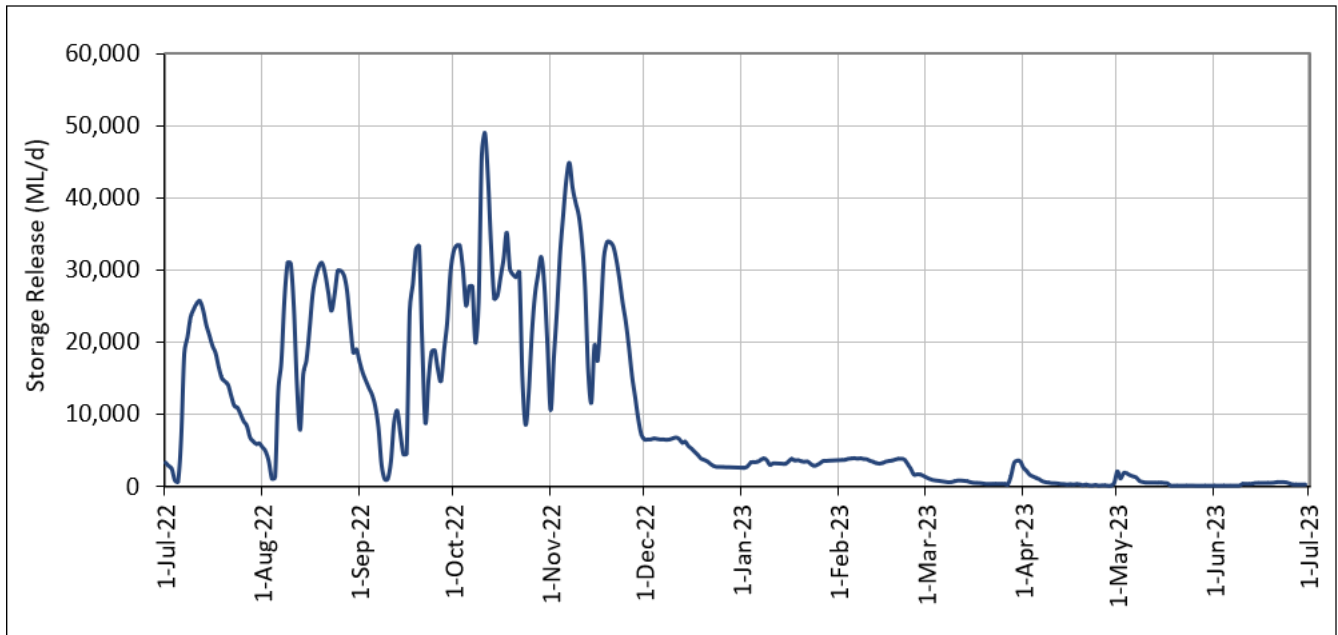
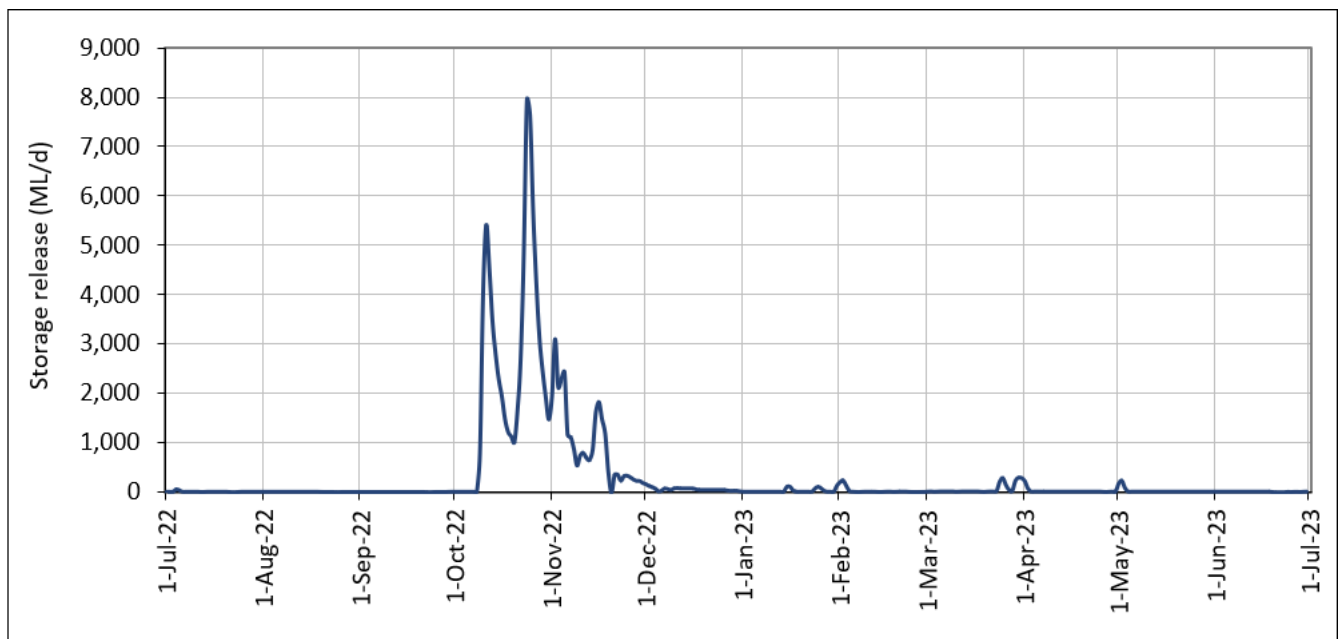


