



GENERAL PURPOSE WATER ACCOUNTING REPORT

Macquarie Catchment

2020–21



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Contents

Acknowledgement of Country	1
Director’s foreword	2
Contextual statement	3
Accounting extent	4
Snapshot	6
Climate	6
Dam inflows and volume	10
Long-term trends	10
Burrendong Dam	10
Windamere Dam	12
Major high flow events	14
Surface water resources and management	15
Legislation	15
Access licence account management	15
Cudgegong details	15
Macquarie details	26
Replenishment flows	37
Environmental water	38
Planned environmental water	38
Held environmental water	38
Water accounting statements	41
Significant water accounting policies	42
Quantification of data	42
Data accuracy	42
2020–21 Macquarie and Cudgegong physical flows mass balance diagram	43
Statement of water assets and water liabilities	44
Changes in water assets and water liabilities	45
Note disclosures	49
Reconciliation and future prospect descriptions	50
Detailed item notes	53
Note 1—Allocation accounts	53
Note 2—Available water determination (AWD) (allocation announcement)	57
Note 3—Allocation account usage	63
Note 4—Internal trading (allocation assignments)	65
Note 5—Storage spill account reset	67
Note 6—Held environmental water	69
Note 7—Environmental provisions	74
Note 8—Surface water storage	76

Note 9—River channel storage	77
Note 10—Storage inflow	78
Note 11—Storage evaporation and storage rainfall	79
Note 12—River evaporation and river rainfall	80
Note 13—Gauged tributary inflow	81
Note 14—Ungauged runoff estimate	82
Note 15—Dam releases, river inflow from dam releases	83
Note 16—End of system/Regulated effluents	85
Note 17—Flow to Macquarie Marshes	87
Note 18—Extractions from river	89
Note 19—Basic rights extractions	90
Note 20—Supplementary extractions.....	91
Note 21—Replenishments flows	95
Note 22—River and groundwater interaction	98
Note 23—Unaccounted difference	99
Note 24—Adjusting entry	100
References.....	101

Abbreviations

Abbreviation	Description
ARCGIS	mapping and spatial analysis platform for designing and managing solutions through the application of geographic knowledge
AWAS 1	Australian Water Accounting Standard 1
AWD	available water determination
BoM	Bureau of Meteorology
CAIRO	computer-aided improvements to river operations
ECA	environmental contingency allowance
GIS	geographic information system
GPWAR	general purpose water accounting report
IQQM	integrated quantity and quality model
MDBA	Murray–Darling Basin Authority
ML	megalitres (1,000,000 litres)
ML/d	megalitres per day
MODFLOW	modular, 3-dimensional, finite-difference groundwater flow model
SILO	climatic data provision system run by the Queensland Government for the provision of both measured and modelled data
WASB	Water Accounting Standards Board
WaterNSW	WaterNSW is a New South Wales Government–owned statutory corporation that is responsible for supplying the state’s bulk water needs, and operating the state’s river systems and dams
WSP	water sharing plan

Glossary

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

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

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

Acknowledgement of Country

NSW 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 hold the land and waters of the New South Wales Macquarie River catchment area being 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.

Director's foreword

This is the 12th 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 2020 to 30 June 2021 (reporting period) under the Australian Water Accounting Standard 1 (WASB, 2012).

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

Included in the GPWAR are:

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

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 Planning and Environment, 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 Planning and Environment has to the best of its ability prepared this GPWAR in accordance with the Australian Water Accounting Standard 1



Danielle Baker

Director Water Analytics

NSW Department of Planning and Environment

Contextual statement

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

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

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

The Macquarie catchment is regulated by 2 major storages. Burrendong Dam supplies water for irrigation as well as town water and stock and domestic requirements along the Macquarie River and the lower Bogan River. It also stores water for environmental requirements in the lower valley including the Ramsar-listed wetlands in the Macquarie Marshes. Windamere Dam, on the Cudgegong River upstream of Burrendong Dam, provides water for the towns of Mudgee and Gulgong and is operated in conjunction with Burrendong to supply water requirements along the Cudgegong River and the lower Macquarie valley.

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

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

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

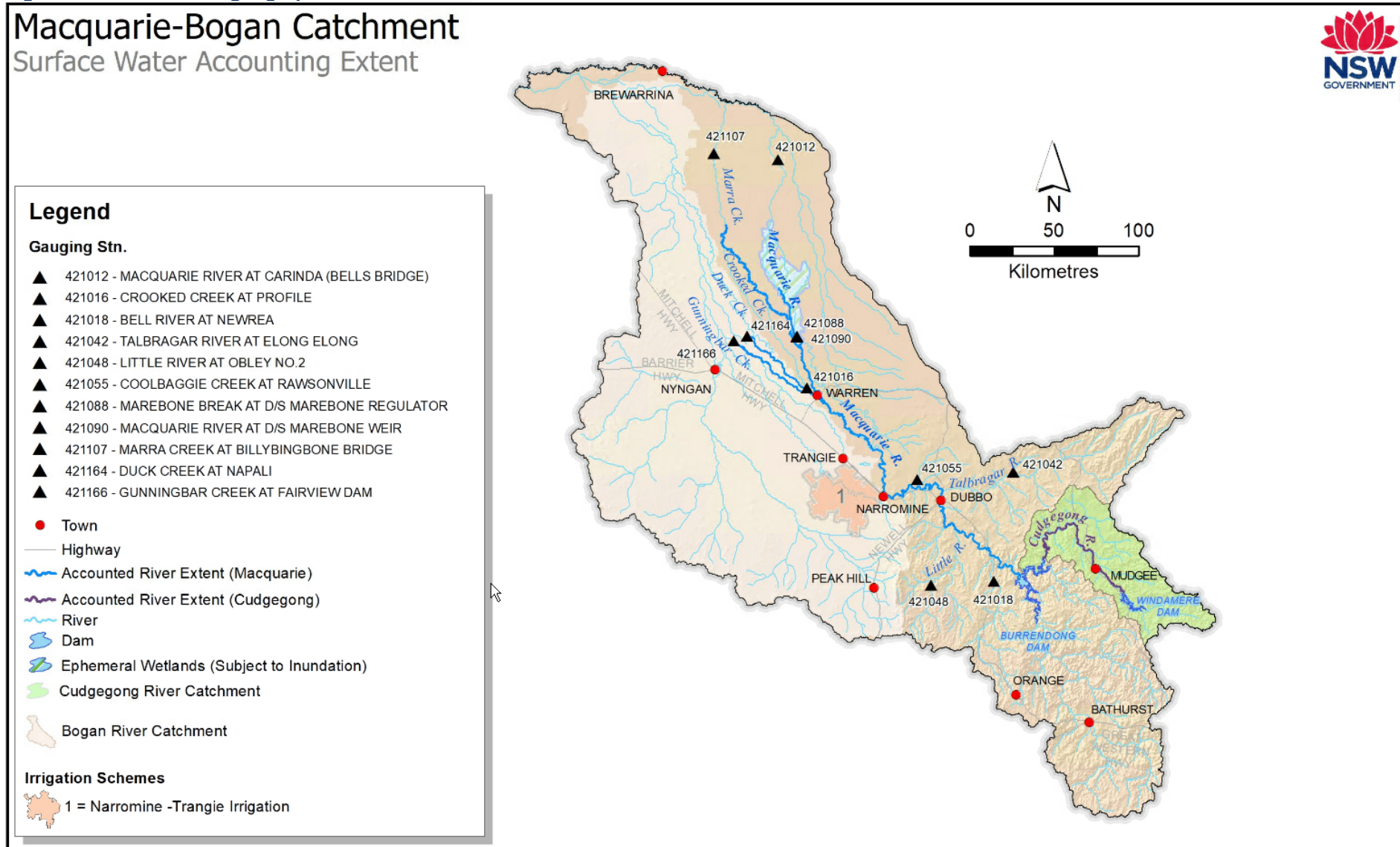
Accounting extent

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

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

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](#).

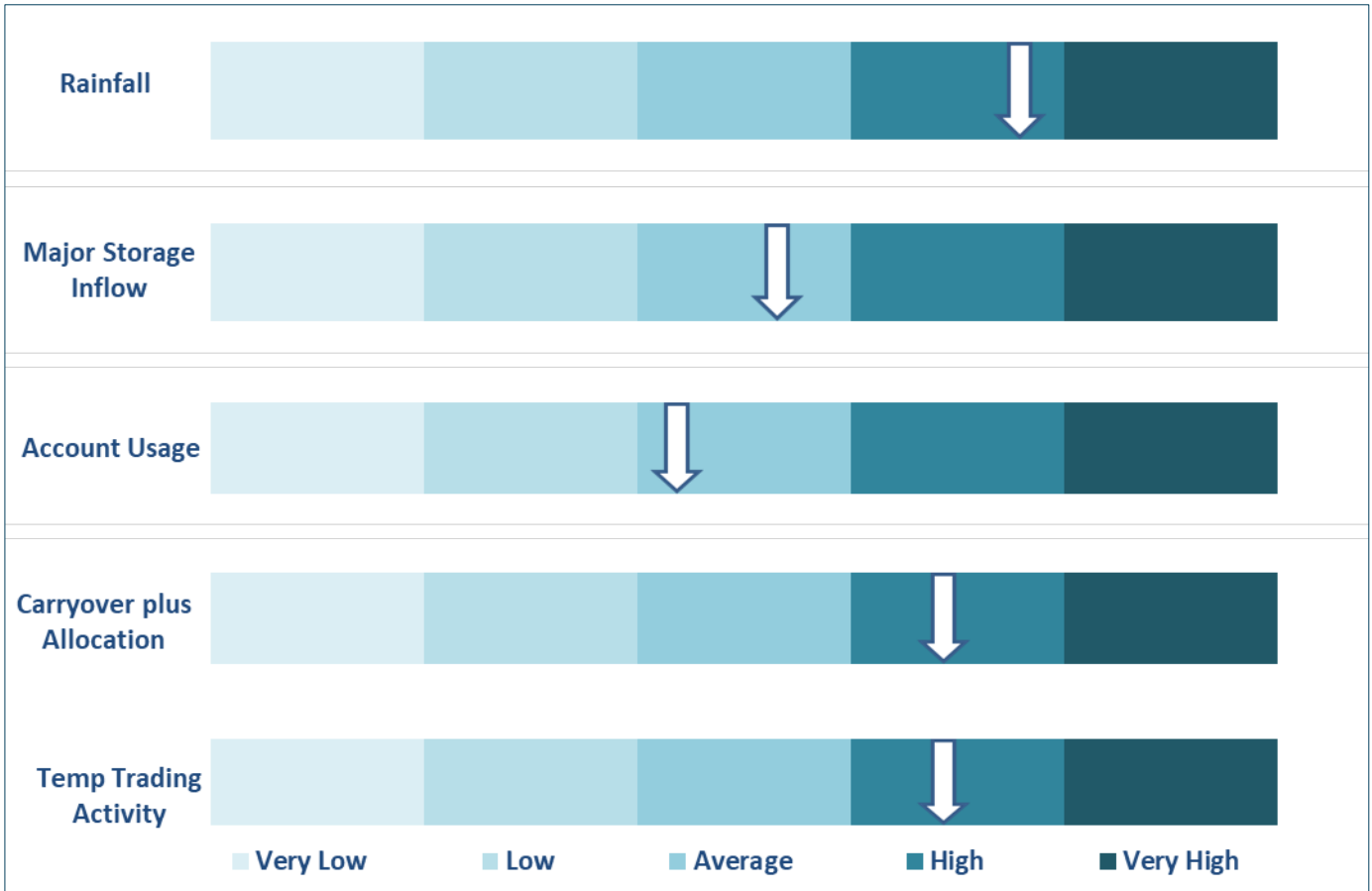
Figure 1: Surface water geographical extent of the accounts



Snapshot

The key indicators for 2020–21 relative to other years under water sharing plan management conditions are presented in Figure 2. Rainfall, effective allocation (carryover plus allocation) and temporary trading activity were in the high range relative to historical information, while major storage inflow and account usage were average.

Figure 2: 2020–21 Summary indicators



Climate

At Bathurst (upper catchment), 724 millimetres of rainfall was recorded for the reporting period (Table 1). Comparatively this volume of rainfall is

- 115% of the long-term historical median for rainfall at this location.
- 66% of the highest rainfall on record at this location.
- The highest monthly rainfall occurred in March 2021 (135 millimetres) and February 2021 (98 millimetres) (Figure 3 and Figure 4).

At Warren (lower catchment), 698 millimetres of rainfall was recorded for the reporting period (Table 2). Comparatively this volume of rainfall is

- 149% of the long-term historical median for rainfall at this location.
- 68% of the highest rainfall on record at this location.
- The highest monthly rainfall occurred in March 2021 (235 millimetres) and February 2021 (100 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 apart from a small area around Bourke.

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

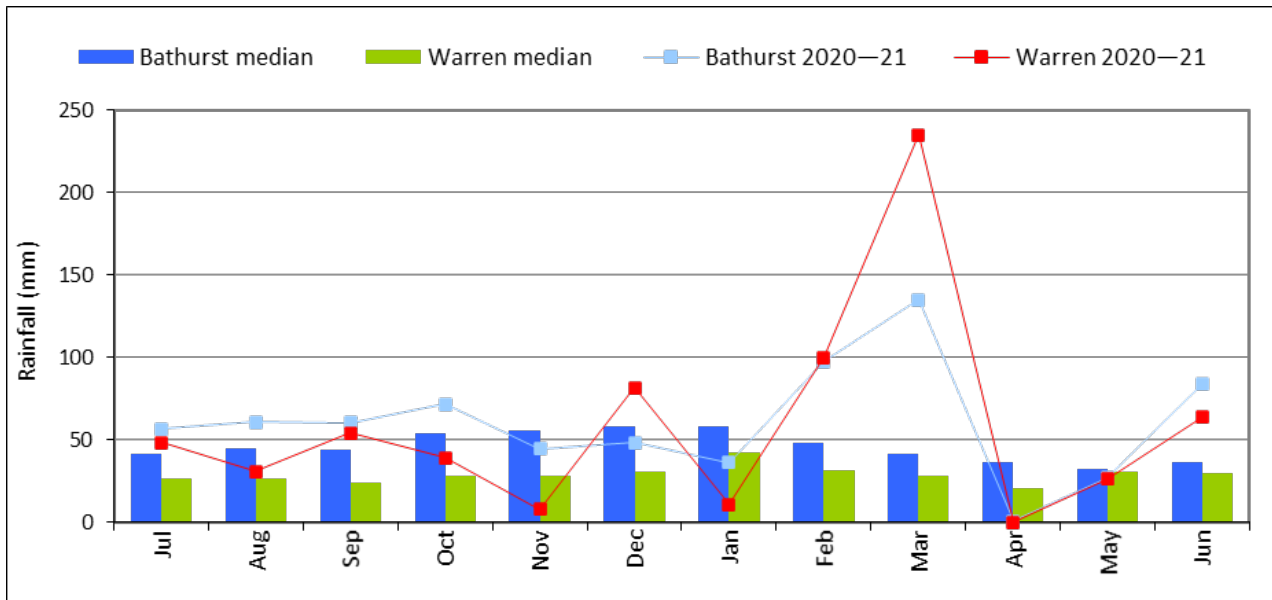


Figure 4: Monthly rainfall historical median deviations at Bathurst and Warren

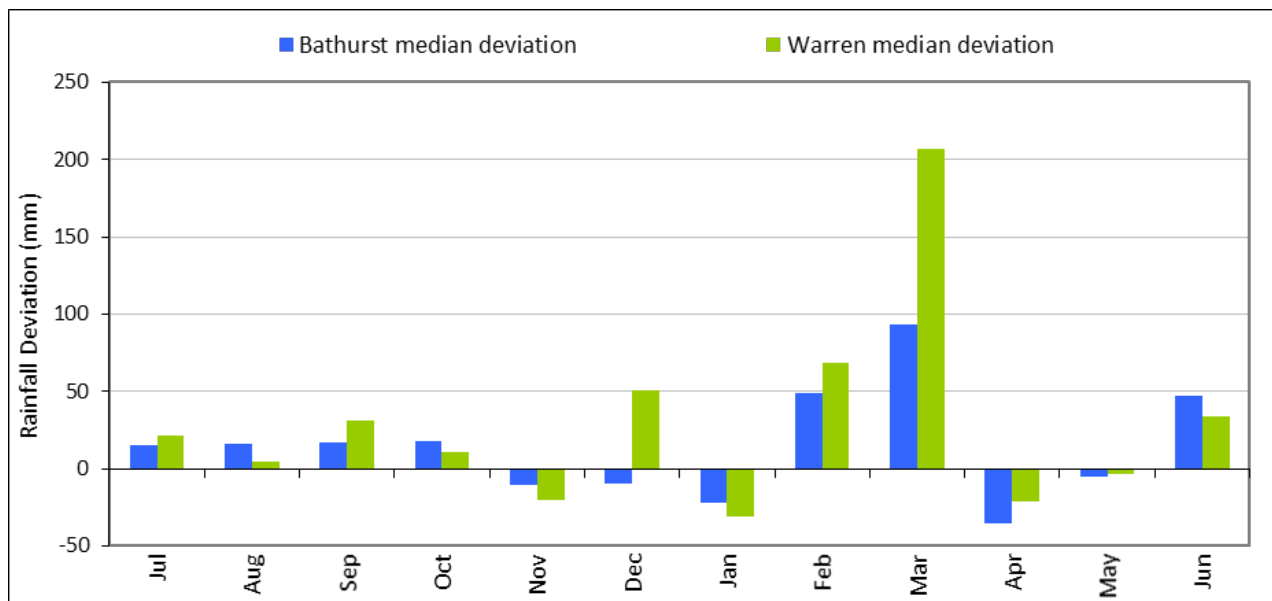


Table 1: 2020–21 monthly rainfall and historic monthly rainfall statistics at Bathurst¹

Bathurst	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Annual
2020–21	56.9	60.8	60.6	71.8	44.8	48.3	36.2	97.6	135.2	1.0	27.0	83.6	723.8
Historical mean	48.1	49.2	47.1	58.7	60.7	65.5	68.0	58.1	53.6	41.6	41.2	44.3	636.0
Historical median	41.7	44.6	43.6	53.8	55.4	58.1	57.9	48.4	41.8	36.5	32.6	36.8	627.4
Historical low	3.7	1.4	3.8	2.3	0.8	0.0	1.4	0.0	0.0	0.5	1.0	0.8	375.3
Historical high	154.7	163.2	130.9	215.8	195.7	218.5	223.7	235.5	205.3	166.0	115.0	193.1	1100.0
Year of high	1921–22	1985–86	2015–16	1998–99	1960–61	2009–10	1977–78	1970–71	1925–26	1989–90	1994–95	1915–16	1949–50

Table 2: 2020–21 monthly rainfall and historic monthly rainfall statistics at Warren¹

Warren	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Annual
2020–21	48.2	31.0	54.4	39.1	7.8	81.8	10.7	100.0	234.9	0.0	26.5	63.8	698.2
Historical mean	33.7	33.3	30.6	39.6	38.2	42.0	56.7	49.9	45.7	37.9	37.5	39.3	483.6
Historical median	26.5	26.5	23.6	28.1	28.3	31.0	42.0	31.5	28.2	21.0	30.3	29.8	469.3
Historical low	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	181.9
Historical high	130.8	144.5	145.0	173.8	205.1	237.0	241.9	363.0	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 2021 for Bathurst and 1889 to 2021 for Warren.

Figure 5: Macquarie annual rainfall for 2020–21

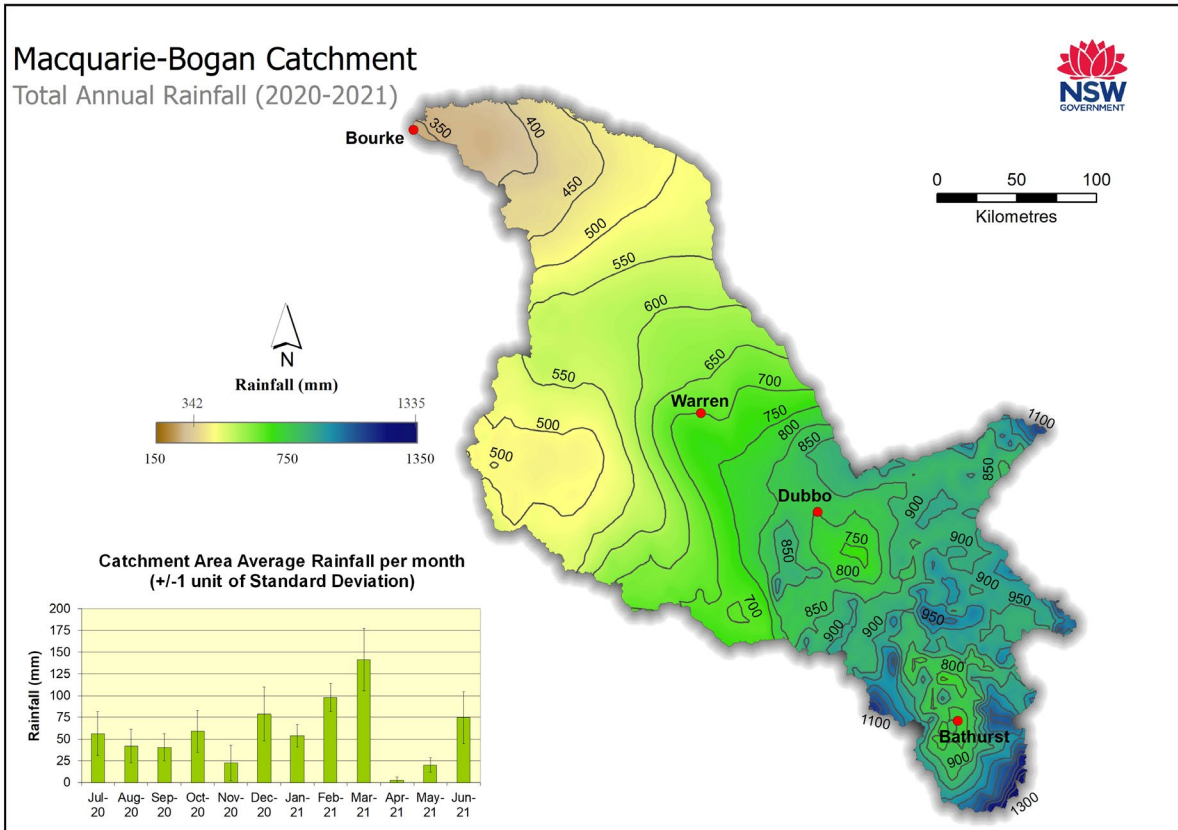
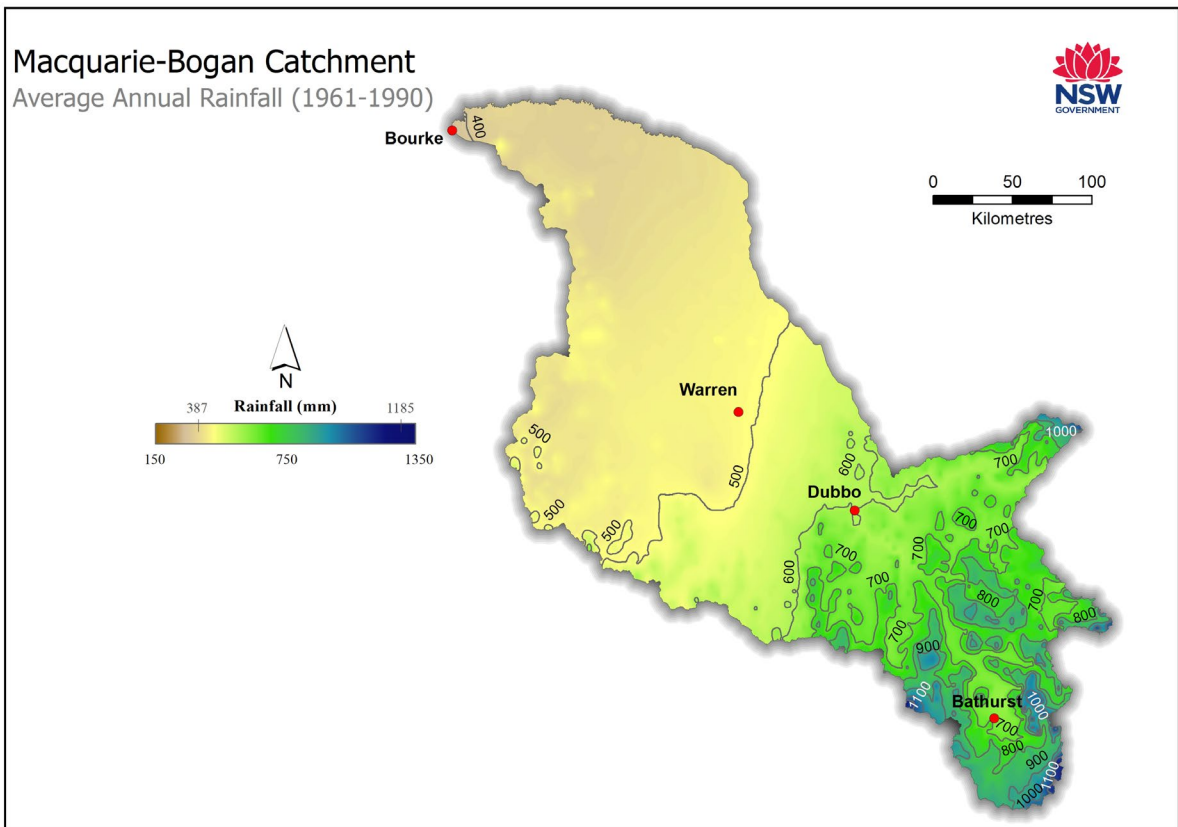


Figure 6: Average annual rainfall in the Macquarie catchment (1961–90)



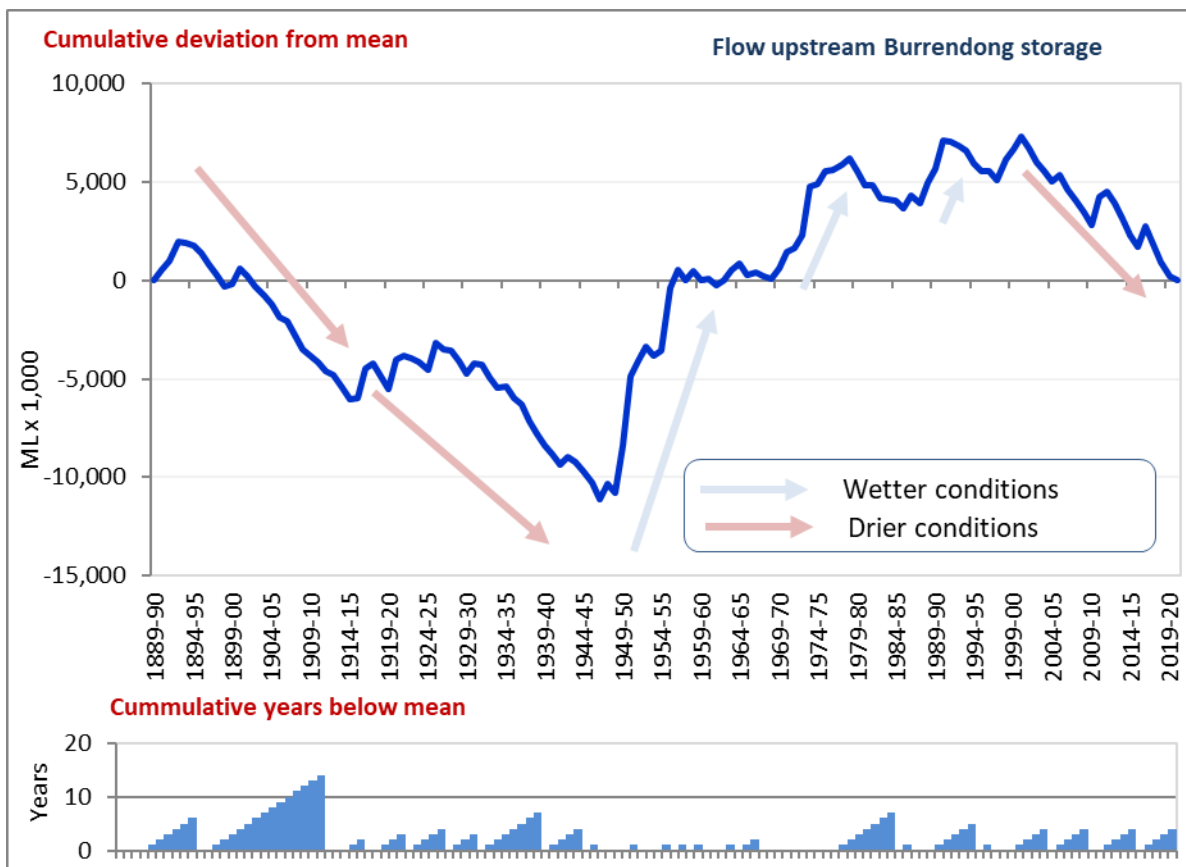
Dam inflows and volume

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 present.

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



Burrendong Dam

Inflow

For the reporting period, the total inflow to Burrendong Dam was 755,122 megalitres (Figure 8), which is:

- 104% of the long-term median annual inflow (739,000 megalitres)
- moderate compared to the long-term data set exceeded 52 per cent of years in dataset (1890-91 to 2020-21)
- the first year above median in 4 years

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

The maximum mean daily inflow rate for the reporting period was 53,374 megalitres, occurring on 24 March 2021 (Figure 9).

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

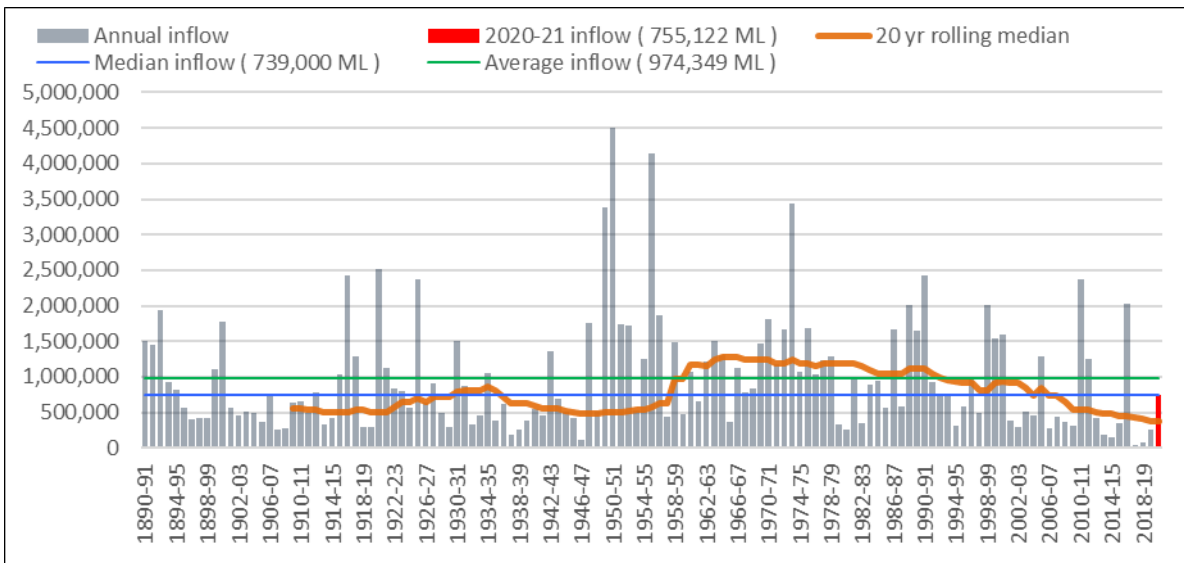
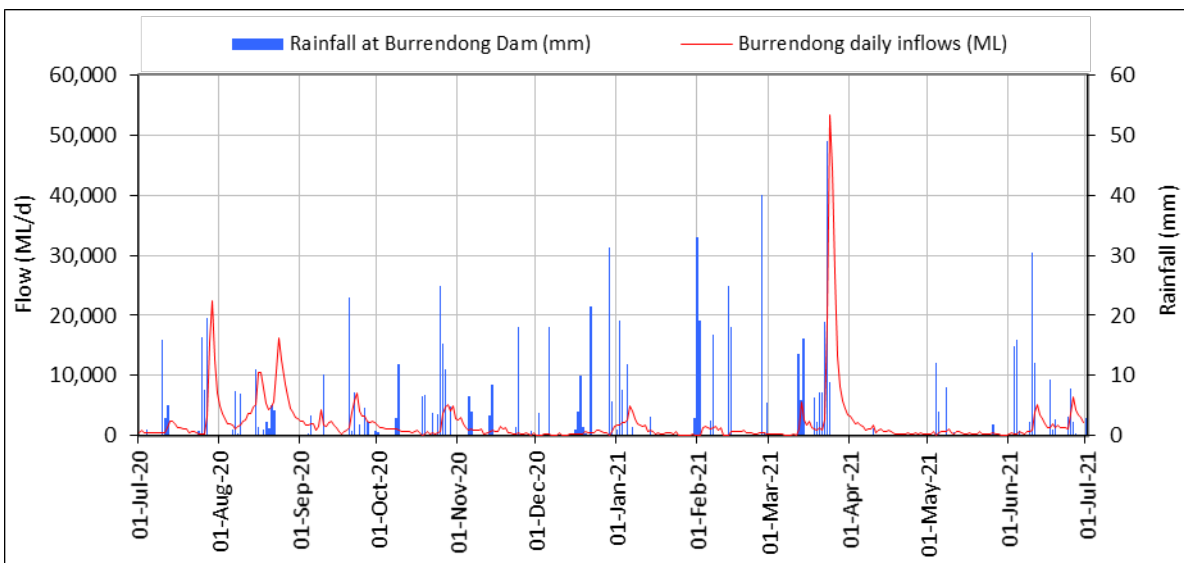


Figure 9: Daily inflows and rainfall at Burrendong

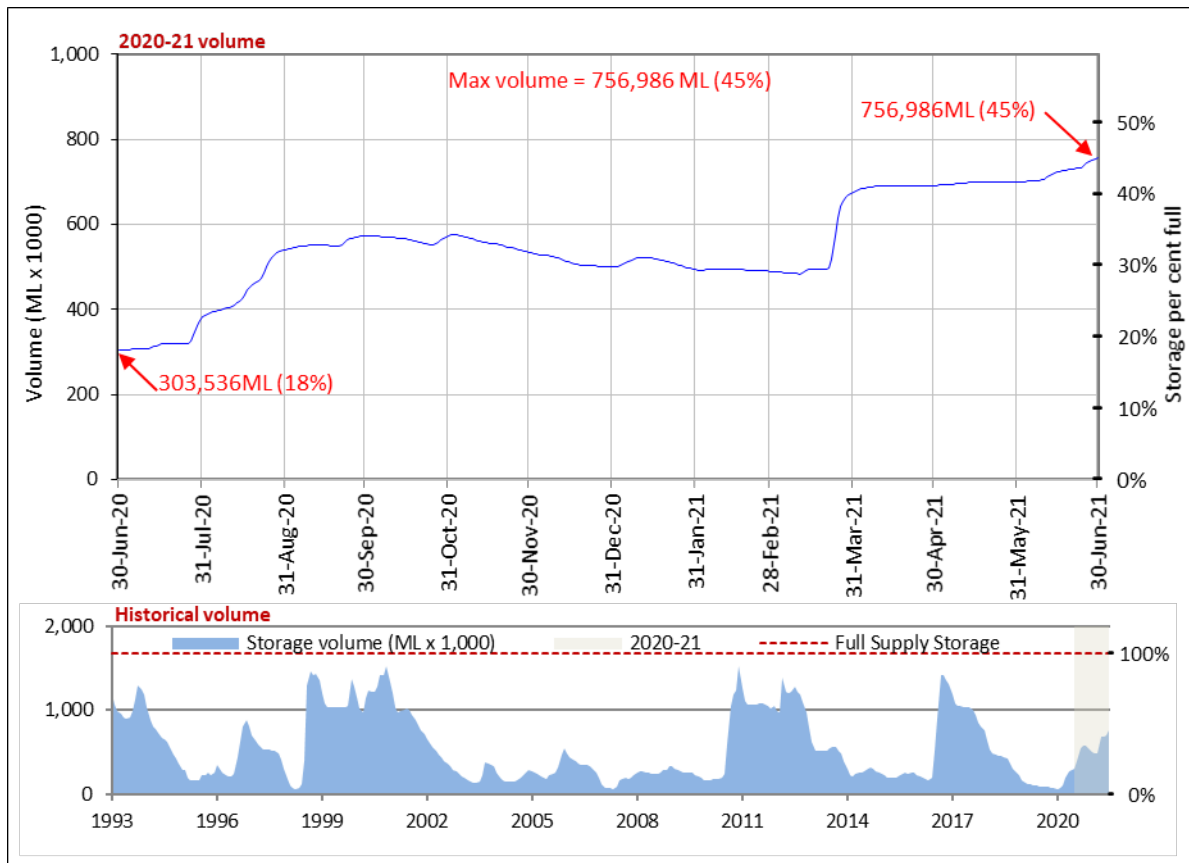


Storage volume

Burrendong storage volume:

- commenced the reporting period at 303,536 megalitres or 18% of full supply capacity (Figure 10)
- ended the reporting period at 756,986 megalitres or 45% of full supply, an increase of 27% for the water year
- had a maximum volume during the reporting period of 756,986 megalitres, occurring on 30 June 2021.

Figure 10: Burrendong Dam volume and percentage full



Windamere Dam

Inflow

For the reporting period, the total inflow to Windamere Dam was 41,081 megalitres (Figure 11), which is:

- 105% of the long-term median annual inflow (39,175 megalitres)
- moderate in comparison to the long-term data set, exceeded 55 per cent of years in dataset (1890-91 to 2020-21)
- the first year above median in 4 years.

The maximum mean daily inflow rate for the reporting period was 8,394 megalitres, occurring on 23 March 2021 (Figure 12).

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

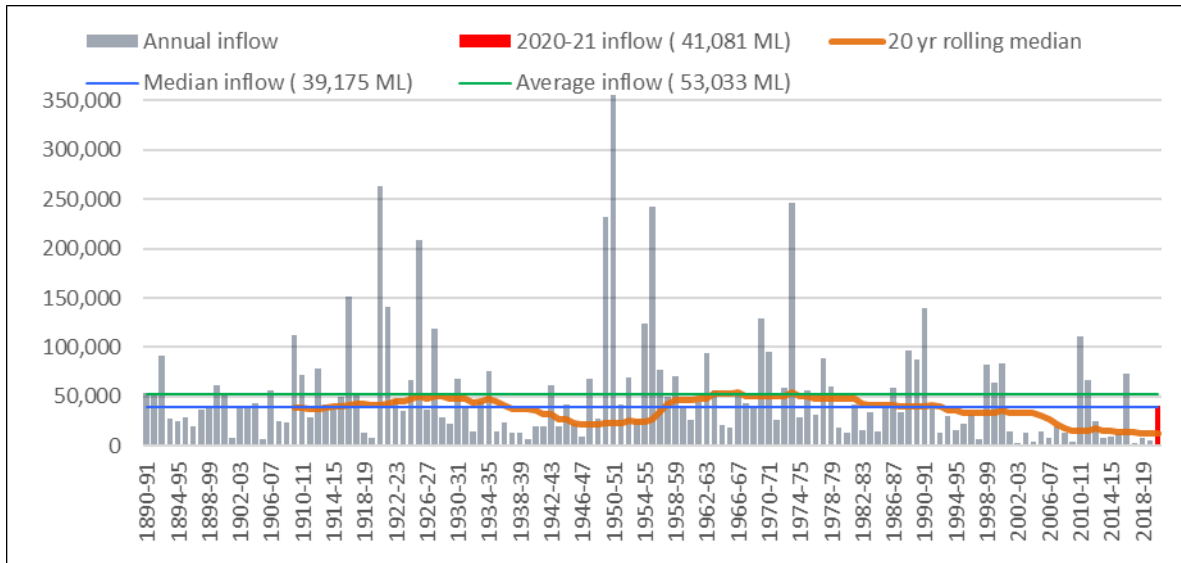
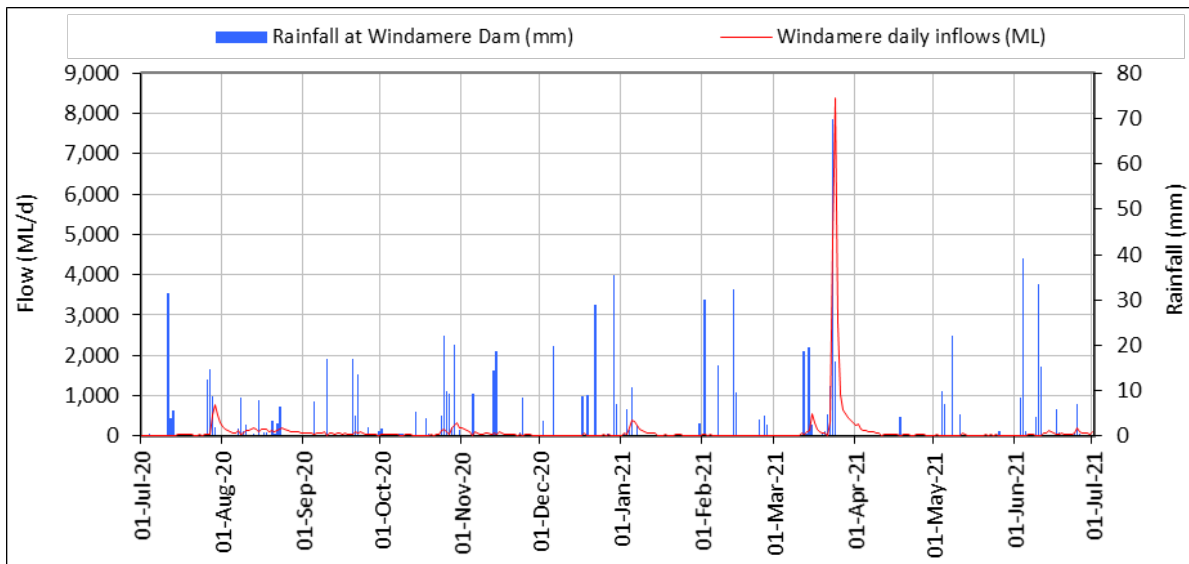


Figure 12: Daily inflows and rainfall at Windamere Dam

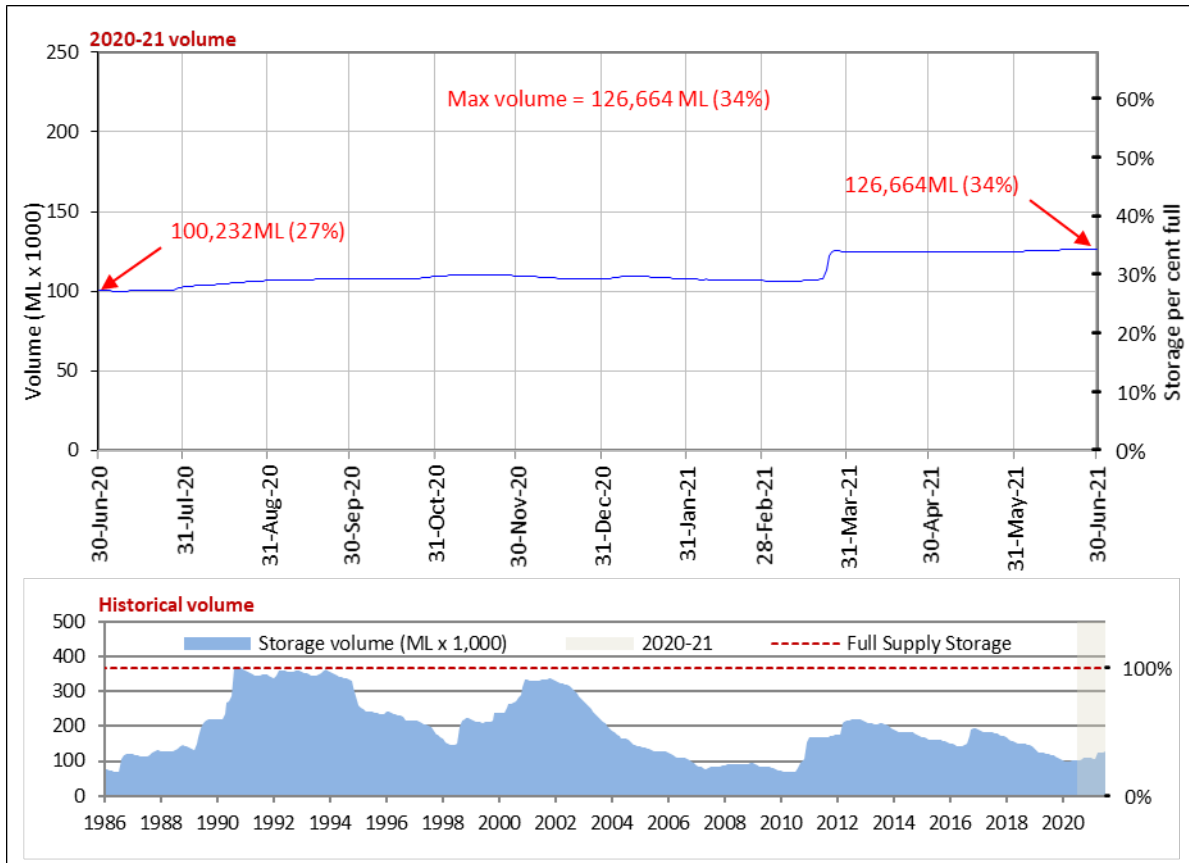


Storage volume

Windamere storage volume:

- commenced the reporting period at 100,232 megalitres or 27% of full supply capacity (Figure 13)
- ended the reporting period at 126,664 megalitres or 34% of full supply, an increase of 7% for the water year
- had a maximum volume during the reporting period of 126,664 megalitres, occurring on 30 June 2021.