Figure 60: Windamere Dam releases during reporting period



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 Climate Change, Energy, the Environment and Water

WaterNSW

Data source

NSW Department of Climate Change, Energy, the Environment and Water— 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 of this GPWAR the end of system is considered to be the Macquarie River at Miltara (421135)¹⁹. The Miltara site is downstream of the last regulated river licences and also downstream of environmental assets within the Macquarie Marshes that source water from the regulated system. The regulated system defined by the water sharing plan ceases at the confluence of the Macquarie River and Monkeygar Creek offtake.

Regulated effluents leaving are quantified for the regulated Duck Creek and Gunningbar Creek (last downstream gauge) as well as regulated flows to Marra Creek and Crooked Creek and Gum Cowal Creek which receive replenishment supplies from the regulated system (closest offtake measurement is used). In addition effluent flows flow leaving the system via Ewenmar Creek are estimated as no viable gauge is available.

Gauges at these locations record a time series of heights that are 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.

¹⁹ Revised accounting extent commencing in the 2019-20 GPWAR

Additional Information

Table 33: Accounted system outflows during reporting period

Station	Station name	Volume (ML)
421166	Gunningbar Creek At Fairview Dam	167,523
421016	Crooked Creek At Profile	42,764
421164	Duck Creek At Napali	60,263
421097	Marra Creek At Carinda Road	358,343
421135	Macquarie River At Miltara	1,828,417
421146	Gum Cowal At Bitification	127,443
	Ewenmar Creek	1,067,257
Total	-	3,652,010

Figure 61: Macquarie end of system flow

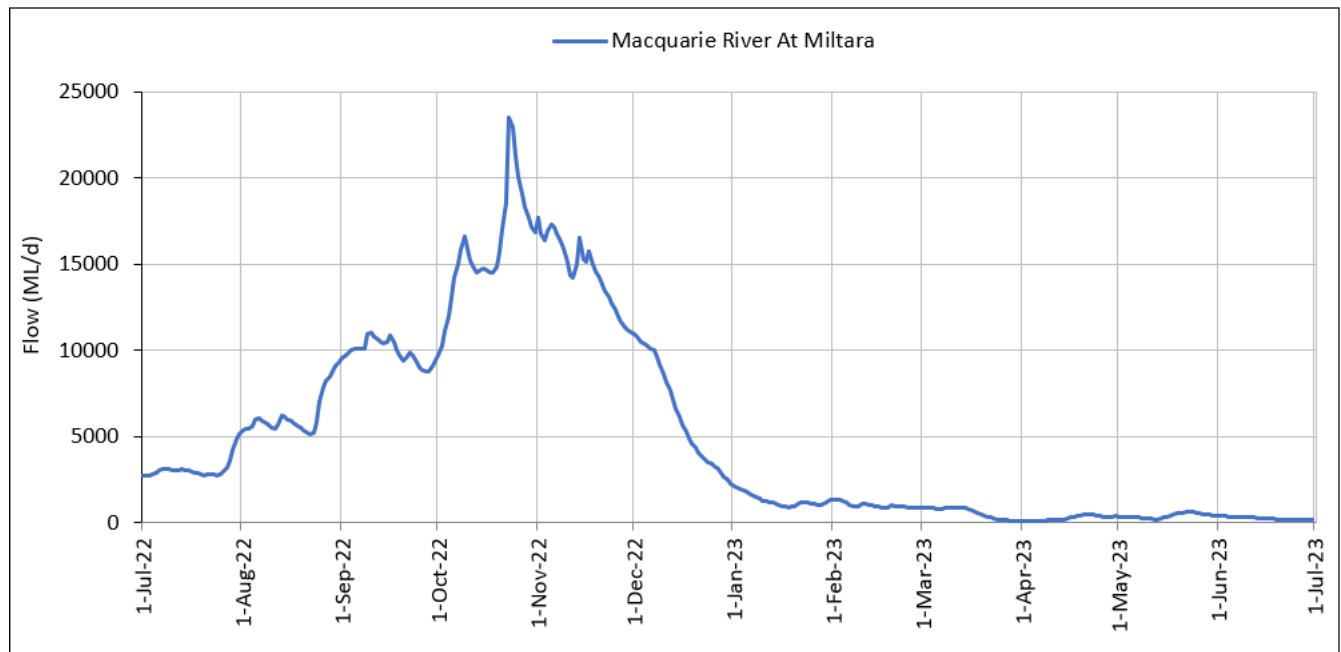
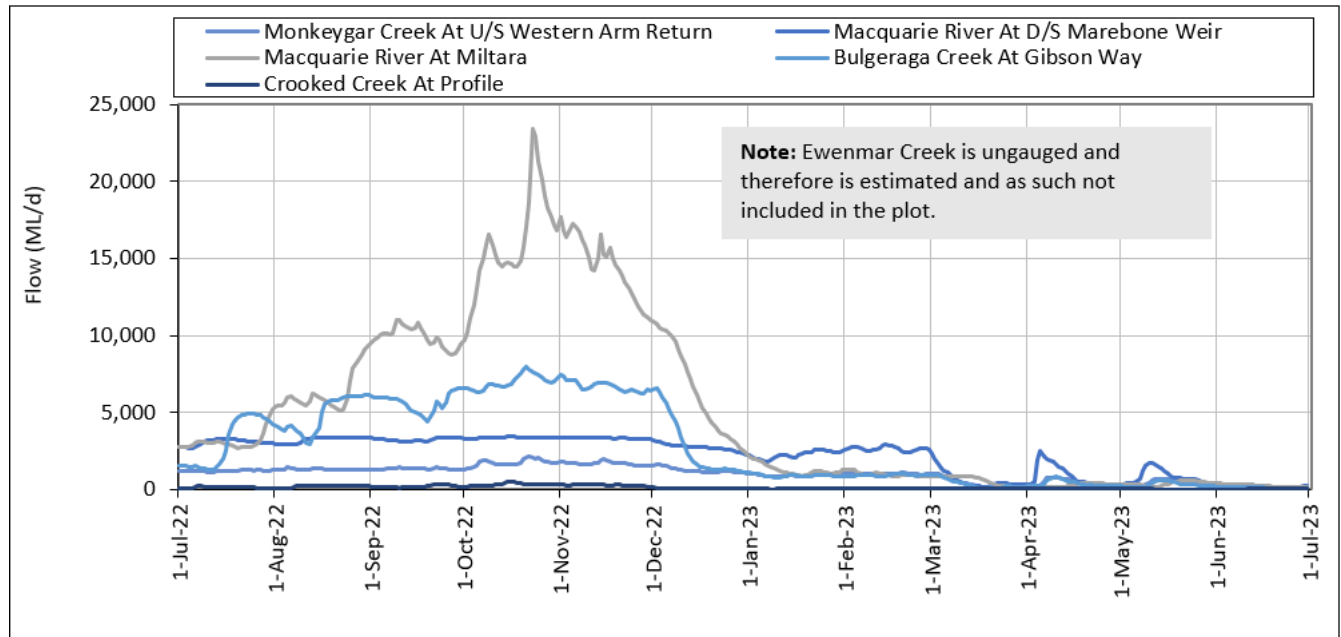