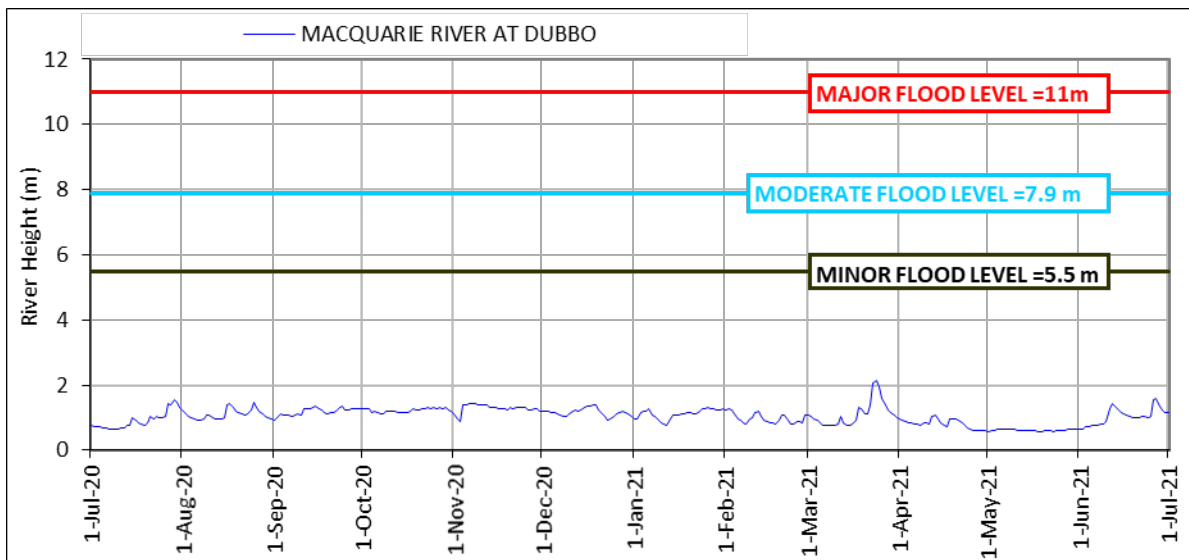
Figure 13: Windamere Dam volume and percentage full



Major high flow events

There were no major high flow events in Macquarie River at Dubbo in 2020-21 (Figure 14). River level at Dubbo remained at or below 2 metres for the entire reporting period.

Figure 14: Macquarie River at Dubbo maximum daily flow heights



Surface water resources and management

Legislation

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

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 to provide a framework for managing extreme events in the major river systems of the NSW Murray–Darling Basin. This framework is based on a staged approach, providing a range of measures for water managers to implement as conditions deteriorate.

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

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

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

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

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

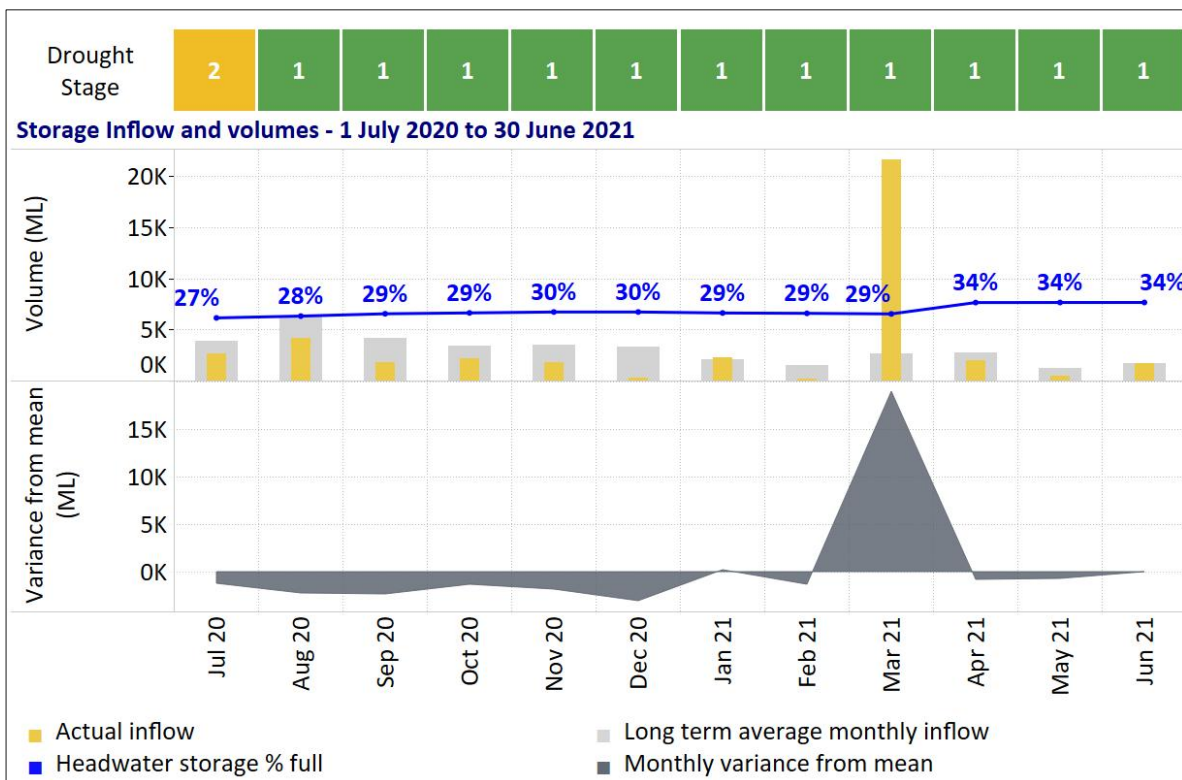
Temporary water restrictions for the reporting period

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

Extreme events stage

- The Cudgegong Regulated River Water Source was in stage 2 (emerging/recovering drought) at the commencement of the reporting period but reverted to stage 1 from August till the end of the reporting period (Figure 15). Only one month of the year (March 2021) received an above average storage inflow to Windamere Dam.

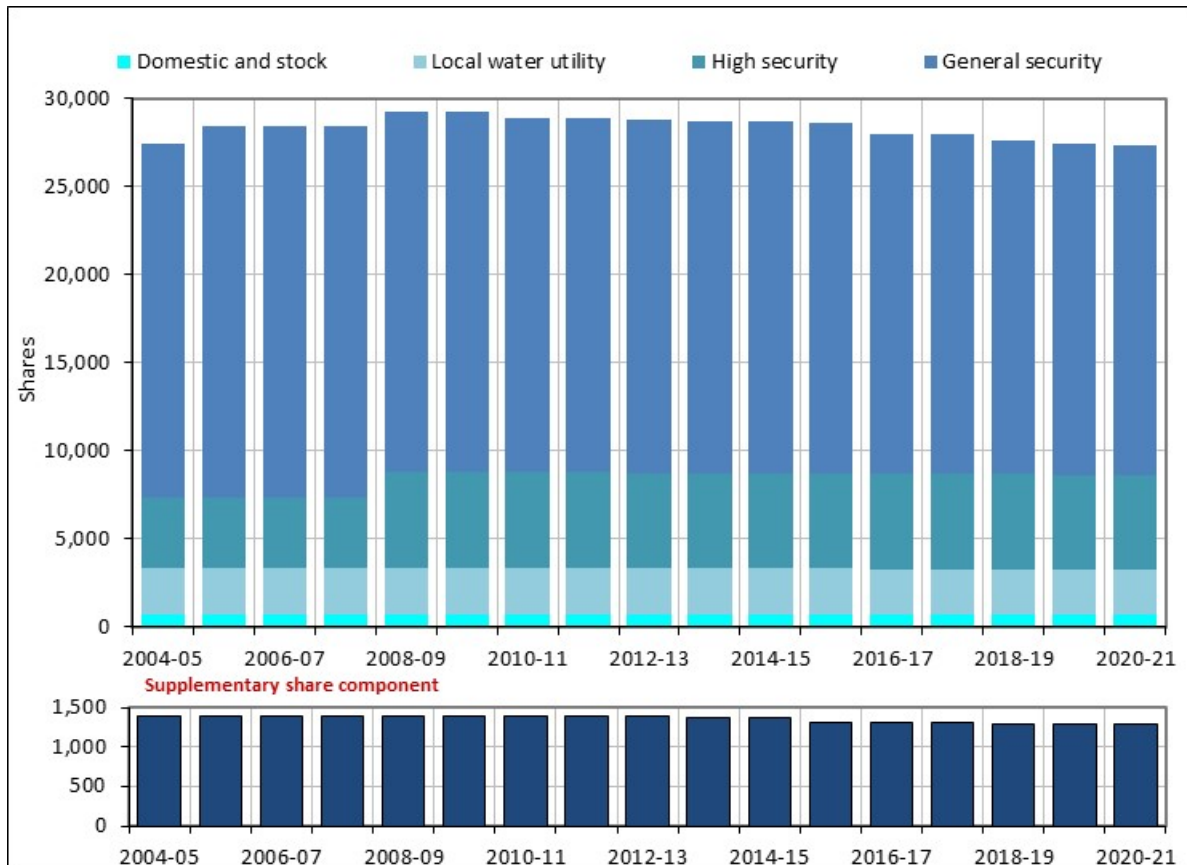
Figure 15: Drought stage for the reporting period referenced with monthly headwater storage inflow and long-term monthly inflow mean (Windamere Storage)



Access rights

- Total issued share component of general security within the Cudgegong decreased by 222 shares (107 General Security and 115 High Security), which was moved downstream to the Macquarie (Figure 16). Share in Domestic and Stock (Domestic) increased by 2 shares due to new licences issued.
- The total issued shares at the end of the reporting period was 28,700 including 1,290 shares of supplementary access licences.

Figure 16: 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 17 and Figure 18 respectively. Detailed information on the water accounts for all categories of licence issued are provided in Note 1 of this report.

Figure 17: Annual water account summary Cudgegong General Security

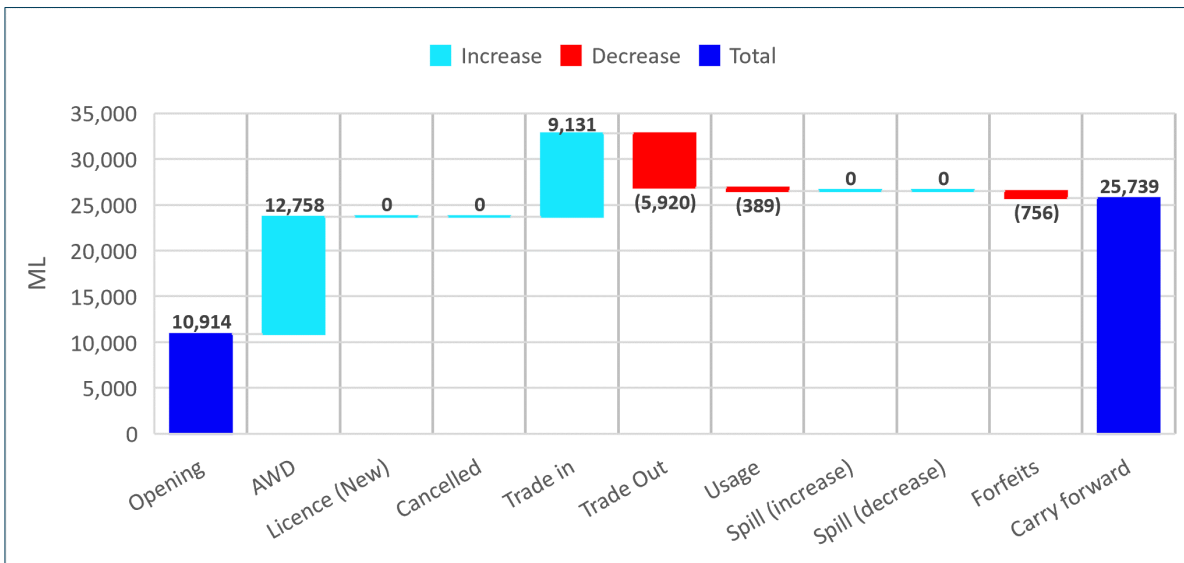
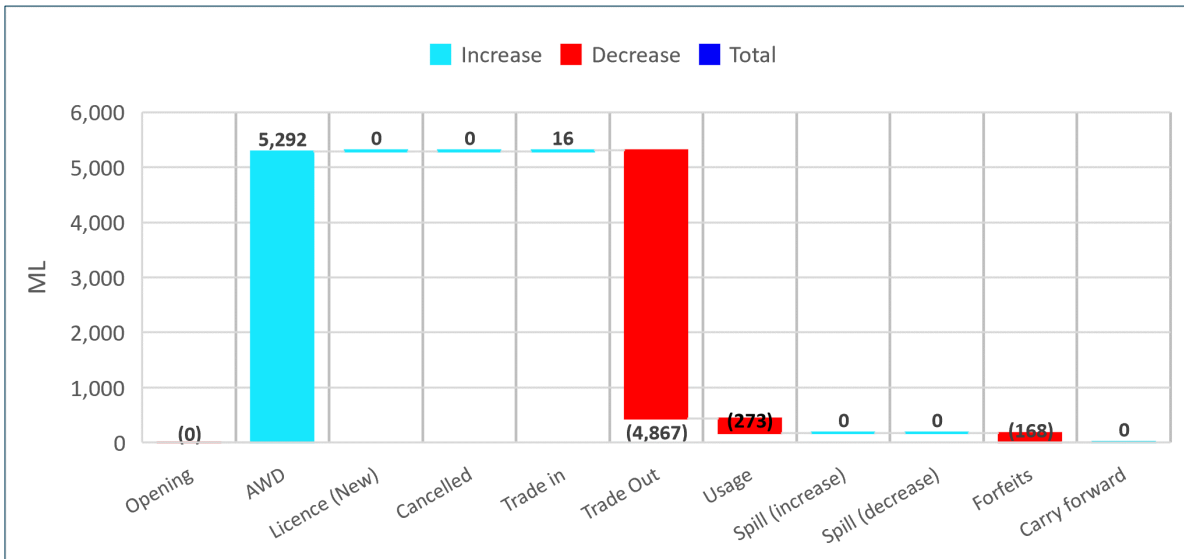


Figure 18: Annual water account summary Cudgegong High Security (includes sub-categories)

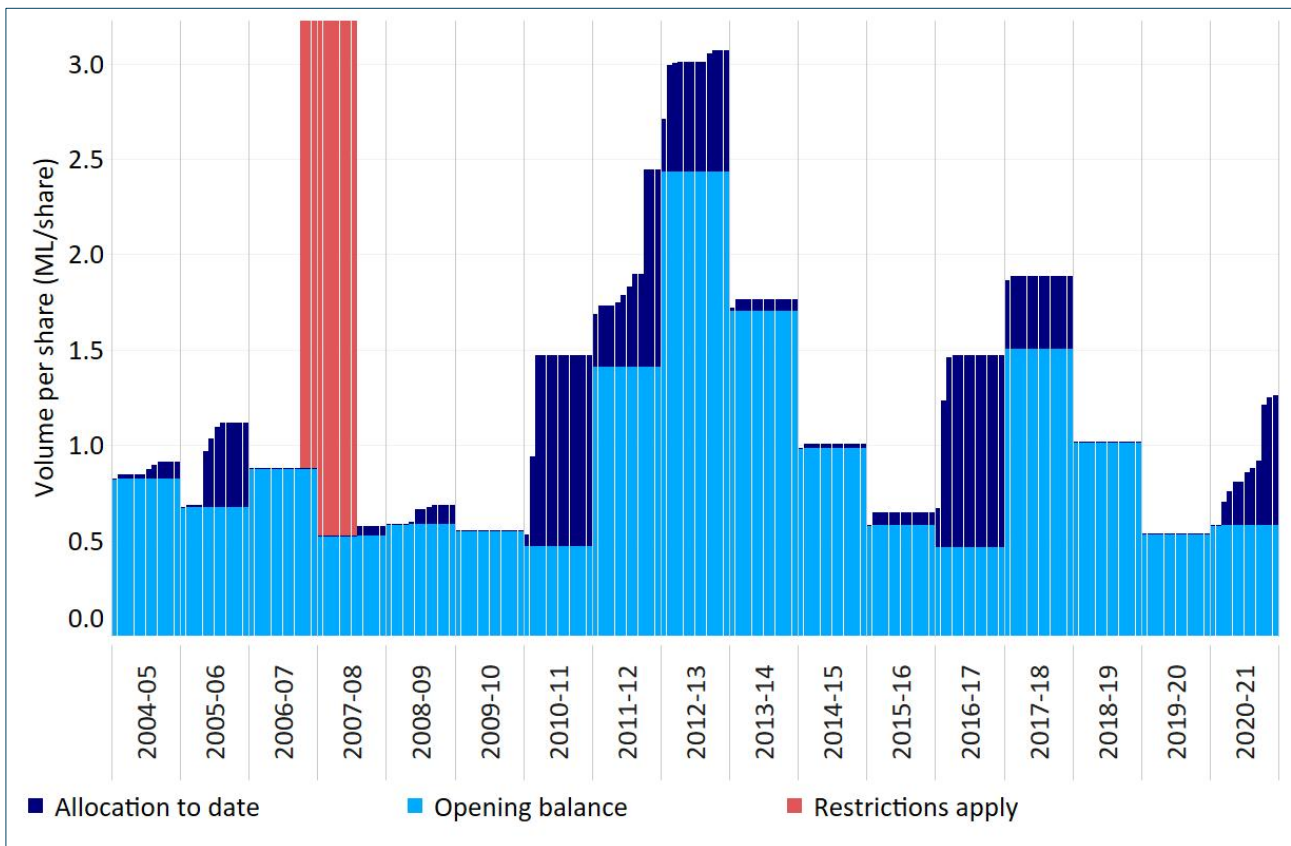


Water availability

- 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 10,914 megalitres into the reporting period, equating to 58% of issued share component for this category (in the Cudgegong).
- General security access licence received an opening available water determination of 0 megalitres per share, with further announcements being made throughout the year reaching a cumulative total of 0.63 ML/share by end of the reporting period. Carryover and AWD allocation as a proportion of share for the reporting period and historical water sharing plan management are illustrated in Figure 19.