Figure 62: Macquarie regulated effluents



Note 17—Flow to Macquarie Marshes

The flow to Macquarie Marshes is an estimate of the volume of water that enters the Macquarie Marshes from the accounted regulated river extent. It excludes water to deliver consumptive users, replenishment flow deliveries that does not pass through, and regulated outflow downstream of the Marshes (where it is possible to quantify).

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) and translucent flow delivery
- Held Environmental Water (licensed)
- Operational loss
- Other surplus flow during high flow events

Policy

Not applicable

Data type

Measured data

Data accuracy

B—Estimated in the range +/- 25%

Providing agency

NSW Department of Climate Change, Energy, the Environment and Water

Data sources

NSW Department of Climate Change, Energy, the Environment and Water: HYDSTRA, WaterNSW: annual compliance report (internal document) and Water Accounting System

Methodology

Generally for estimating a net flow volume to the Macquarie Marshes system we use flow measurements at Marebone Weir, flow returning downstream of the Marshes, measured regulated consumptive use downstream of Marebone Weir, estimated replenishment deliveries, and a baseflow delivery estimate. However, in times of flood when water is on the flood plain and flows entering the marshes are unreliable we use Warren Weir flows as an alternative to the combined D/S Marebone Weir and Marebone Break flows.

The calculation is summarised below:

$$Q_{\text{Net}} = Q_{\text{mw}} + Q_{\text{mb}} - Q_{\text{out1}} - Q_{\text{out2}} - Q_{\text{Rep}} - E_{\text{Con}} \text{ (non flood)}$$

$$Q_{\text{Net}} = Q_{\text{ww}} - Q_{\text{out1}} - Q_{\text{out2}} - Q_{\text{Rep}} - E_{\text{ConW}} \text{ (flood)}$$

Where:

- Q_{Net} = Net flow estimate to Macquarie Marshes
- Q_{mw} = Total flow passing Marebone Weir via the Macquarie River (421090)
- Q_{mb} = Total flow passing via Marebone Break (421088)
- Q_{ww} = Total flow passing via Warren Weir (421004)
- E_{Con} = Measured licence extractions below Marebone Weir (regulated consumptive use only)
- E_{ConW} = Measured licence extractions below Warren Weir (regulated consumptive use only)
- Q_{out1} = Total flow passing at Miltara (421135) (inclusive of replenishment deliveries to the Lower Macquarie unregulated)
- Q_{out2} = Baseflow delivery
- Q_{Rep} = Estimated replenishment deliveries in the Gum Cowal and Terrigal Creek system

Calculation assumptions

The resulting net flow to Marshes (Q_{Net}) is an approximation for the purpose of this annual account and due to data limitations does not quantify the full suite of processes occurring in the Macquarie Marsh area. The net volume calculated in this account is inclusive of:

- any ungauged outflows to Gingham Creek and Milmiland Creek
- any outflow to Marthaguy Creek via Terrigal Creek (while the volume leaving Terrigal Creek is measured the flow maybe a combination of both regulated outflow, and local rainfall runoff. The volume was therefore excluded for the purpose of this calculation).
- the supply of basic landholder rights between Marebone and Miltara and replenishment delivery losses occurring in the Northern Marshes bypass channel.

Additionally, the calculation does not allow for:

- floodplain harvest take from any overbank flows
- any unregulated licence extractions downstream of Marebone Weir
- other loss processes in the system.

Additional Information

Table 34 below shows the components and calculation process that determines the flow going to Macquarie Marshes. Due to flooding during the reporting period flows entering the marshes were estimated based on the flood flow methodology described earlier.

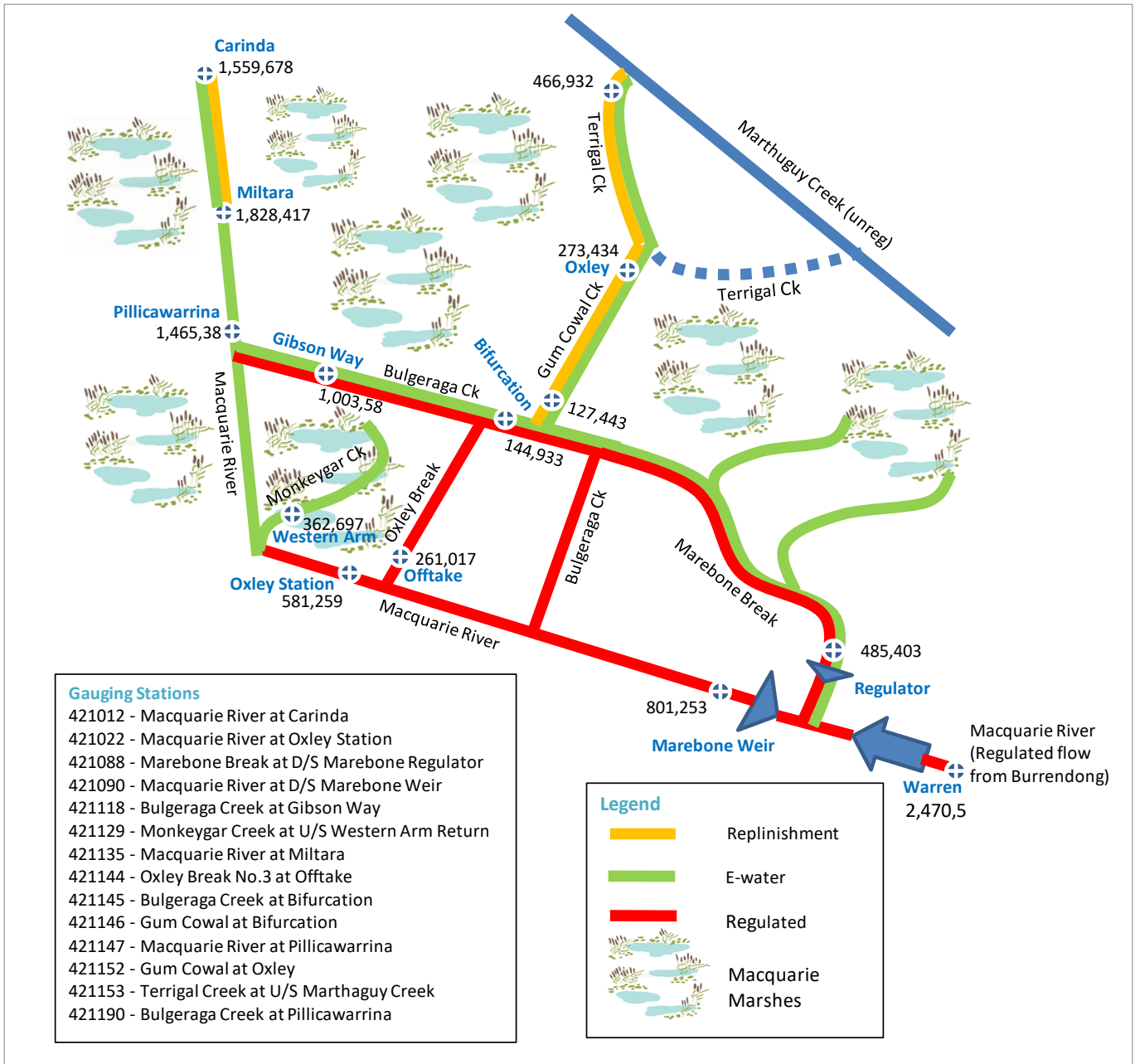
Figure 63 provides a diagram show the distribution of flows into, around and out of the Macquarie Marshes.