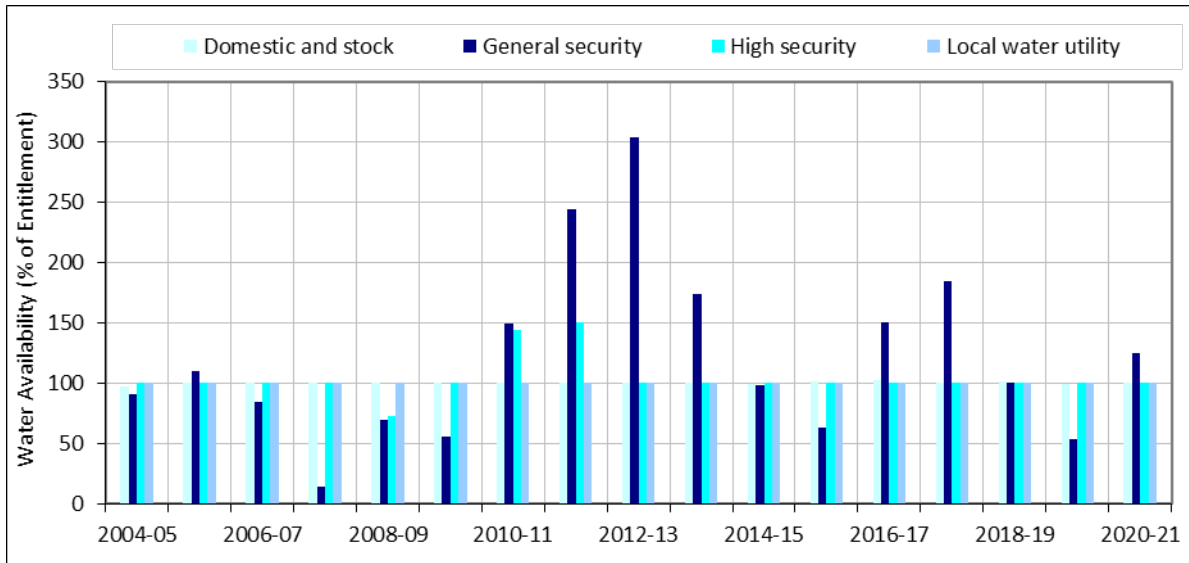
- Supplementary licence holder received an AWD of 1 megalitre per share. Each year of the plan this licence category has been granted an available water determination of 1 megalitre per share, however access to this water is contingent on high flow events available. Actual usage information against this category of licence is available in note 20 of this GPWAR.
- Total water availability⁴ was the highest since 2017–18 (Figure 20)
- No storage spill allocation adjustments were applicable in the reporting period. Storage spill allocations adjustments occurred in 2010–11, 2011–12 and 2016–17 (full reset of allocation accounts to 1 megalitre per share). Refer to Note 5 (detailed item notes) for more information on this accounting process.

Figure 19: 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.

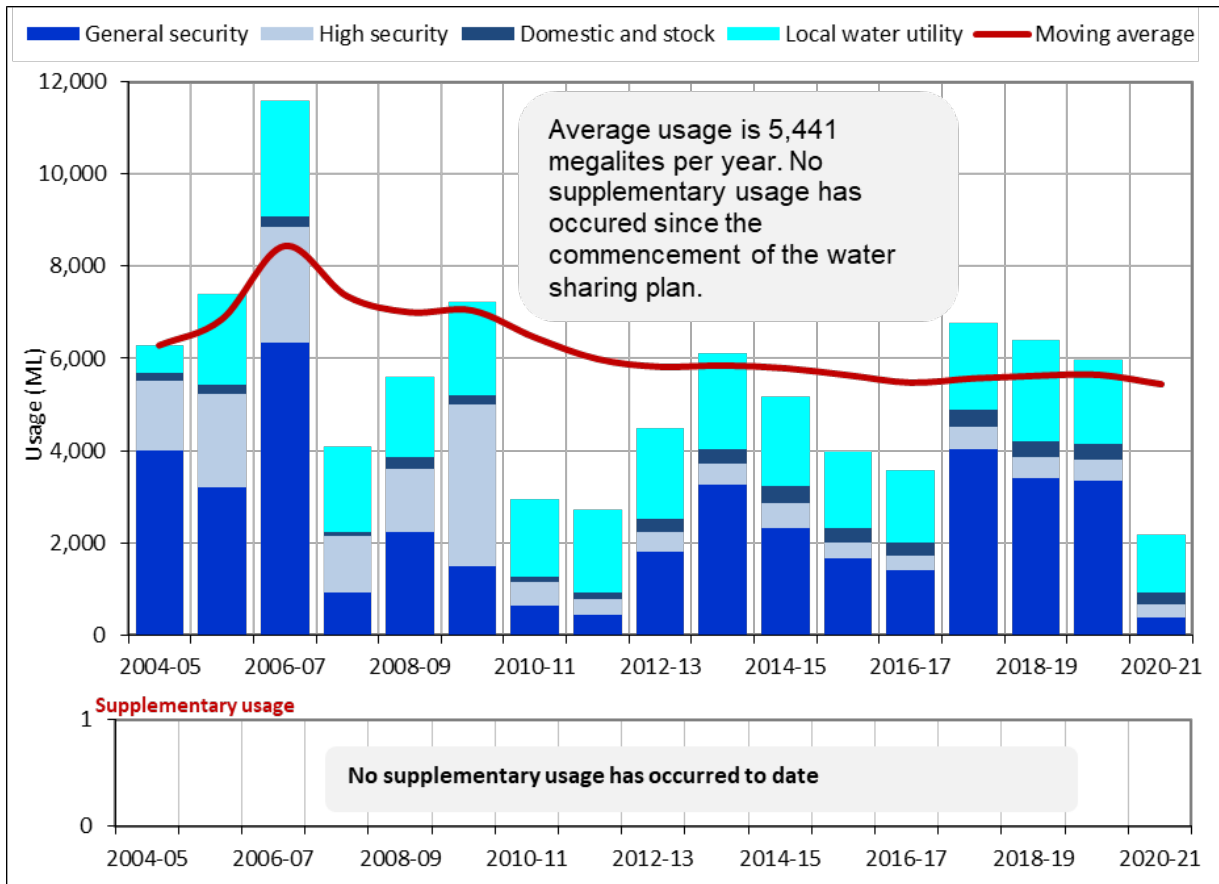
Figure 20: Cudgegong account water availability (carryover + available water determinations)



Account usage

- Water usage in the Cudgegong decreased with 2,180 megalitres debited against licence accounts (Figure 21).
- 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 5,441 megalitres.

Figure 21: Cudgegong annual usage against moving average usage



Utilisation and inactive share

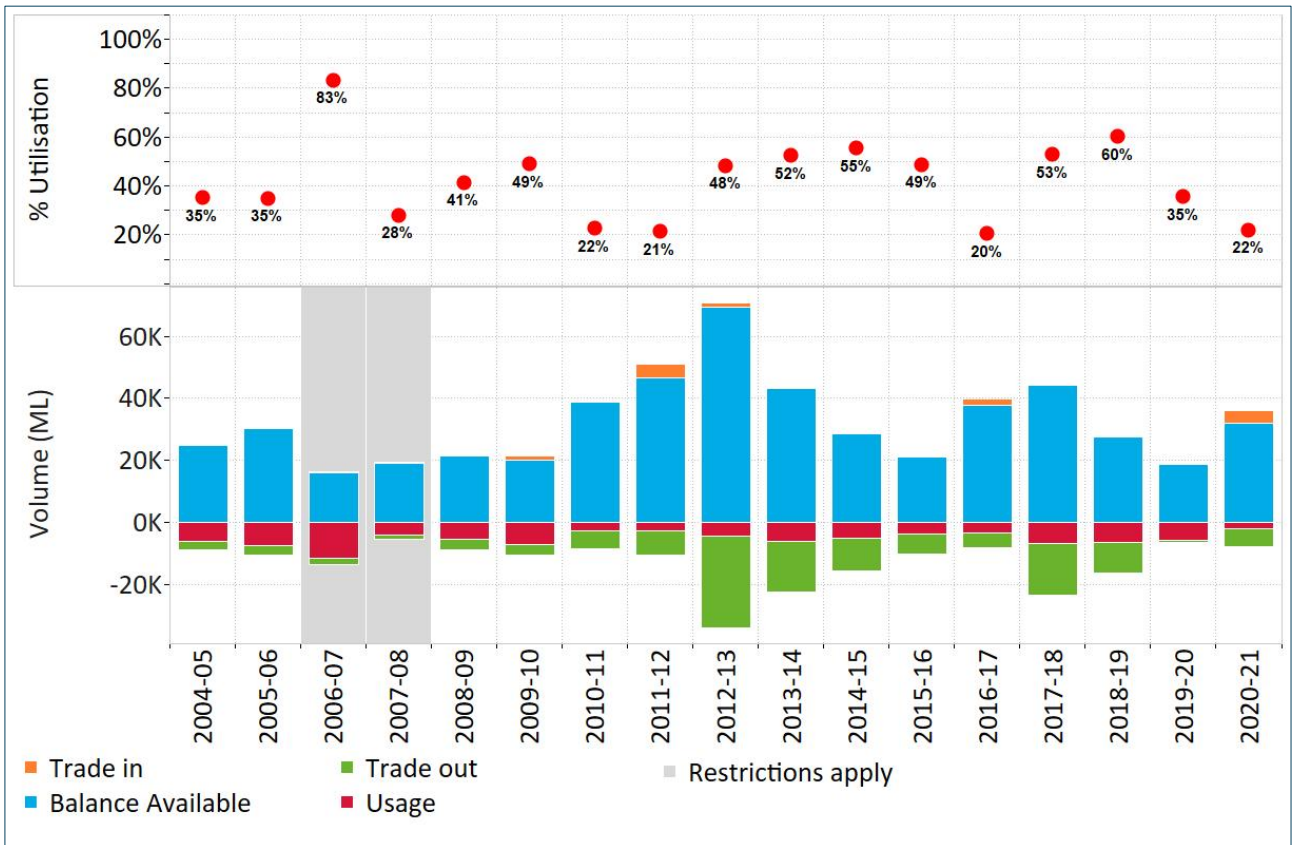
- 25% of general security share component was inactive for the reporting period, which is a decrease of 7% on the prior reporting period (Table 5). Notably significant increases to allocation arrived later in the water year, after the summer cropping season.
- Considering all categories of access licences issued 19% of share component was inactive, a decrease of 4% on the prior reporting period.
- Utilisation⁵ of available water from regulated supplies (excluding supplementary) decreased by 35% to 22%, largely reflective of the late season increase in availability of general security water (Figure 22).

Table 5: Inactive licence summary Cudgegong

Licence category	Inactive licences (number) 2020–21	Inactive share component 2020–21	Inactive share component % of total 2020–21	Inactive share component % of total prior year 2019–20
Domestic and Stock	27	328	50%	29%
Domestic and Stock [Stock]	3	15	100%	100%
Domestic and Stock [Domestic]	9	23	100%	90%
Local water utility	0	0	0%	0%
Regulated river (General Security)	80	4,698	25%	32%
Regulated river (High Security)	7	133	3%	1%
Regulated river (High Security) [research]	1	1	100%	100%
Total regulated supply	127	5,198	19%	23%
Supplementary water	88	1,290	100%	95%

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

Figure 22: Cudgegong percentage utilisation (water availability plus trade in from external water source against account usage and trade out to external water source)

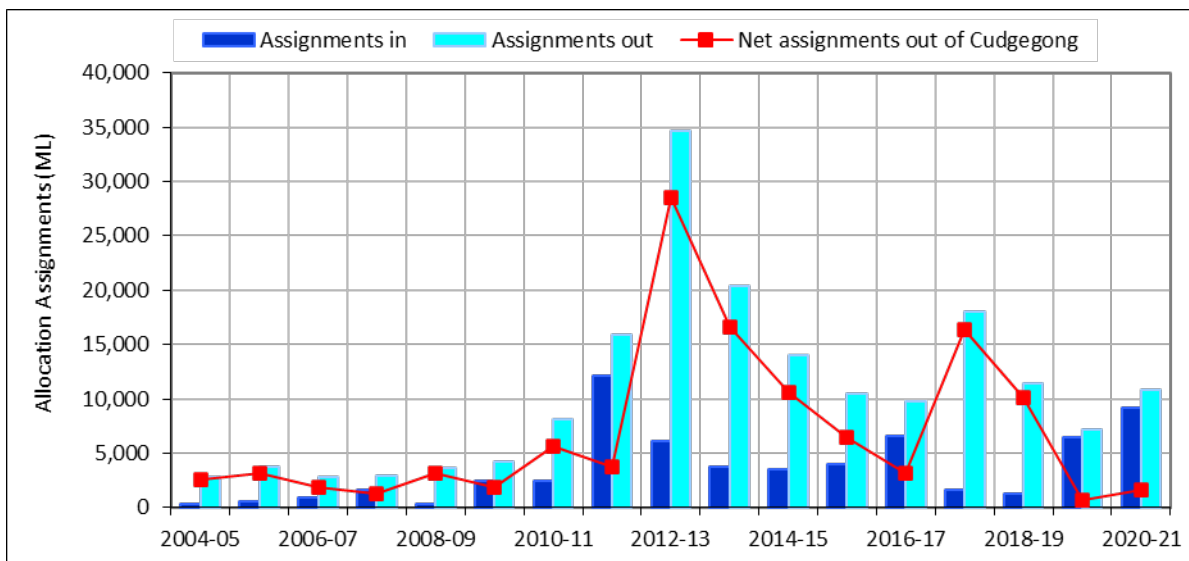


Temporary trading (allocation assignments)

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 an increase on the previous year (Figure 23).
- 9,148 megalitres was traded into Cudgegong access licences and 10,787 megalitres was traded out of access licences, a net assignment out of 1,639 megalitres (to the Macquarie).

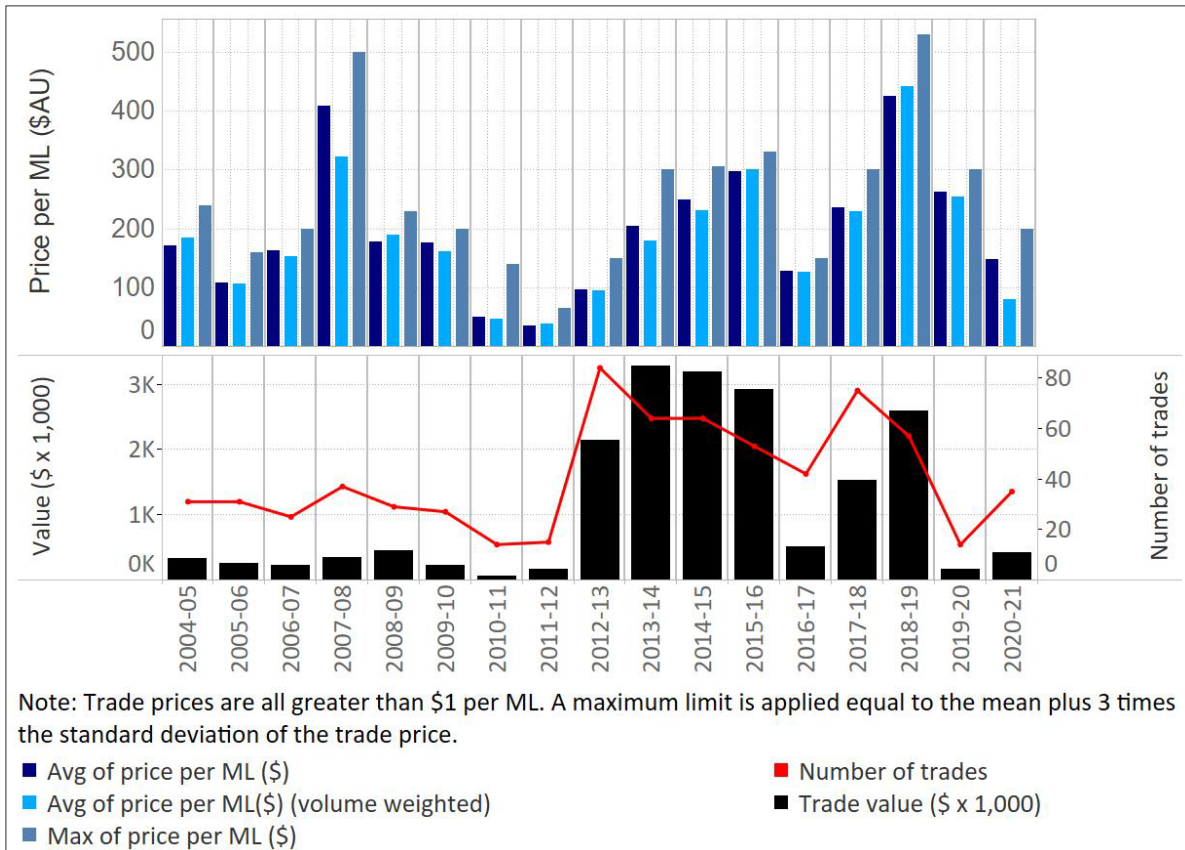
Figure 23: Cudgegong allocation assignment (temporary trading) summary



Commercial temporary trading statistics (assignment of allocation)

- Considering commercial temporary trading activity⁶, the average price of water decreased to \$147 per megalitre (\$80 weighted average) for the reporting period, a 42% decrease on the prior year (Figure 24).
- The maximum price was \$200 per megalitre.
- In total, 35 commercial trades were processed for a total trade value of \$166,000, a 250% increase on the prior year.

Figure 24: Cudgong allocation assignments—trade price statistics



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 perspective⁷:

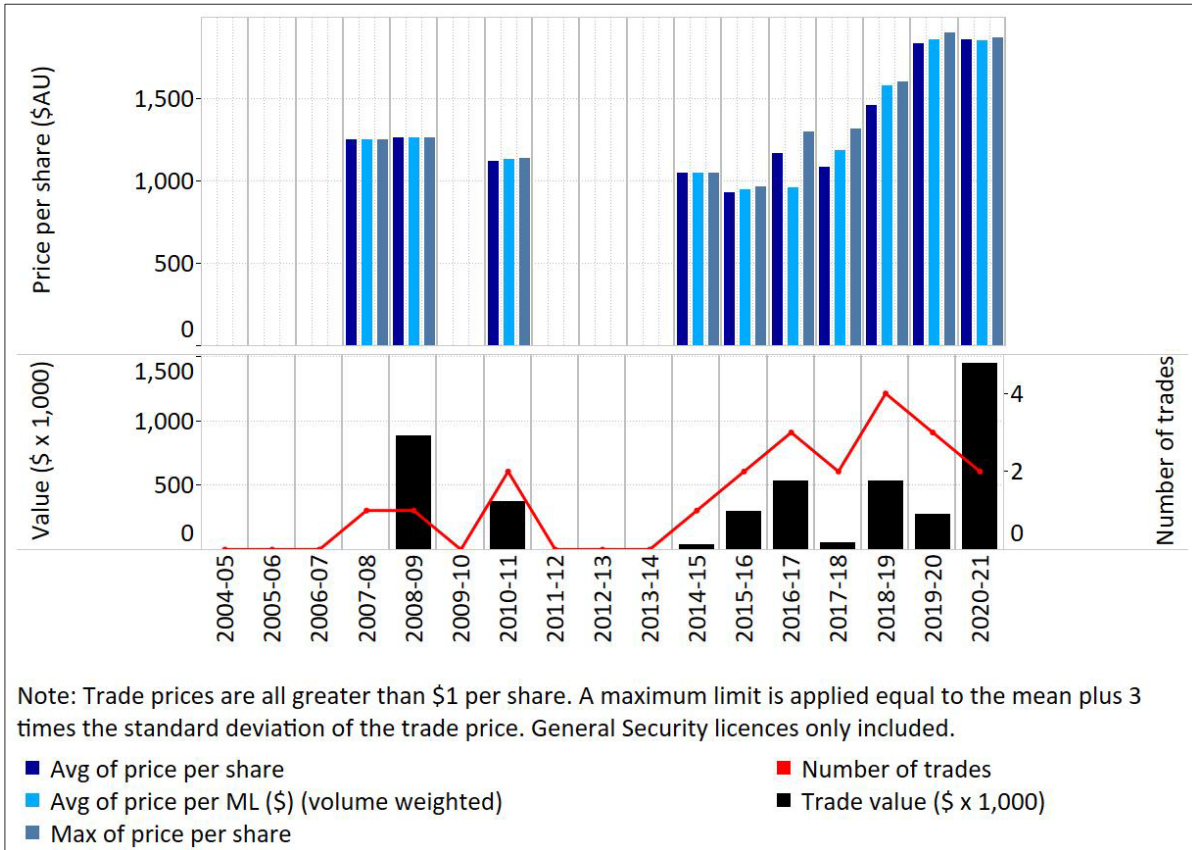
- broadly the market is relatively inactive in the Cudgong, with 71Q dealing never exceeding 5 transactions in any water year
- 2 commercial general security 71 Q transactions were processed in the reporting period (Figure 25)
- the average price was \$1,860 per general security share (weighted average \$1,851), the highest consideration under water sharing plan management conditions

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

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

- The general security sale price within the Cudgegong relative to other NSW regulated river water sources selling share in the reporting period is provided in Figure 26
- no commercial high security 71 Q transaction were processed (Figure 27)
- a total of 9 (71M) commercial transactions⁸ were processed in the reporting period which moved a total of 559 shares to a new holder (Figure 28).