Table 34: Flow to Macquarie Marshes for the reporting period

Item	Volume(ML)
Total flow Warren Weir (Flood)	2,470,520
minus Total outflow at Miltara	1,828,417
minus regulated extractions downstream Warren	26,770
minus baseflow delivery	3,650

Item	Volume(ML)
<i>minus Gum Cowl and Terrigal Creek replenishment flow</i>	246,653
<i>equals net flow to Macquarie Marshes</i>	365,000

Figure 63: Diagram of flow distribution in Macquarie Marshes



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 Climate Change, Energy, the Environment and Water

Data source

WaterNSW/NSW Department of Climate Change, Energy, the Environment and Water— Water Accounting 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 35: Reconciliation of physical extraction to account usage (ML)

Formula	Macquarie	Cudgegong
Licenced extractions from River ²⁰	141,804	1,900
plus		
Licenced flow leaving System ²¹	18,118	0
plus		
In stream licenced usage ²²	0	0
equals		
Total account usage ²³	159,922	1,900

²⁰ Direct licenced extractions from the river excluding basic rights usage estimate

²¹ Licenced environmental water ordered delivered to the Macquarie Marshes for environmental purposes. This volume is already accounted in the flow to Macquarie Marsh line item (note 17), and is removed here to avoid double accounting

²² Water ordered and used within the accounted system for environmental benefit (not extracted from the river)

²³ 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 Climate Change, Energy, the Environment and Water website at www.industry.nsw.gov.au/water

Data accuracy

C—Estimated in the range +/- 50%

Providing agency

NSW Department of Climate Change, Energy, the Environment and Water

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 38 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 Climate Change, Energy, the Environment and Water website at www.industry.nsw.gov.au/water

Data accuracy

A—Estimated in the range +/- 10%

Providing agency

NSW Department of Climate Change, Energy, the Environment and Water

Data source

WaterNSW/NSW Department of Climate Change, Energy, the Environment and Water—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

The operational supplementary announcements for the reporting period are presented in Table 36. Account usage by river section and total daily usage is provided in Figure 64 and Figure 65 respectively.

Table 36: Supplementary Announcements for reporting period

Date	Use limit (%)	Section	Star Date	End Date	Usage
4-Jul-22	100	Gunningbar Ck Junc (Start 22c) To Monkey Bridge	5-Jul-22	16-Dec-22	-
4-Jul-22	100	Marebone To Bifurcation (Gs421145)	6-Jul-22	18-Dec-22	-
4-Jul-22	100	Bifurcation (Gs421145) To Macquarie Junction	6-Jul-22	18-Dec-22	-
4-Jul-22	100	Gunningbar O/T To Gunningbar Weir (Gs421017)	5-Jul-22	17-Dec-22	163
4-Jul-22	100	Gunningbar Weir (Gs421017) To Fairview (Gs421166)	5-Jul-22	17-Dec-22	430
4-Jul-22	100	Fairview (Gs421166) To Bogan Junction	5-Jul-22	17-Dec-22	16
4-Jul-22	100	Crooked Creek	5-Jul-22	17-Dec-22	-
4-Jul-22	100	Duck Creek To Napali (Gs421164)	5-Jul-22	17-Dec-22	2
4-Jul-22	100	Napali (Gs421164) To Bogan Junction	5-Jul-22	17-Dec-22	-
4-Jul-22	100	Gunningbar To Creek Cutting 2	5-Jul-22	17-Dec-22	-
4-Jul-22	100	Marebone Break	6-Jul-22	18-Dec-22	-
4-Jul-22	100	Burrendong Dam To Bell River	4-Jul-22	16-Dec-22	-
4-Jul-22	100	Bell River To Little River	4-Jul-22	16-Dec-22	-
4-Jul-22	100	Little River To Dubbo (Gs421001)	4-Jul-22	16-Dec-22	-
4-Jul-22	100	Dubbo (Gs421001) To Talbragar River	4-Jul-22	16-Dec-22	-
4-Jul-22	100	Talbragar River To Coolbaggie Creek	4-Jul-22	16-Dec-22	104
4-Jul-22	100	Coolbaggie Creek To Baroona (Gs421127)	4-Jul-22	16-Dec-22	-
4-Jul-22	100	Baroona (Gs421127) To Narromine (Gs421006)	4-Jul-22	16-Dec-22	-
4-Jul-22	100	Narromine (Gs521006) To Gin Gin Weir	4-Jul-22	16-Dec-22	3,210
4-Jul-22	100	Gin Gin Weir To Reddenville Break	4-Jul-22	16-Dec-22	180
4-Jul-22	100	Reddenville Break To Beleringar O/T	4-Jul-22	16-Dec-22	-
4-Jul-22	100	Beleringar O/T To Gunningbar O/T	4-Jul-22	16-Dec-22	3,050
4-Jul-22	100	Gunningbar O/T To Warren Weir	5-Jul-22	17-Dec-22	-
4-Jul-22	100	Warren Weir To Junction Creek Confluence	5-Jul-22	17-Dec-22	-
4-Jul-22	100	Junction Creek Confluence To Marebone Weir	5-Jul-22	17-Dec-22	1,525
4-Jul-22	100	Marebone Weir To Oxley (Gs421022)	5-Jul-22	17-Dec-22	185
4-Jul-22	100	Oxley (Gs421022) To Castlereagh River	5-Jul-22	17-Dec-22	-

Figure 64: Total supplementary usage for reporting period, by river section

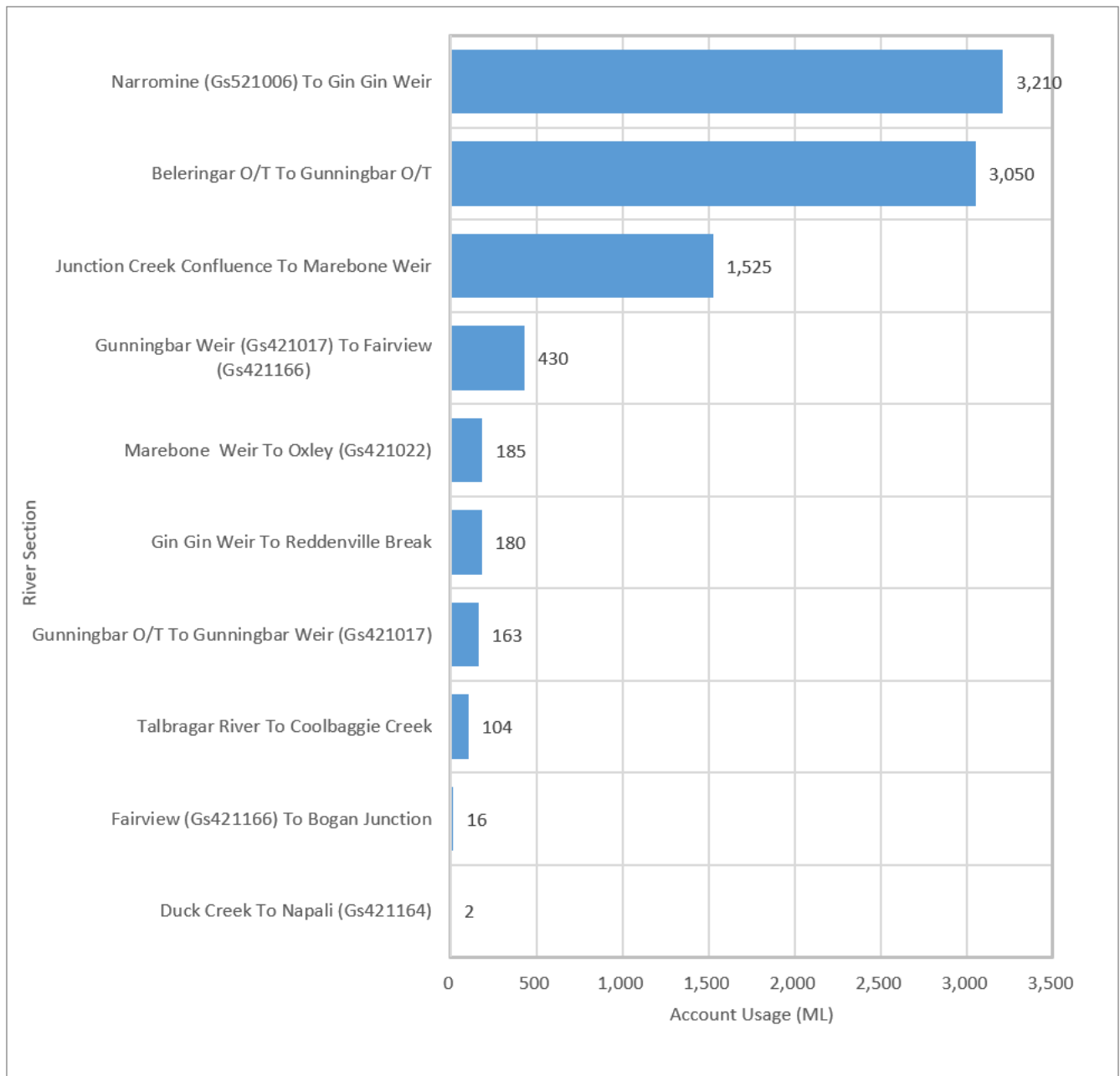
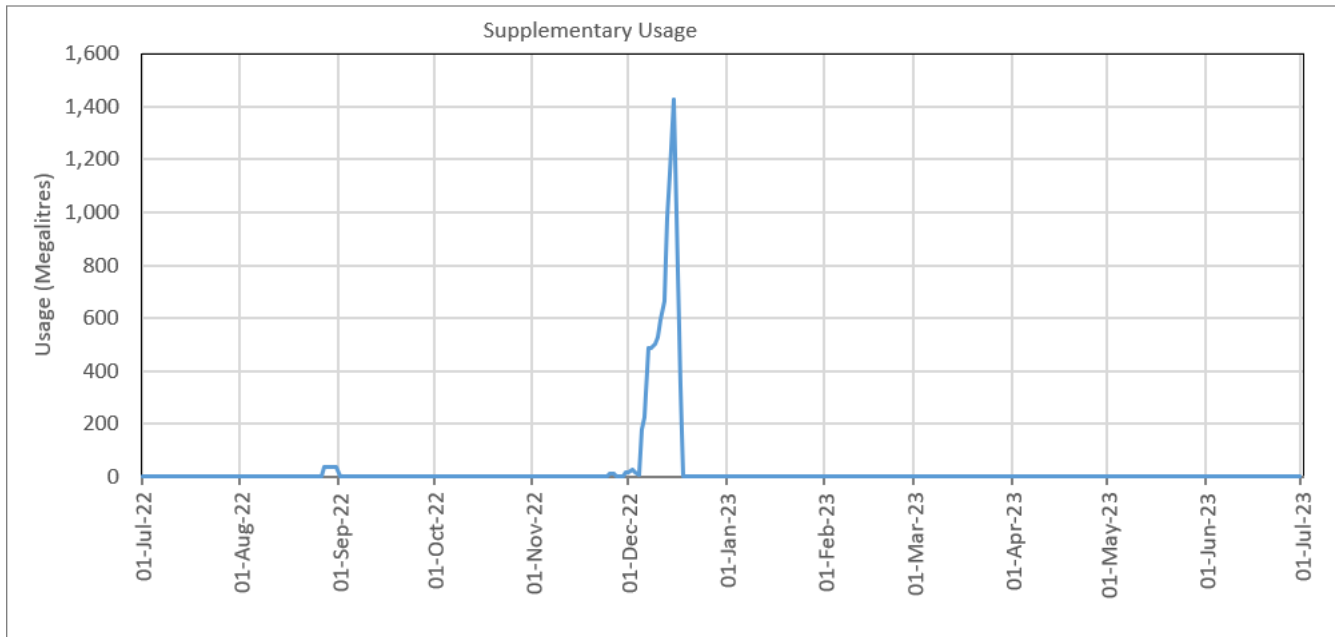