Figure 25: Commercial share assignment statistics, General Security, Cudgegong



⁸ Considers all categories of licence

Figure 26: General Security average share price relative comparison for reporting period

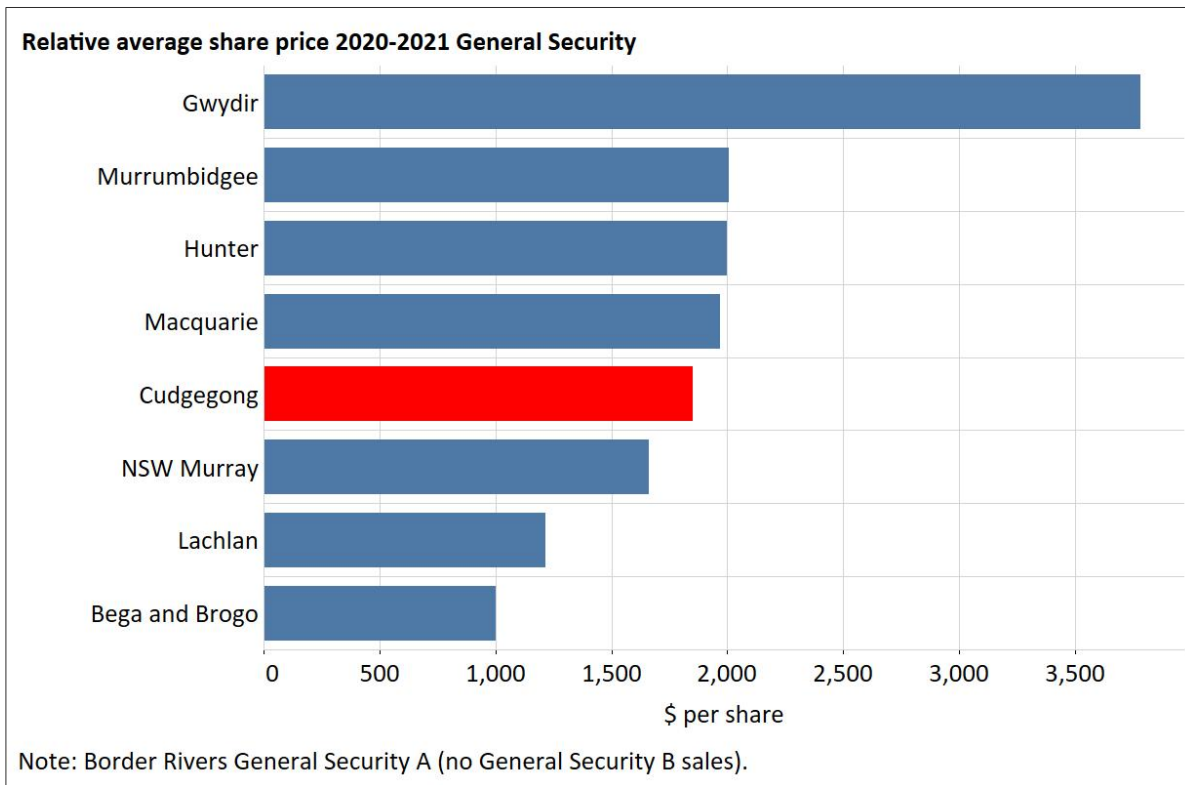


Figure 27: Commercial share assignment statistics, High Security, Cudgegong

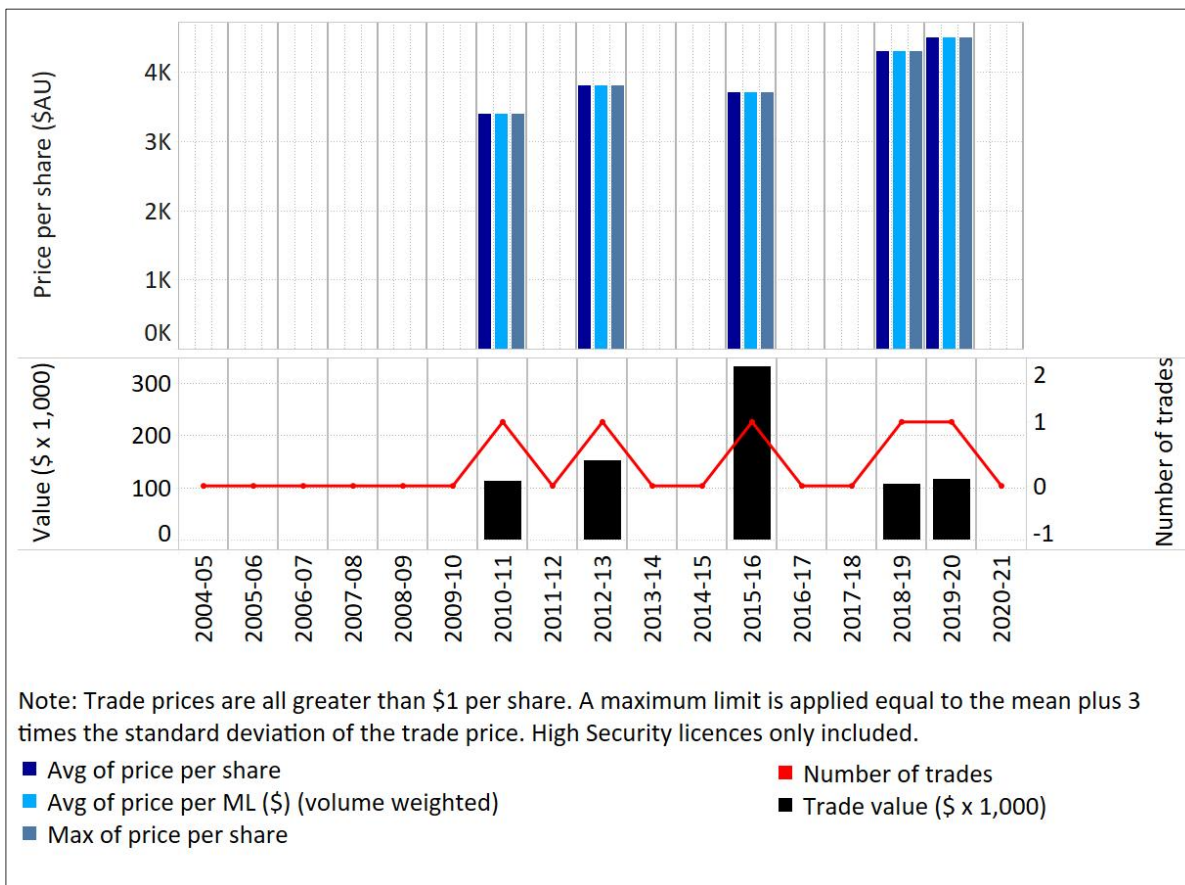
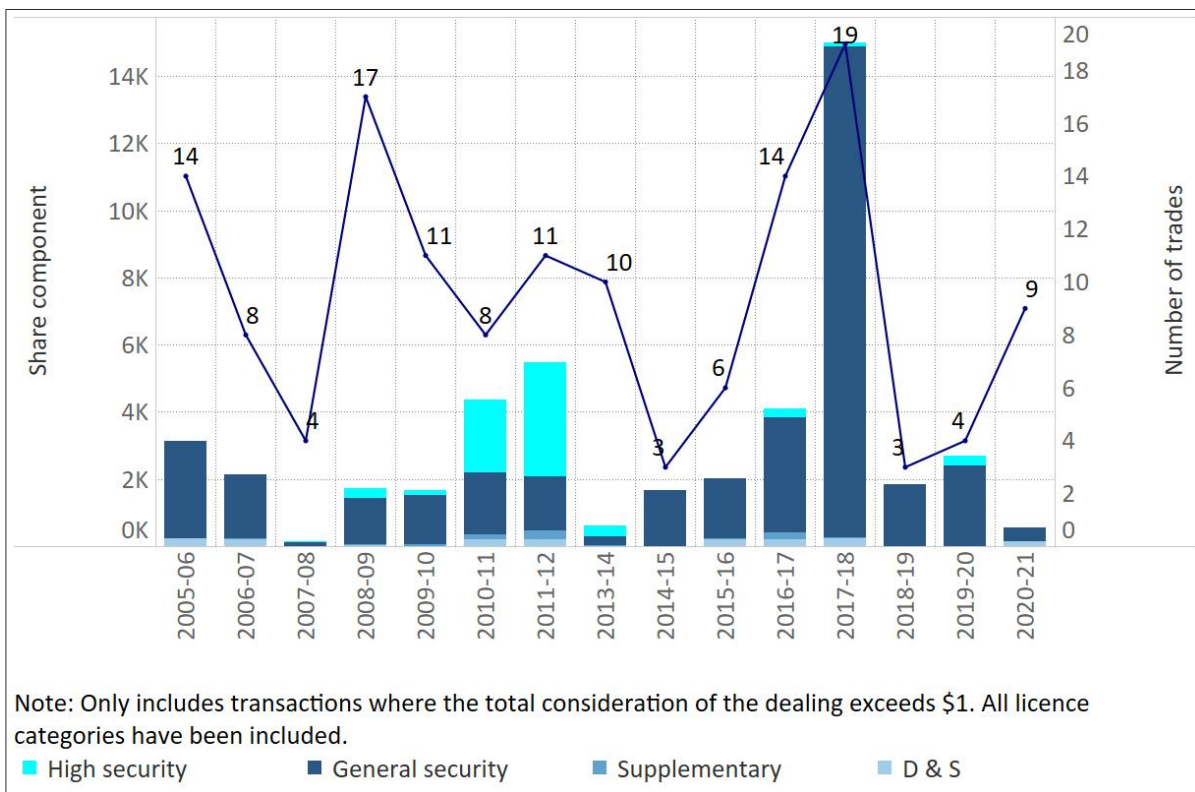


Figure 28: Commercial change of holder transactions—Cudgegong



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 (Macquarie)” of this document.

Temporary water restrictions for the reporting period

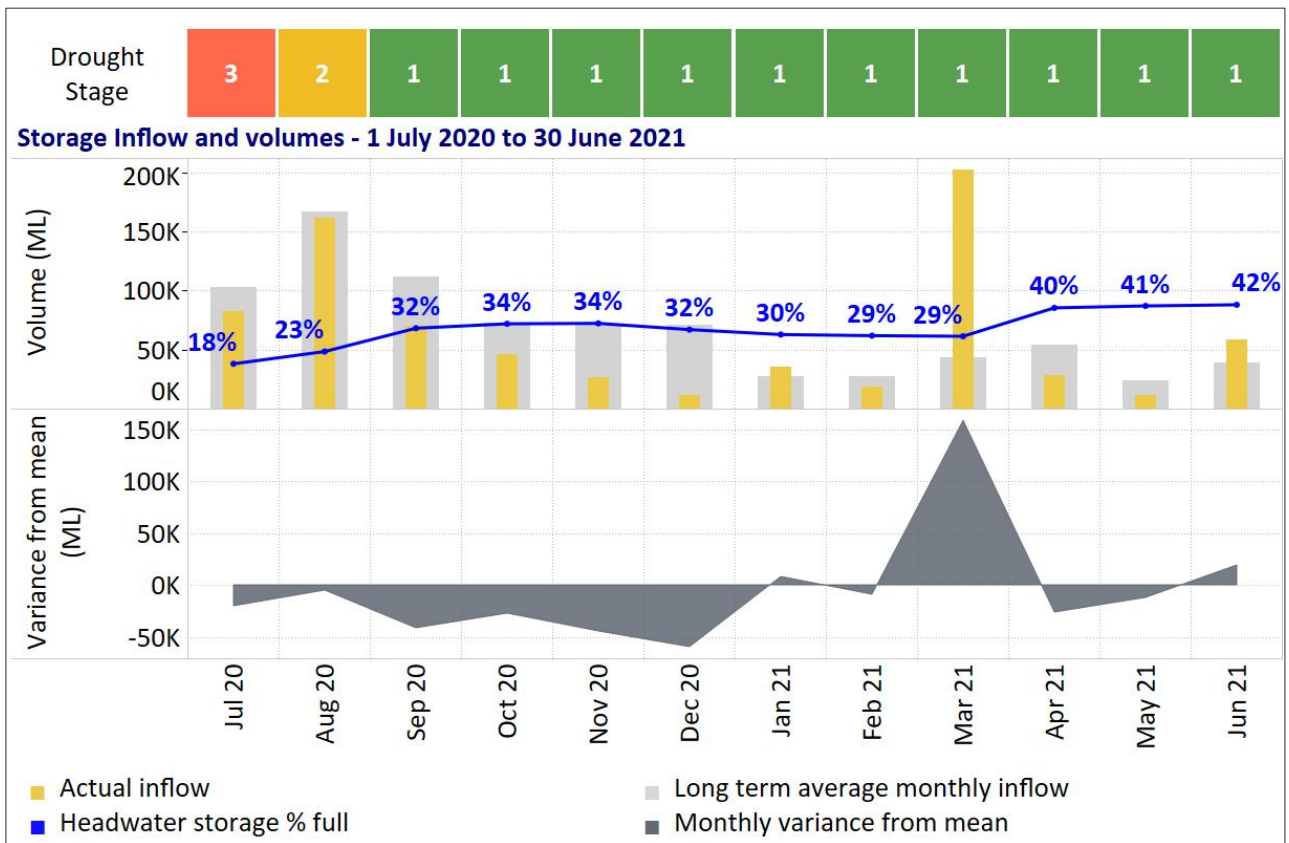
All temporary water restrictions for general security entitlement holders in the Macquarie regulated river water source ceased in August 2020. No further water restrictions were issued for the reporting period.

More detailed information relating to the flow event of February 2020 and the associated restrictions on access is available at [Temporary water restrictions - Water in New South Wales \(nsw.gov.au\)](https://www.nsw.gov.au/temporary-water-restrictions-water-in-new-south-wales)

Extreme events stage

- The Macquarie Regulated River Water Source was in stage 3 (severe drought) at the commencement of the water year with storage inflows continuing to track significantly below historical averages. Conditions improved early in the year (August and September 2020) resulting in a de-escalation of drought management protocols to stage 1 (normal management). Burrendong Dam total inflow (actual), percentage full and long term monthly average inflows are illustrated with the monthly drought stage classification in Figure 29.

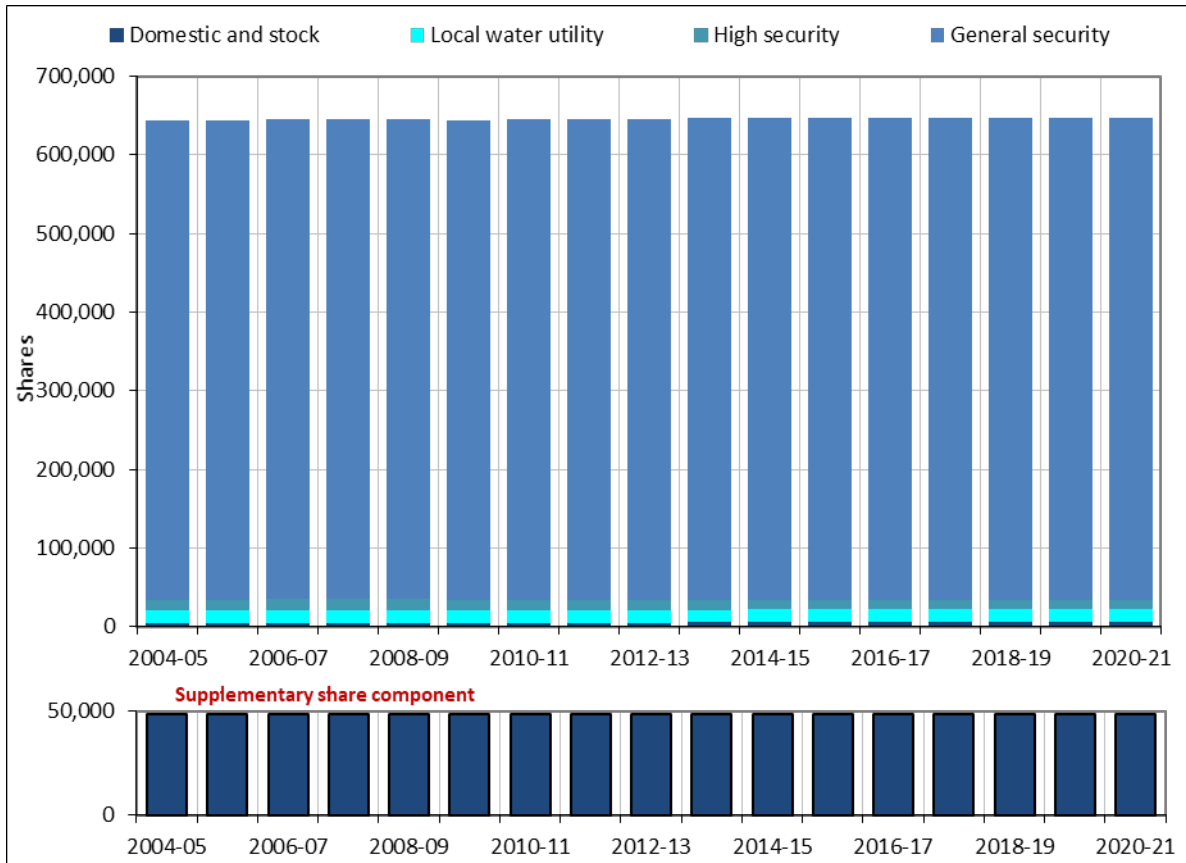
Figure 29: Drought stage for the reporting period referenced with monthly storage inflow for the reporting period and long-term monthly inflow mean



Access rights

- Share component of general security in the Macquarie increased by 50 shares (moved down from the Cudgegong) (Figure 30).
- Domestic and Stock shares increased by 4 (moved down from the Cudgegong).
- The total issued share at the end of the reporting period was 696,495 including 48,708 shares of supplementary access.

Figure 30: Macquarie share component since the commencement of the water sharing plan



Allocation account summary

A summary illustration of the accounting for Macquarie General Security and High Security access licence categories is provide in Figure 31 and Figure 32 respectively. Detailed information on the water accounts for all categories of licence issued are provided in Note 1 of this report.

Figure 31: Annual water account summary Macquarie General Security

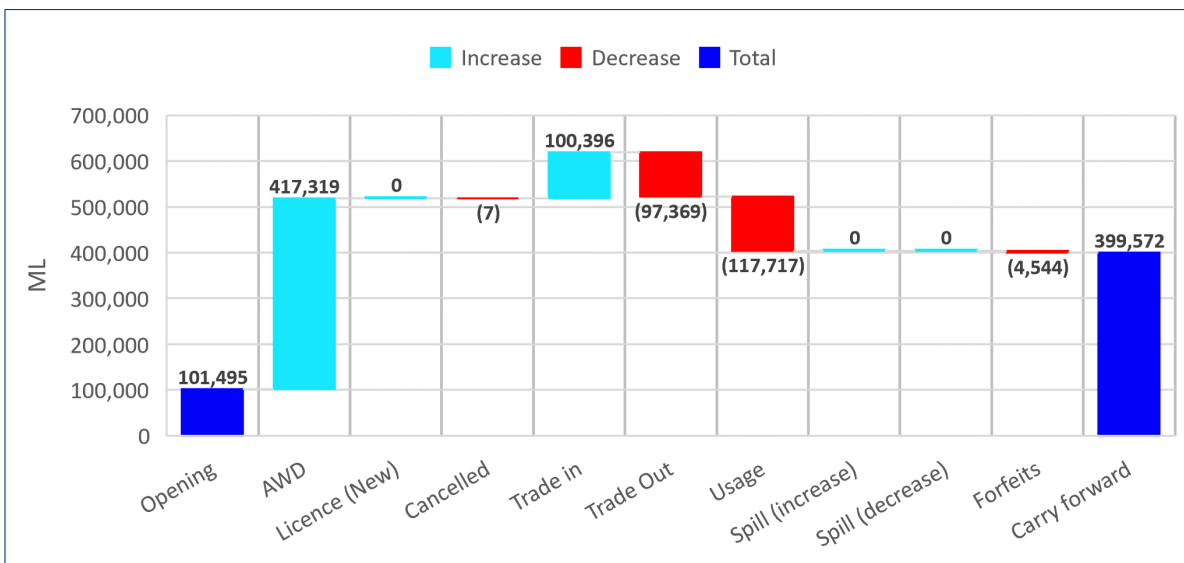
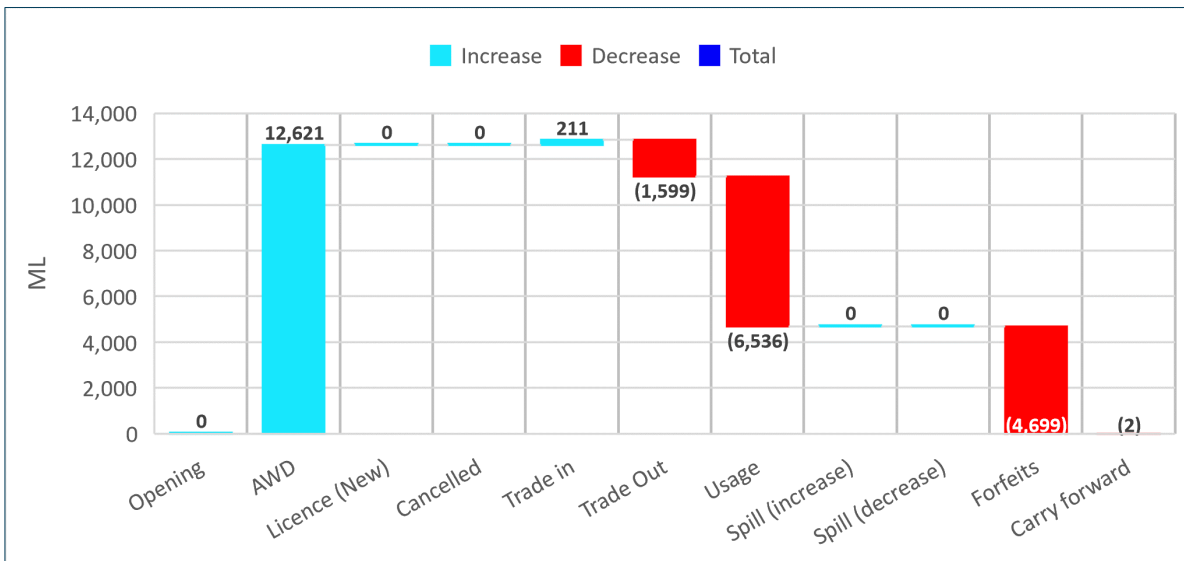


Figure 32: Annual water account summary Macquarie High Security (includes sub-categories)

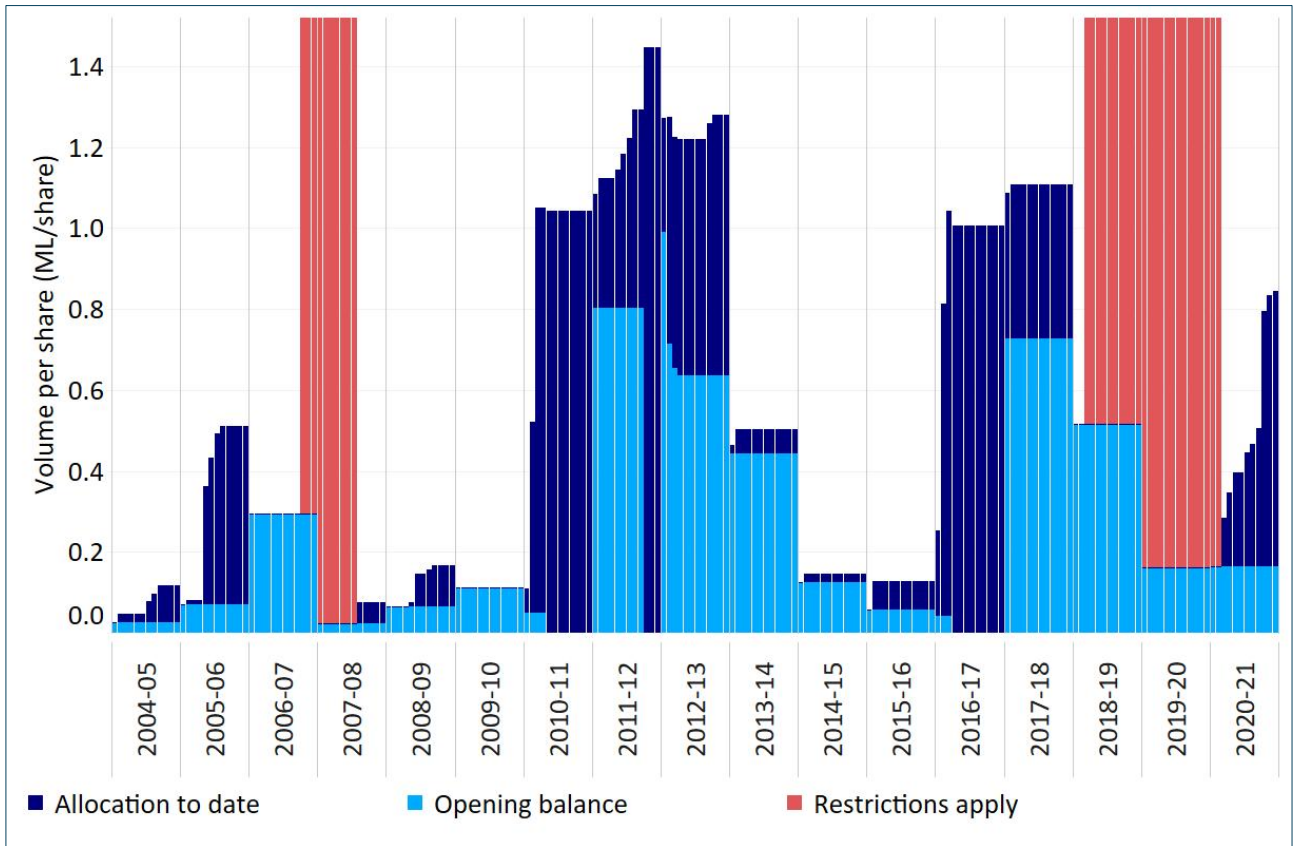


Water availability

- 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.
- General security access licences had a carryover of 101,495 megalitres into the reporting period equating to 16.5% of issued share component for this category (in the Macquarie). Of the carryover water at the commencement of the water year only 2,001 megalitres was available while 99,494 megalitres was not available for use (suspended in drought account). The drought account water was released from suspension on 14 August 2020.
- General security access licence received an opening available water determination of 0 megalitres per share with further announcements being made throughout the year reaching a cumulative total of 0.63 ML/share by end of the reporting period. Carryover and AWD allocation as a proportion of share for the reporting period and historical water sharing plan management are illustrated in Figure 33.
- 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.
- At the water source level 18 days of supplementary access was available in the reporting period. Historical and reporting period supplementary access periods are illustrated in Figure 35.
- By volume 62% of the 193,632 megalitres of tributary inflows to the Macquarie River downstream of Burrendong dam was contributed by the Bell River and Talbragar River (Figure 36).

- Total water availability⁹ was the highest since 2017–18 (Figure 34).
- Storage spill allocations adjustments occurred in 2010–11, 2011–12 and 2016–17 (full reset of allocation accounts to 1 megalitre per share). Refer to Note 5 (detailed item notes) for more information on this accounting process.

Figure 33: Incremental available water determination and carryover volumes for Macquarie General Security as a proportion of share component



⁹ 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 34: Macquarie account water availability (Carryover + available water determinations)

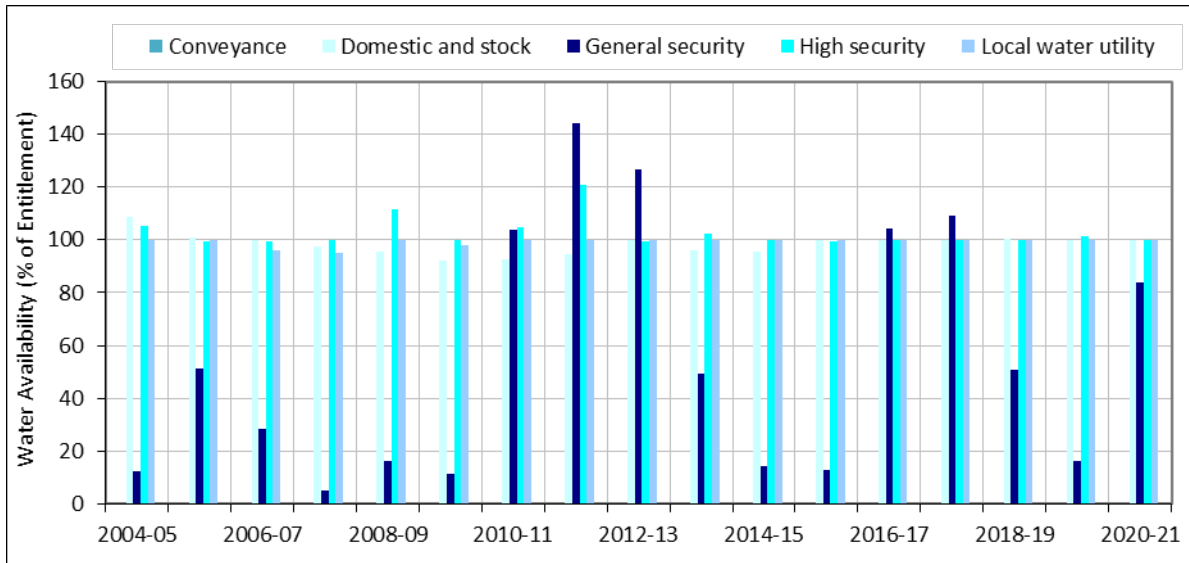


Figure 35: Supplementary event access

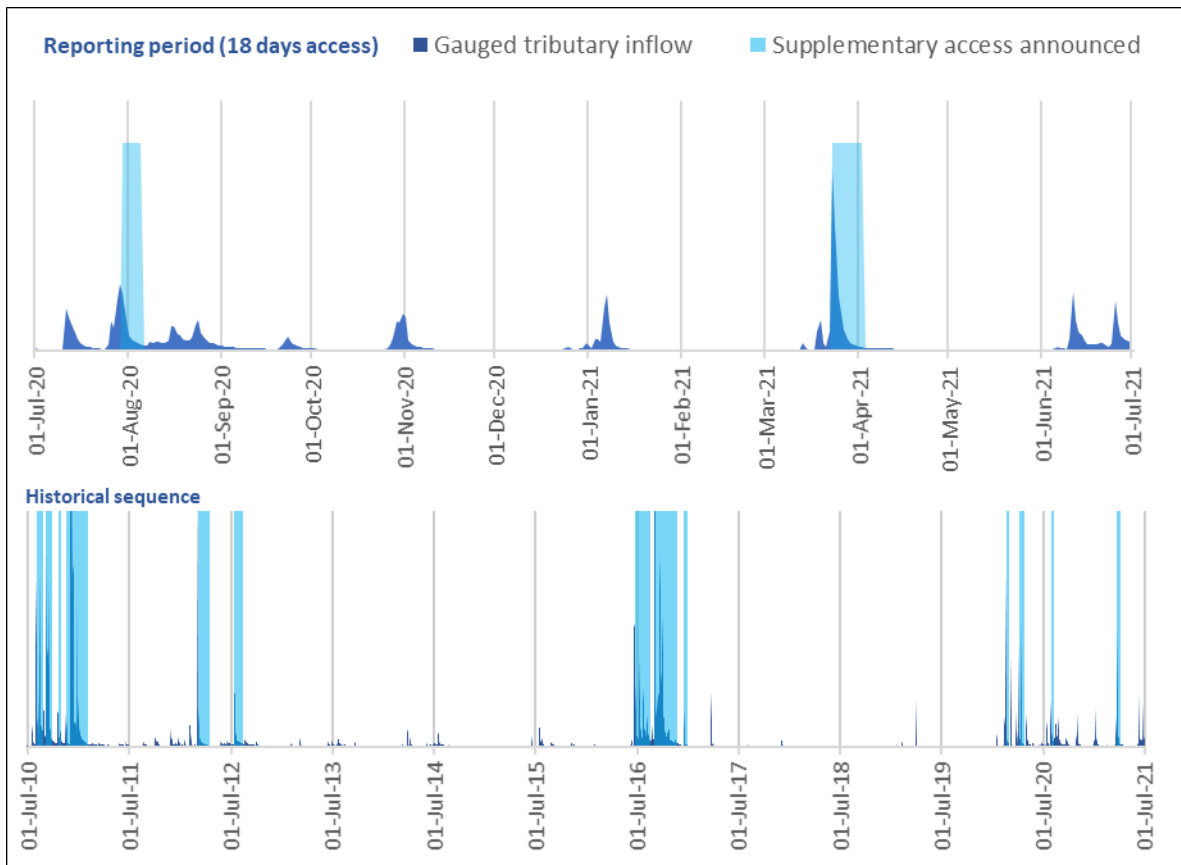
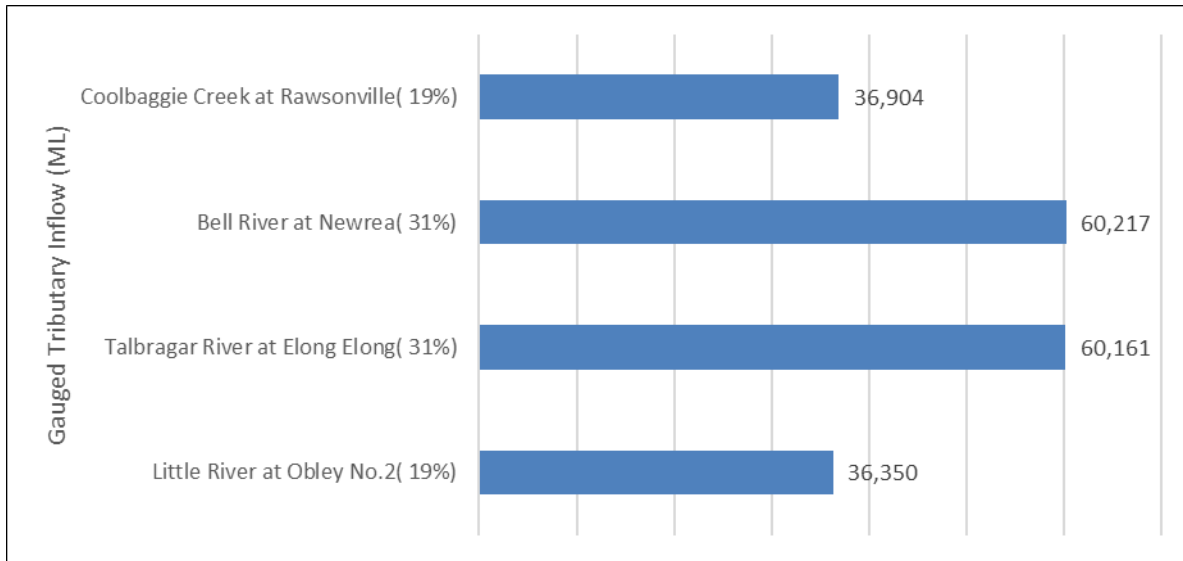


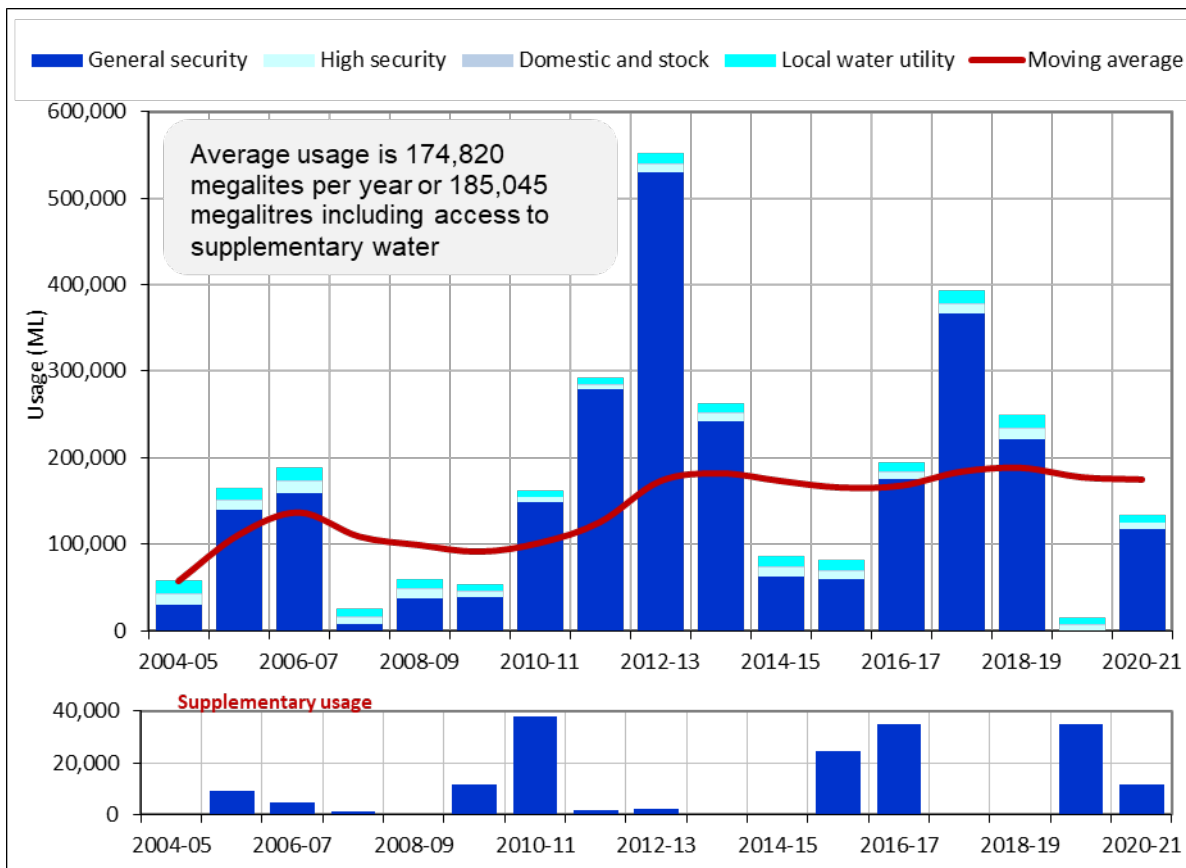
Figure 36: Measured tributary inflow contributions



Account usage

- Water usage from regulated supply in the Macquarie increased relative to the previous reporting period, with 145,444 megalitres debited against accounts (Figure 37).
- The dominate source of supply was general security usage, totalling 117,717 megalitres.
- Average annual usage (since 2004-05) decreased moderately to 174,820 megalitres (regulated supply) per year, or 185,045 megalitres per year including access to supplementary water.

Figure 37: Macquarie annual usage against moving average usage



Utilisation and inactive share

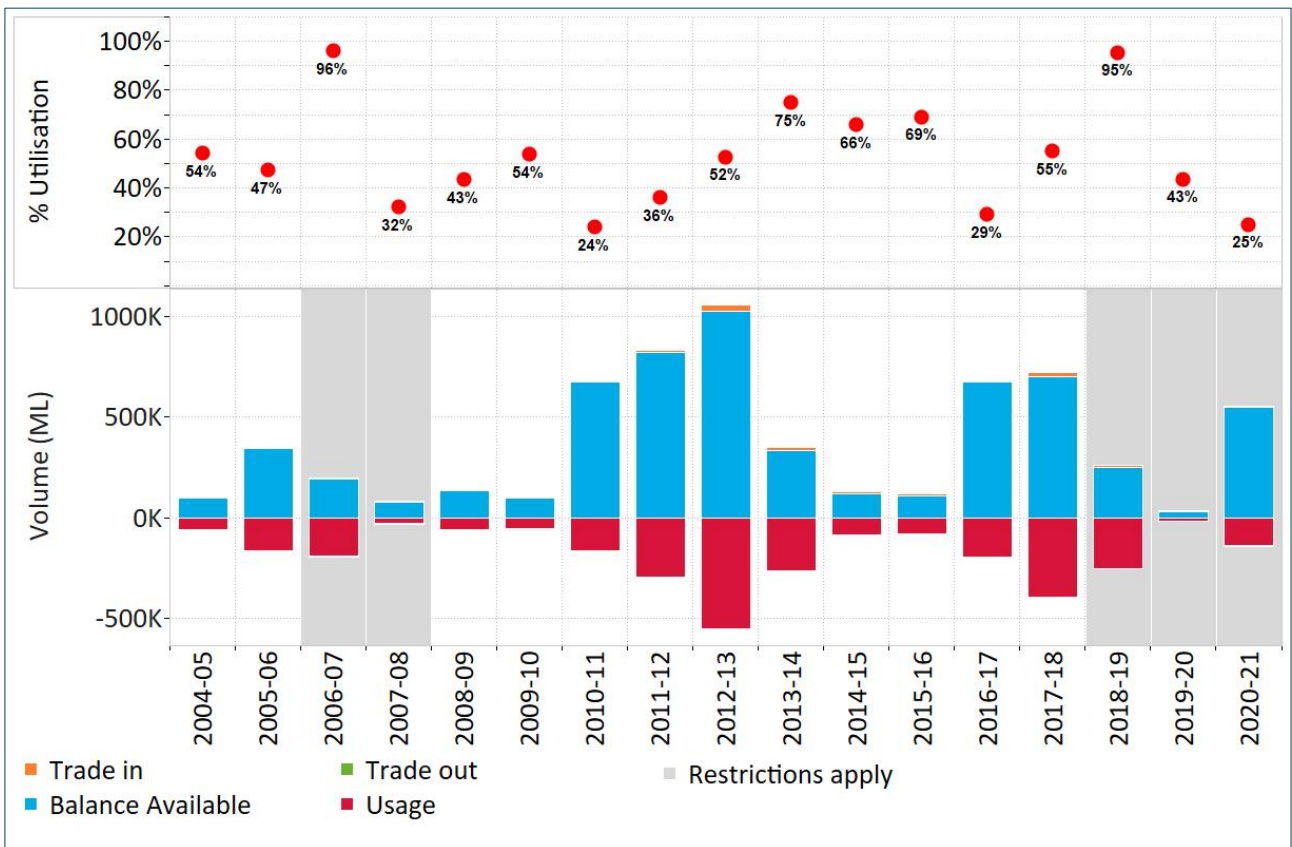
- 10% of general security share component was inactive for the reporting period, a decrease of 61% on the prior reporting period due to restrictions on access to carry over (Table 6).
- Considering all categories of access licences issued 10% of share component was inactive, a decrease of 58% on the prior reporting period.
- Utilisation¹⁰ of available water from regulated supplies (excluding supplementary) decreased significantly, down 43% to 25%, largely reflective of the late season increase in availability of general security water (Figure 38).