Figure 65: Supplementary water daily usage



Note 21—Replenishments 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 Climate Change, Energy, the Environment and Water 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 Climate Change, Energy, the Environment and Water

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 Information²⁴

Table 37: Replenishment flow summary for uncontrolled flow requirements

2022–23	Annual requirement	Estimated replenishment delivery	Event period	Source of supply	Performance
a) Gum Cowal / Terrigal system	Up to 10,000 ML/yr.	246,653 ML	01/07/2022 to 15/03/2023	Replenishment provided by rain and downstream tributary flows, combined with airspace releases and local rainfall runoff	System completely replenished
b) Crooked Ck. below Mumblebone	Up to 4000 ML/yr.	43,722 ML	01/07/2022 to 4/12/2023	Replenishment provided by rain and downstream tributary flows, combined with airspace releases and local rainfall runoff	The creek was fully replenished
c) Bogan R. Nyngan – Gunningbar confluence	Up to 1000 ML/yr.	Unable to estimate the exact volume. However as per the visual inspections our best estimate is more than 1000ML/d	01/07/2022 to 30/12/2022	Replenishment provided by rain and downstream tributary flows, combined with airspace releases and local rainfall runoff and flows from upper Bogan River	System completely replenished
d) Belaringar Ck. D/S of Albert Priest Channel	Up to 1000 ML/yr.	As the system was replenished by Belaringar creek, we are unable to estimate the flows. >1,000 ML estimated	01/07/2022 to 31/12/2022	System replenished with flow coming down from Belaringar creek	System completely replenished
e) Ewenmar Ck. (Reddenville Break)	Up to 1,500 ML/yr.	Unable to estimate exact volumes. However as per our best estimate over 996,759 ML was diverted.	01/07/2022 to 31/12/2022	Both pipe and road crossing flowed during period. No estimate.	Reddenville Break flowed for the period shown and replenished Birchell's Plain Ck. Ewenmar Ck. replenished by this flow along with flow from its own catchment.

²⁴Table 37, Table 38 and Table 39 extracted from Water NSW, Annual Compliance Report

2022–23	Annual requirement	Estimated replenishment delivery	Event period	Source of supply	Performance
f) Belaringar Ck. U/S	Up to 5000 ML/yr.	Estimated around 209,058 ML diverted	01/07/2022 to 31/12/2022	Replenishment provided by rain and downstream tributary flows.	System completely replenished.

Table 38: Replenishment flow summary for water made available from storage (or supplemented from uncontrolled flows)

2022–23	Annual requirement	Estimated replenishment delivery	Event period	Source of supply	Performance
a) Marra Ck.	Up to 15000 ML/yr.	Estimated Volumes * - measured at Carinda Rd (421097) - 366,696ML	01/07/2022 to 06/03/2023	Replenishment provided by rain and downstream tributary flows, combined with airspace releases and local rainfall runoff.	System completely replenished
b) Lower Bogan River	Up to 15000 ML/yr.	Estimated Volumes - measured at d/s. Fairview (421166) Estimates 167,731ML.	01/07/2022 to 30/06/2023	Replenishment provided by rain and tributary flows. Approx. 167,731 ML measured at Fairview provided from tributaries joining Macq River and the rest was provided by flows from Bogan River	System completely replenished.