Table 6: Inactive licence summary Macquarie

Licence category	Inactive licences (number) 2020–21	Inactive share component 2020–21	Inactive share component % of total 2020–21	Inactive share component % of total prior year 2019–20
Domestic and Stock	131	1,958	46%	46%
Domestic and Stock [Stock]	24	135	82%	85%
Domestic and Stock [Domestic]	61	604	75%	74%
Local water utility	0	0	0%	4%
Regulated river (General Security)	329	62,771	10%	71%
Regulated river (High Security)	14	240	3%	2%
Regulated river (High Security) [research]	1	320	8%	8%
Total regulated supply	560	66,028	10%	68%
Supplementary Water	352	14,856	31%	7%

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

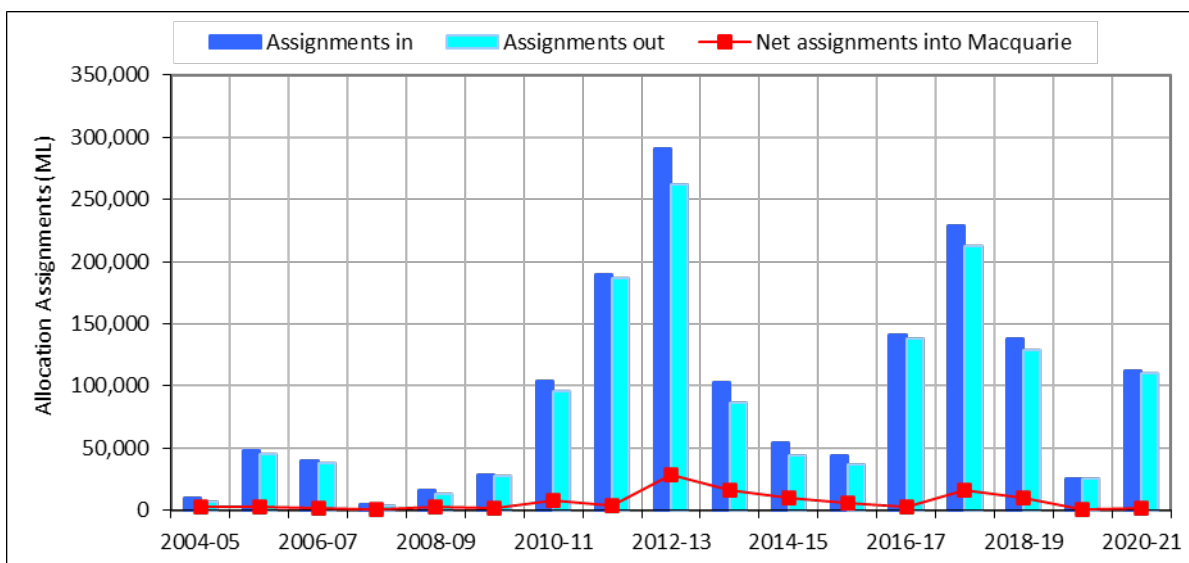
Figure 38: Macquarie percentage utilisation (water availability plus trade in from external water source against account usage and trade out to external water source)



Temporary trading (allocation assignments)

- By volume allocation assignments significantly decreased with a 112,319 megalitres traded into Macquarie access licences, including supplementary trading (Figure 39).
- A total of 110,680 megalitres was traded out of Macquarie access licences resulting in a net assignment into the Macquarie (from the Cudgegong) of 1,639 megalitres.
- Trade into the Macquarie exceeds trade out in all years under water sharing plan operation.

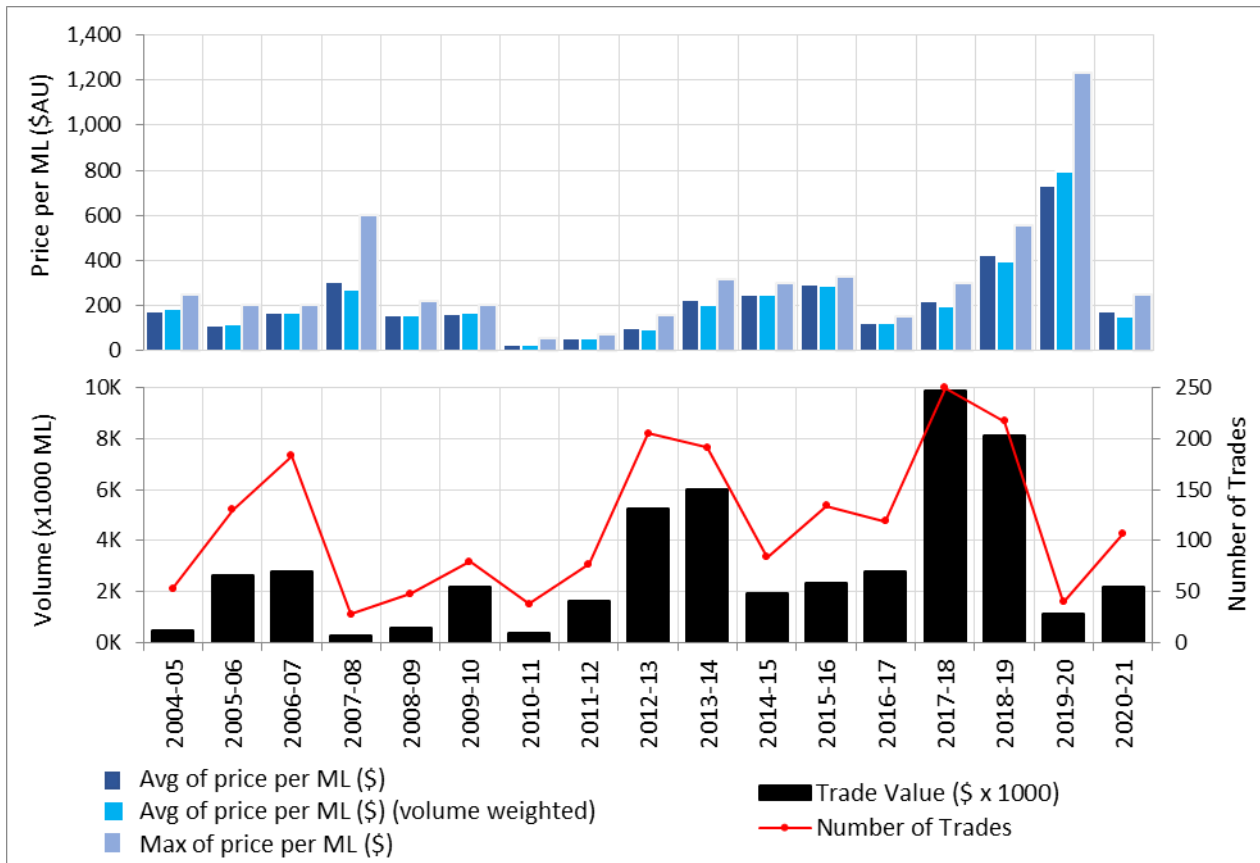
Figure 39: Macquarie allocation assignment (temporary trading) summary



Commercial temporary trading statistics (assignment of allocation)

- Considering commercial temporary trading activity¹¹, the average price of water decreased to \$177 per megalitre (\$153 weighted average) for the reporting period. Following 4 years of increasing water prices this year resulted in a decrease of 76% on the prior year (Figure 40).
- The maximum price was \$250 per megalitre.
- In total, 107 commercial trades were processed for an exchange of \$2,155,323, up 91% on the prior year reflecting the increased volumes of water available to trade.

Figure 40: Macquarie allocation assignments—trade price statistics¹²



Permanent trading (share assignments and transfer of licence)

- A total of 14 commercial general security 71Q transactions were processed in the reporting period (Figure 41).
- The average price was \$1,895 per general security share (weighted average \$1,968) an increase of 3% 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 42.
- No commercial share assignments of high security have occurred since 2013–14.
- In addition to share assignment dealings, a total of 22 (change of holder 71M) commercial transactions¹³ were processed in the reporting period, which moved a total of 33,567 shares to a new holder (Figure 43).

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

¹² 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.

¹³ Considers all categories of licence

Figure 41: Commercial share assignment statistics, General Security, Macquarie

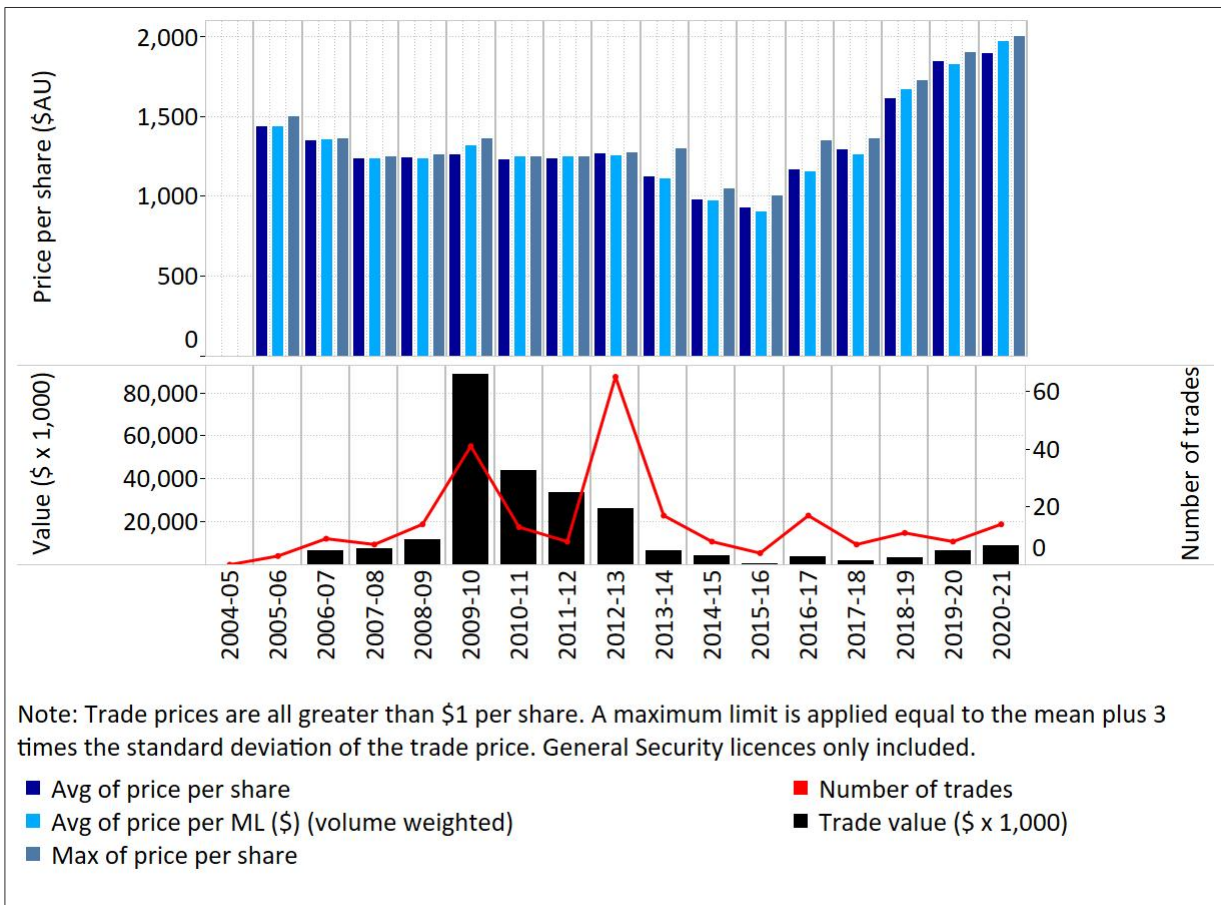


Figure 42: General Security average share price relative comparison for reporting period

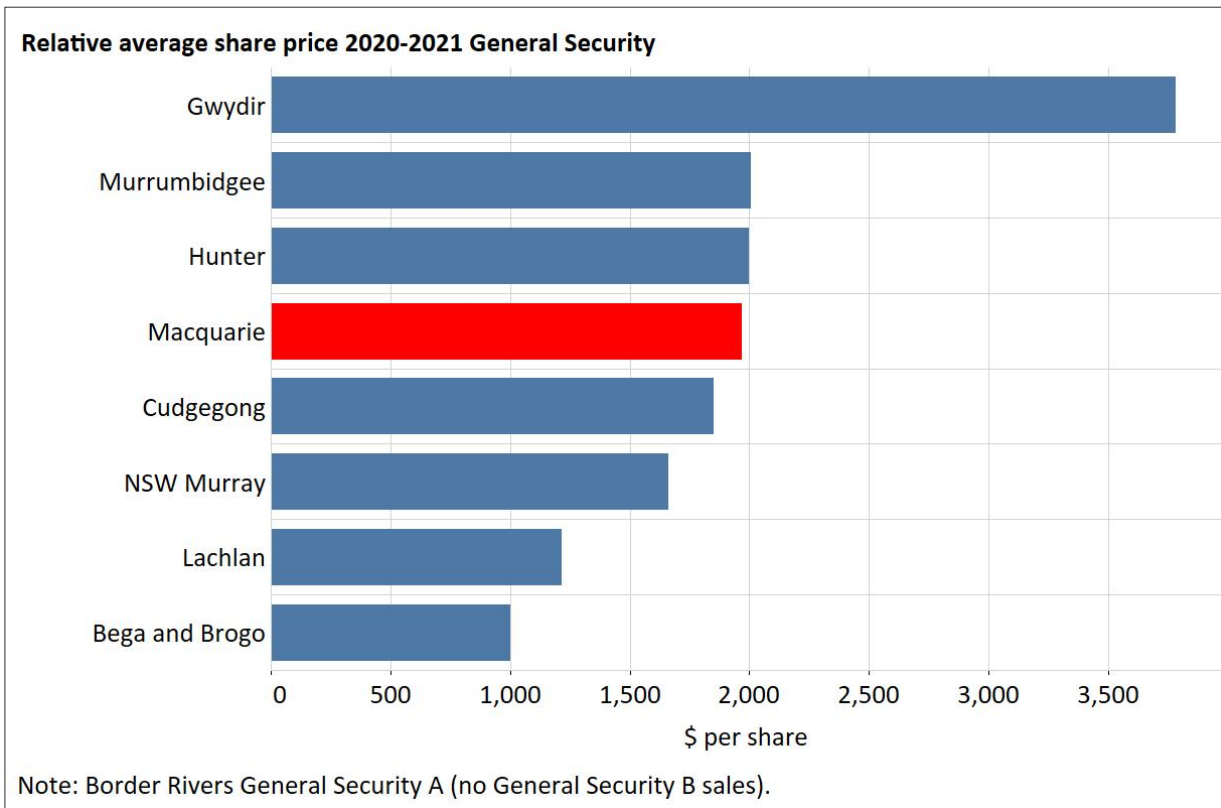
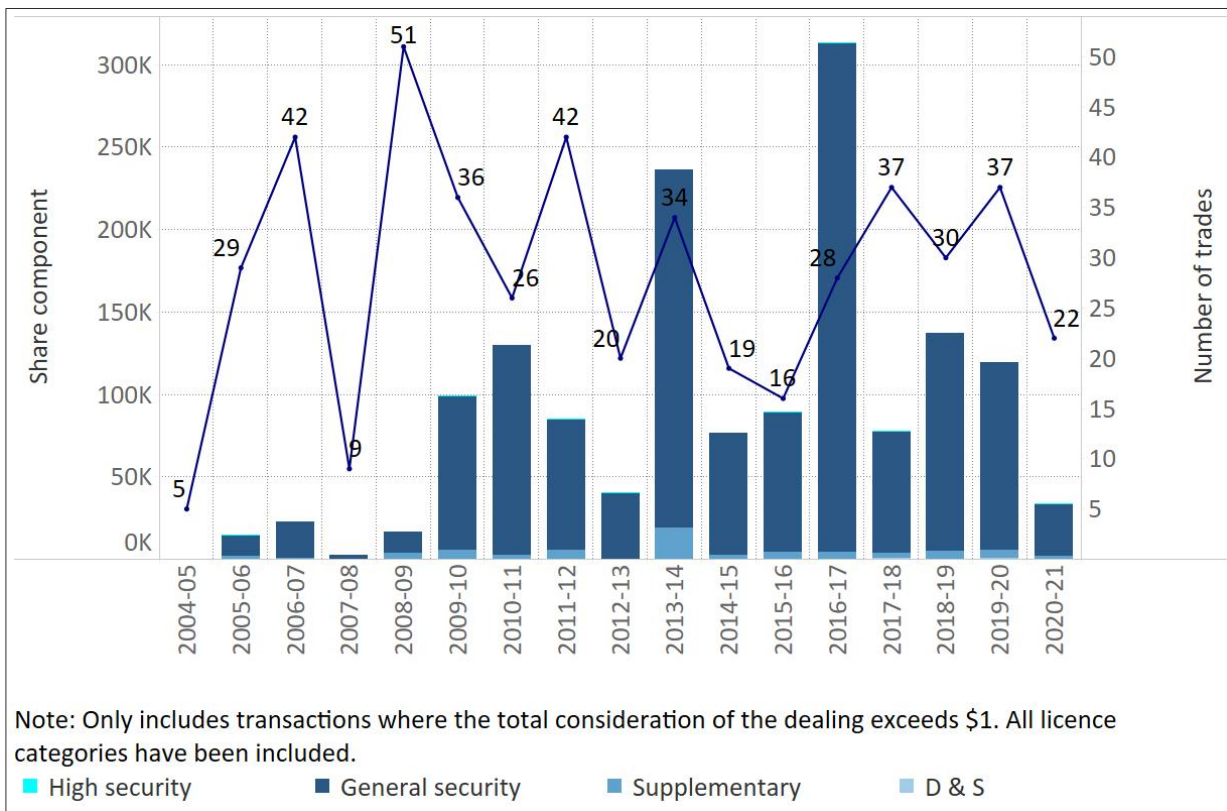


Figure 43: Commercial change of holder transactions—Macquarie



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 between March to April 2021. The replenishments flow volumes delivered are estimated as:

- Gum Cowal – Terrigal Creek system: 27,395 megalitres
- Crooked Creek below Mumblebone: 1,313 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 Preist channel: 5,000 megalitres
- Ewanmar Creek (Reddenville Break): > 5,000 megalitres
- Marra Creek: 10,221 megalitres
- Lower Bogan River: 13,263 megalitres
- Macquarie River downstream of Macquarie Marshes 191,504 megalitres¹⁴

All of 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.

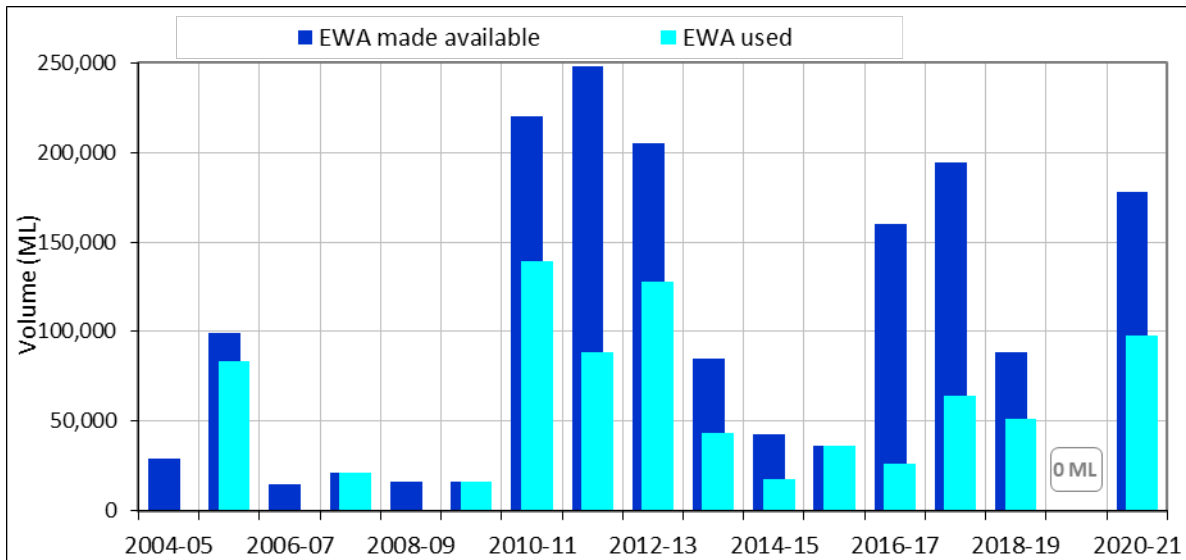
¹⁴ The replenishment flow requirement below the Macquarie Marshes requires that (at least) 2 deliveries of up to 50 megalitres per day from Miltara to achieve a visible flow at Glenacre for 5 or more days. Operationally the flow is managed through monitoring flows at the Pillicawarrina gauging station (421127), which reflects the volume stated here. There is high interception within the Marshes between Pillicawarrina and Miltara.

Environmental water

Planned environmental water

- The environmental water allowance (active plus translucent sub-accounts) had an opening balance of 69,373 megalitres for the reporting period.
- A total of 108,800 megalitres was allocated to the account during the reporting period.
- Usage for the reporting period was 97,542 megalitres.
- Historical use of the environmental water allowance is presented in Figure 44.
- The end of year balance (carry forward) totalled 80,296 megalitres (61,902 active sub-account and 18,394 translucent sub-account).
- There were no translucent environmental flow events delivered from Windamere Dam (into Cudgegong River) in 2020–21 due to the water sharing plan delivery targets not being triggered.
- Further details on planned environmental water are available in Note 7 of this GPWAR.

Figure 44: 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 2021 (Figure 45).
- No usage has occurred against held environmental licences in the Cudgegong to date (however the allocations may be traded to Macquarie licences to be used).

Macquarie

- There was no increase to the held environmental water portfolio share in the reporting period.
- A total of 183,486 shares were managed for environmental purposes as of 30 June 2021, consisting of 173,742 general security and 9,744 supplementary (Figure 46).
- A total of 51,868 megalitres of general security and 1,250 megalitres of supplementary water was used in the reporting period (Figure 47).

- Historical account utilisation from regulated supply (excluding supplementary) is provided in Figure 48.
- Details on environmental watering targets and outcomes are available from the NSW Department of Planning and Environment—Environment and Heritage website.
- For additional details on held environmental water refer to Note 6.