Table 39: Replenishment flows downstream of Macquarie Marshes

2022–23	Annual requirement	Volume diverted	Event period	Source of supply	Performance
Macquarie River D/S Macquarie Marshes.	Twice Yearly	Measured at Pillicawarrina (421147) Total measured 1,465,990 ML	01/07/22 to 30/06/2023	NMBC opened to connect flows with Marthaguy CK flow, flows provided by tributaries, Active and translucent flows, and environmental licenced flow releases.	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).

While a detailed water budget for the groundwater aquifer had previously been reported within the water accounting statements (Macquarie–Bogan catchment General Purpose Water Accounting Report 2010-11), this 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 Climate Change, Energy, the Environment and Water

Data source

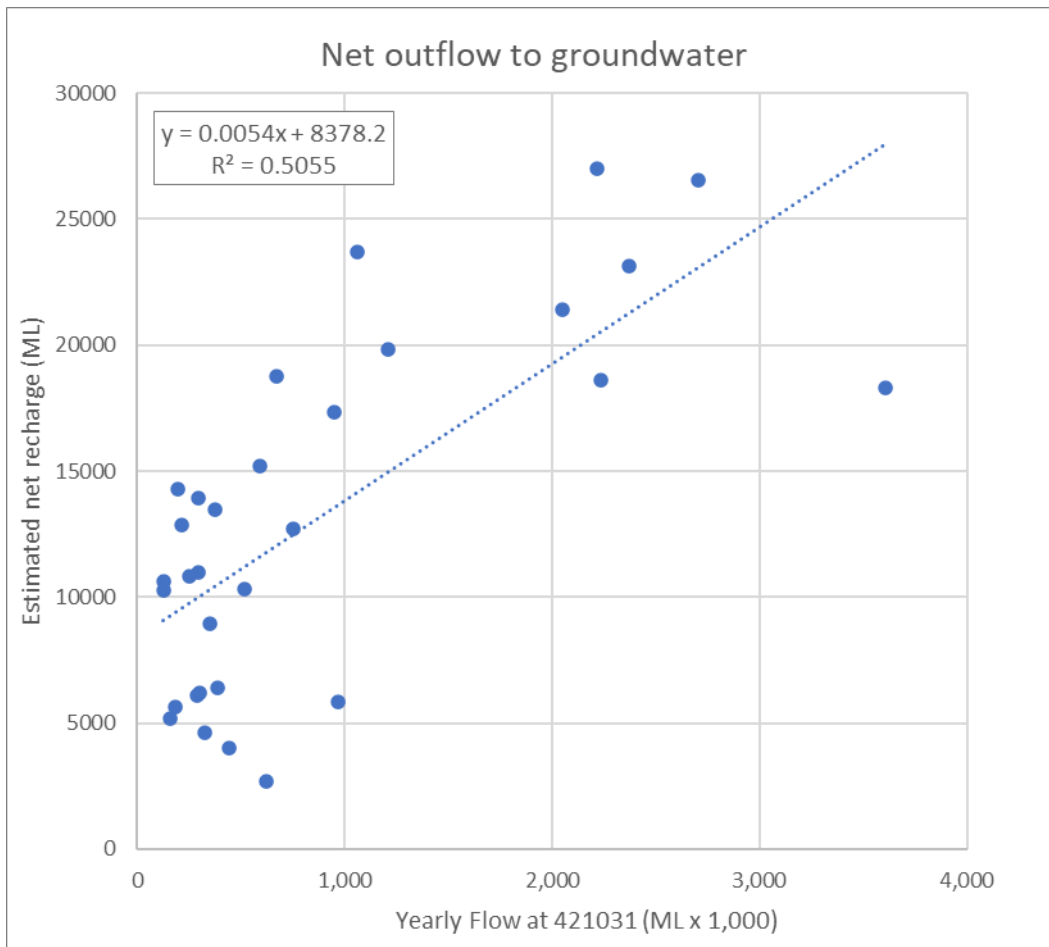
NSW Department of Climate Change, Energy, the Environment and Water MODFLOW (Data inputs from HYDSTRA, GDS)

Methodology

For the lower Macquarie groundwater source the method used to calculate either flow from the connected alluvium to the accounted river extent and the accounted river extent to the alluvium aquifer can be either of the following:

- If available use the estimated annual budget from the NSW Department of Climate Change, Energy, the Environment and Water 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 Climate Change, Energy, the Environment and Water website at www.industry.nsw.gov.au/water)
- Alternatively an estimation based on the relationships developed between the flow at river gauging site '421031 Macquarie River at Gin Gin' and historical MODFLOW model results (Figure 66). The resulting equations used for estimating the accounting input are as follows:
 - Net Outflow to Aquifer = $0.0054 \times \text{Annual Flow (gauging site 421031)} + 8,378$

Figure 66: Net outflow to groundwater relationship chart



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

Additional information

No annual groundwater budget from Method A is available for the reporting period.

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. 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. 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 Climate Change, Energy, the Environment and Water.

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

The adjusting entries applicable for the reporting period are provided below (Table 40)

Table 40: 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