Figure 45: Held environmental water share component in the Cudgegong catchment

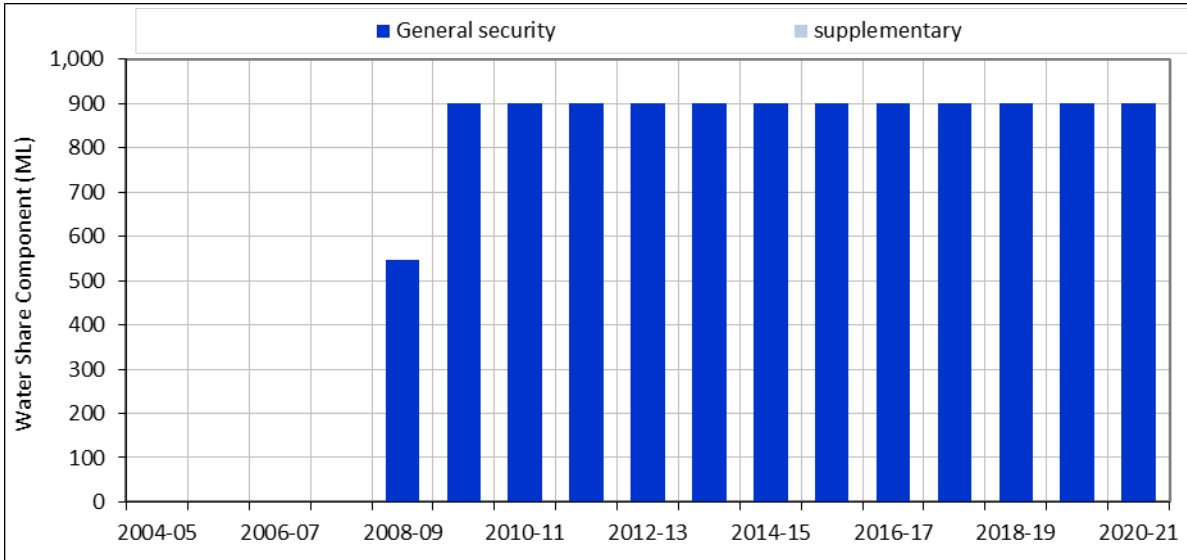


Figure 46: Held environmental water share component in the Macquarie catchment

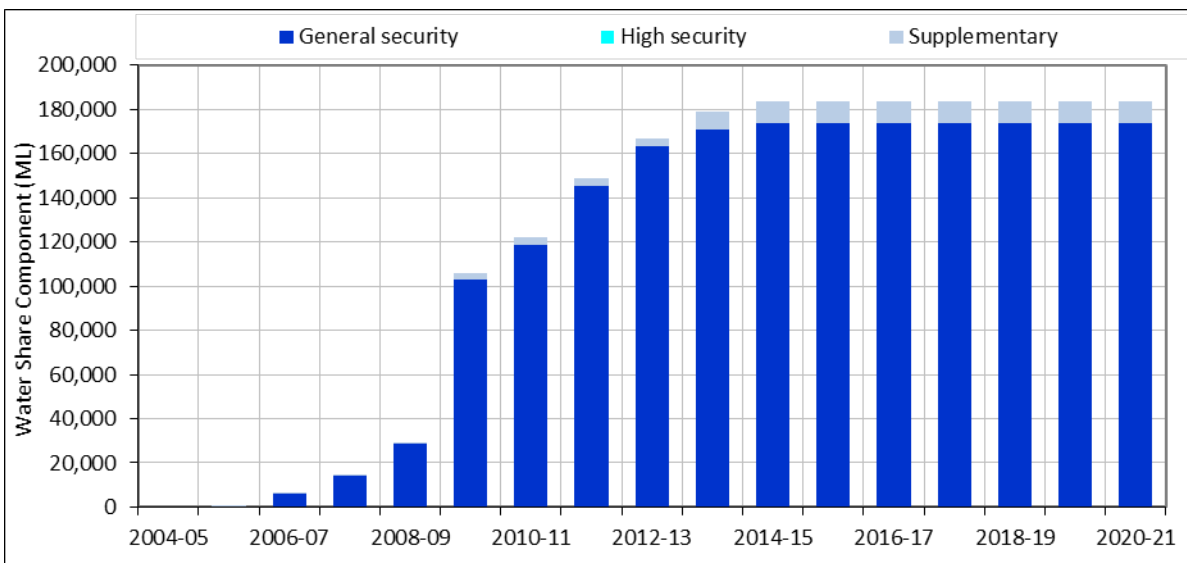


Figure 47: Held environmental usage in the Macquarie catchment

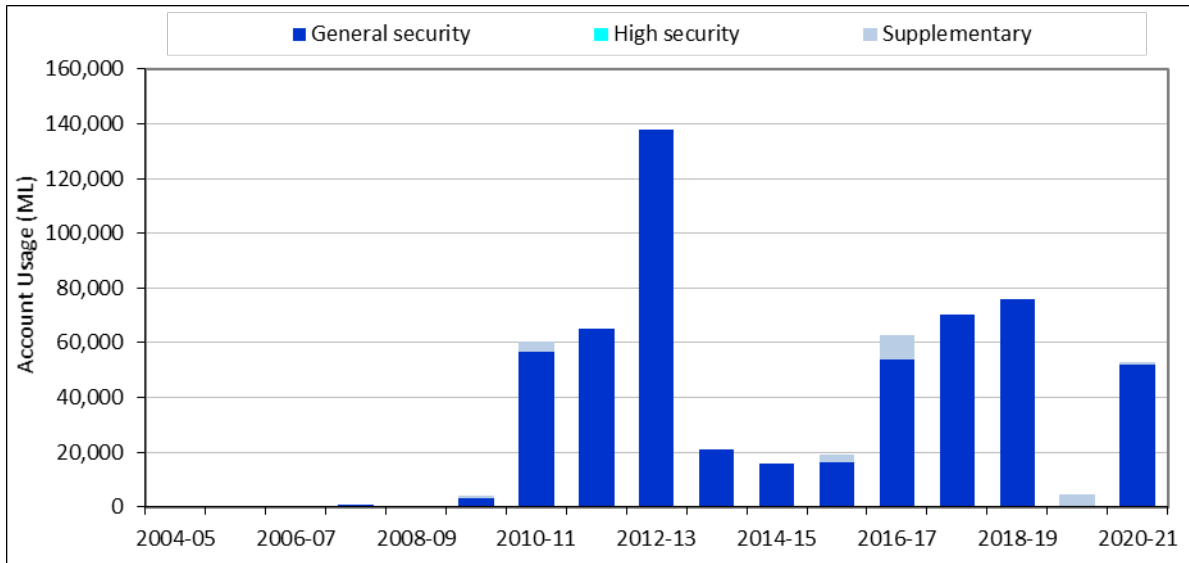
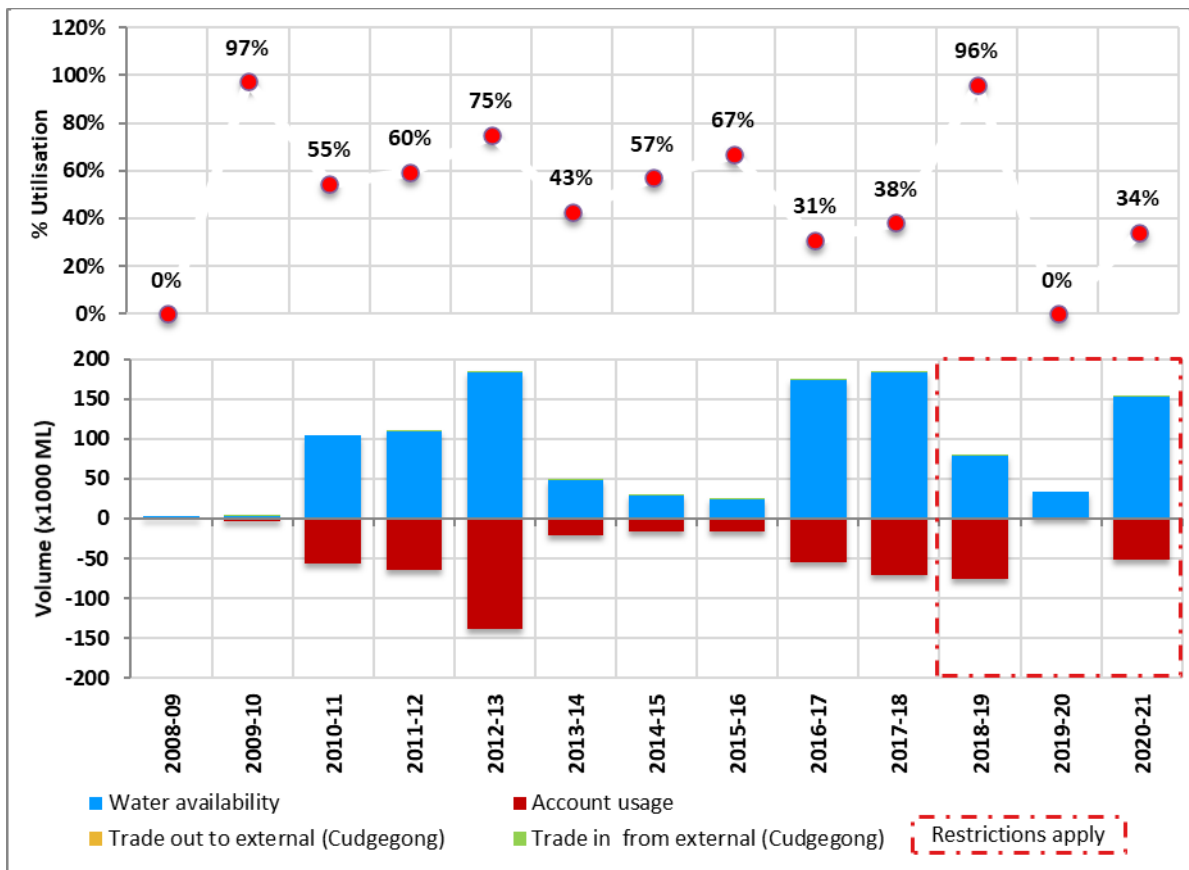


Figure 48: Held environmental utilisation Macquarie catchment (excludes supplementary holdings)



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

Quantification of data

Data accuracy

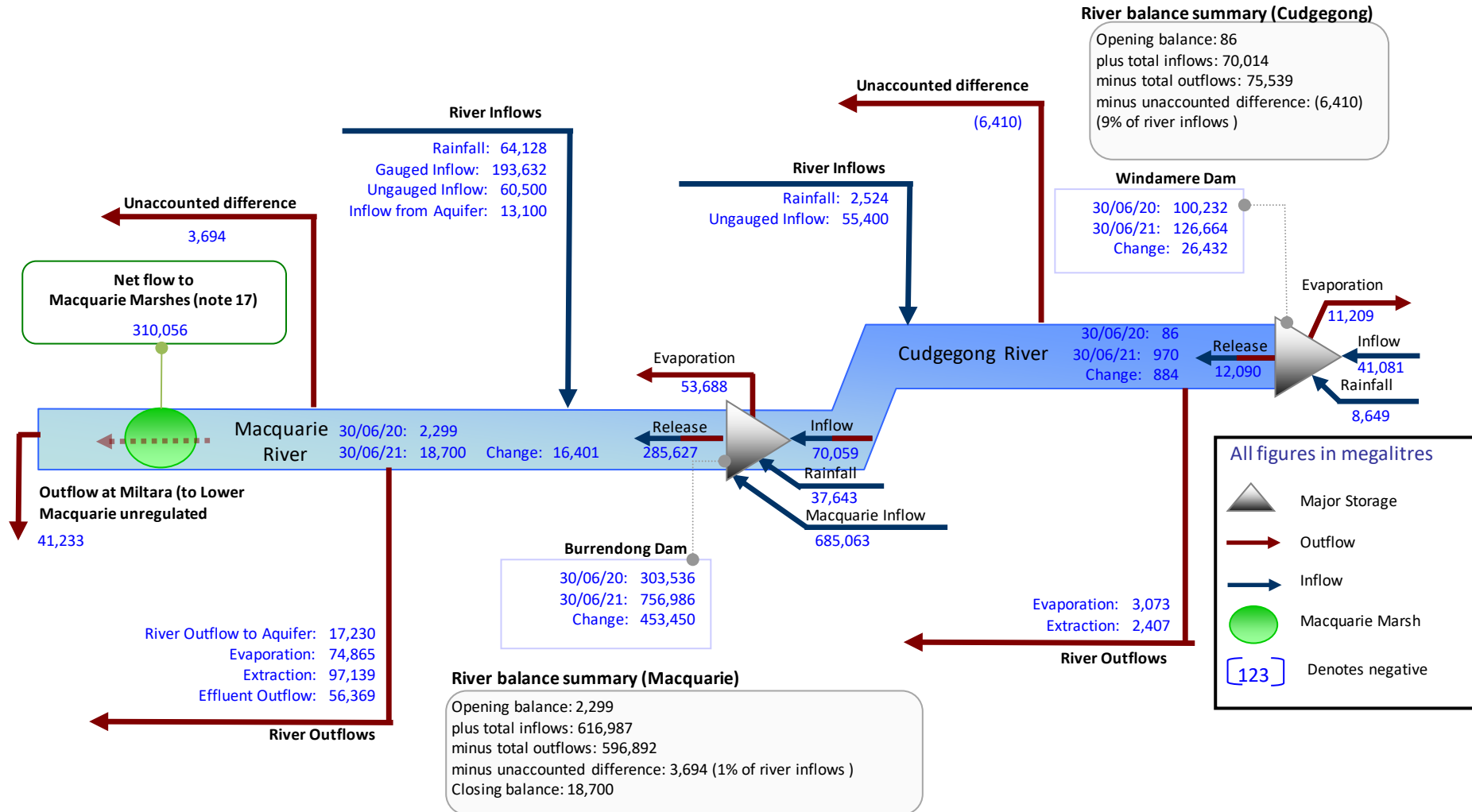
It is important to recognise that the data used to account for water movement and management in the reporting entity has been obtained from a variety of sources and systems. The data ranges from observed values where a high accuracy would be anticipated through to modelled results and estimates where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

Table 7: Water account data accuracy estimates key

Accuracy	Description
A1 ¹⁵	+/- 0% Data is determined rather than estimated or measured. Therefore, the number contains no inaccuracies.
A	+/- 10%
B	+/- 25%
C	+/- 50%
D	+/- 100%

¹⁵ Non-physical administration items, such as available water determinations, trading and carryover volumes are assumed to have no inherent error for the purposes of this report. Items are reported as extracted from the NSW Planning and Environment corporate database

2020–21 Macquarie and Cudgegong physical flows mass balance diagram



Statement of water assets and water liabilities

For the year ended 30 June 2021

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

Surface water assets

1. Surface water storage	Accuracy	Notes	30 June 2021	30 June 2020
Burrendong Dam	A	8	756,986	303,536
Windamere Dam	A	8	126,664	100,232
River (Cudgegong)	B	9	970	86
River (Macquarie)	B	9	18,700	2,299
Total surface water storage (Asws)			903,320	406,153
<i>Change in surface water storage</i>			<i>497,167</i>	<i>190,786</i>

Surface water liabilities

2. Allocation account balance	Accuracy	Notes	30 June 2021	30 June 2020
Cudgegong	-	-	-	-
High Security	A1	1	0.0	(0)
General Security	A1	1	25,739	10,914
Macquarie	A1	1	-	-
Domestic and Stock			0	0
High Security (HS)			0	0
Local Water Utility			(2)	0
General Security			399,572	101,495
Environmental water allowance	A1	7	80,297	69,373
Total allocation account balance (Lsws)			505,605	181,782
<i>Change in allocation account balance</i>			<i>323,824</i>	<i>3,028</i>

Surface water net changes

3. Net change	30 June 2021	30 June 2020
Net surface water assets (Asws – Lsws)	397,715	224,371
<i>Change in net water assets</i>	<i>173,343</i>	<i>187,758</i>

Changes in water assets and water liabilities

For the year ended 30 June 2021 (1 of 4)

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

Surface water storage inflows	Accuracy	Notes	2020-2021	2019-2020
Burrendong Dam	-	-	-	-
Inflow (Cudgegong)	A	10	70,059	83,419
Inflow (Upper Macquarie)	A	10	685,063	181,275
Rainfall	B	11	37,643	9,297
Windamere Dam	-	-	-	-
Inflow	A	10	41,081	5,527
Rainfall	B	11	8,649	4,799
Cudgegong River	-	-	-	-
Rainfall	C	12	2,524	2,029
Ungauged Inflow	C	14	55,400	72,500
Inflow from Windamere	A	15	12,090	17,736
Macquarie River	-	-	-	-
Rainfall	C	12	64,128	11,778
Gauged inflow	A	13	193,632	179,841
Ungauged inflow	C	14	60,500	94,100
Inflow from aquifer	D	22	13,100	6,113
Inflow from Burrendong Dam	A	15	285,627	46,528
Total surface water storage increases (Isws)			1,529,496	714,942

Changes in water assets and water liabilities

For the year ended 30 June 2021 (2 of 4)

Surface water storage outflows	Accuracy	Notes	2020-2021	2019-2020
Burrundong	-	-	-	-
Releases	A	15	285,627	46,528
Evaporation	B	11	53,688	18,204
Windamere	-	-	-	-
Releases	A	15	12,090	17,736
Evaporation	B	11	11,209	12,672
Cudgegong River	-	-	-	-
Evaporation	C	12	3,073	3,808
Basic Rights extractions	C	19	227	227
Licenced extractions from river	A	18	2,180	5,972
Flow to Burrundong	A	10	70,059	83,419
Macquarie River	-	-	-	-
Evaporation	C	12	74,865	30,021
Basic Rights extractions	C	19	973	973
Licenced extractions from river	A	18	96,166	45,254
Flow to Macquarie Marsh	-	-	-	-
Held environmental water	B	17	49,278	4,583
Other flow	B	17	260,778	132,971
End of system flow	A	16	41,233	17,226
Regulated effluent	-	-	-	-
Marra Creek	A	16	12,118	16,392
Crooked Creek	A	16	11,242	8,942
Duck Creek	A	16	11,167	6,390
Gunningbar Creek	A	16	21,842	12,984
River outflow to aquifer	D	22	17,230	12,230
Total surface water storage decreases (Dsws)			1,035,093	476,533
Unaccounted volume (balancing item) (Usws)	-	-	-	-
Cudgegong	D	23	(6,410)	(1,135)
Macquarie	D	23	3,694	48,757

Net surface water storage changes	2020-2021	2019-2020
Net surface water storage inflow (Isws – Dsws – Usws)	497,167	190,786

Changes in water assets and water liabilities

For the year ended 30 June 2021 (3 of 4)

2. Changes in allocation accounts

Allocation account increases	Accuracy	Notes	2020-2021	2019-2020
Available water determinations	-	-	-	-
Cudgegong	-	-	-	-
Domestic and Stock	A1	2	701	699
General Security	A1	2	12,758	0
High Security	A1	2	5,291	5,297
High Security (Research)	A1	2	1	1
Local Water Utility	A1	2	2,600	2,600
Macquarie	-	-	-	-
Domestic and Stock	A1	2	5,256	5,252
General Security	A1	2	417,319	0
High Security	A1	2	8,537	8,731
High Security (Research)	A1	2	4,044	4,044
High Security (TWS)	A1	2	40	40
Local Water Utility	A1	2	16,205	16,205
Environmental water allowance	A1	7	108,800	0
New licence	-	-	-	-
Cudgegong	A1	1	0	0
Supplementary water demand	-	-	-	-
Macquarie	A	20	11,379	34,792
Internal trade—buyers	-	-	-	-
Cudgegong	A1	4	9,148	6,483
Macquarie	A1	4	100,607	4,220
Storage spill reset—increase	-	-	-	-
Cudgegong	A1	5	0	0
Macquarie	A1	5	0	0
Macquarie EWA	A1	5	0	0
Adjusting account entry—increase	A1	24	0	0
Total allocation account increases (laa)	-	-	702,685	88,366

Changes in water assets and water liabilities

For the year ended 30 June 2021 (4 of 4)

Allocation account decreases	Accuracy	Notes	2020-2021	2019-2020
Account usage	-	-	-	-
Cudgegong	-	-	-	-
Domestic and Stock	A	3	259	338
General Security	A	3	389	3,331
High Security	A	3	273	475
Local Water Utility	A	3	1,258	1,827
Macquarie	-	-	-	-
Domestic and Stock	A	3	1,204	1,075
General Security	A	3	117,717	487
High Security	A	3	4,887	4,261
High Security (Research)	A	3	1,649	1,299
Local Water Utility	A	3	8,607	7,922
Supplementary	A	3	11,379	34,792
EWA	A1	7	97,542	0
Account forfeiture	-	-	-	-
Cudgegong	-	-	-	-
Domestic and Stock	A	1	433	361
General Security	A	1	756	0
High Security	A	1	167	84
High Security (Research)	A	1	1	1
Local Water Utility	A	1	1,342	774
Macquarie	-	-	-	-
Domestic and Stock	A	1	4,052	4,176
General Security	A	1	4,544	32
High Security	A	1	2,264	2,351
High Security (Research)	A	1	2,395	2,745
High Security (TWS)	A	1	40	40
Local Water Utility	A	1	7,598	8,253
Licence cancelled	-	-	-	-
Cudgegong	A1	1	8	0
Macquarie	A1	1	7	7
Internal trade—sellers	-	-	-	-
Cudgegong	A1	4	10,787	3,549
Macquarie	A1	4	98,968	7,155
Adjusting account entry—decrease	-	-	-	-
Cudgegong	A1	24	0	2
Storage spill reset—decrease	-	-	-	-
Macquarie	A1	5	0	0
Environmental Water Allowance	A1	5	334	0
Total allocation account decreases (Daa)	-	-	378,862	85,338
Net change in allocation accounts			2020-2021	2019-2020
Net allocation account balance increase (Iaa – Daa)			323,824	3,028
3. Overall changes				
Surface water assets			2020-2021	2019-2020
Change in net surface water assets (Isws – Dsws – Usws – Iaa + Daa)			173,343	187,758

Note disclosures

Reconciliation and future prospect descriptions

Reconciliation of change in net water asset to net change in physical water storage ¹⁶	2020–21 ML	2019–20 ML
Change in net surface water assets	173,343	187,758
Non-physical adjustments		
Net change in allocation accounts	312,900	3,028
Net change in claims to water: EWA	10,924	0
Total non-physical adjustments	323,824	3,028
Net change in physical surface water storage	497,167	190,786

Reconciliation of closing water storage to total surface water assets	30 June 2021 ML	30 June 2020 ML
Closing water storage		
Surface water storage	903,320	406,153
Total surface water assets	903,320	406,153

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.

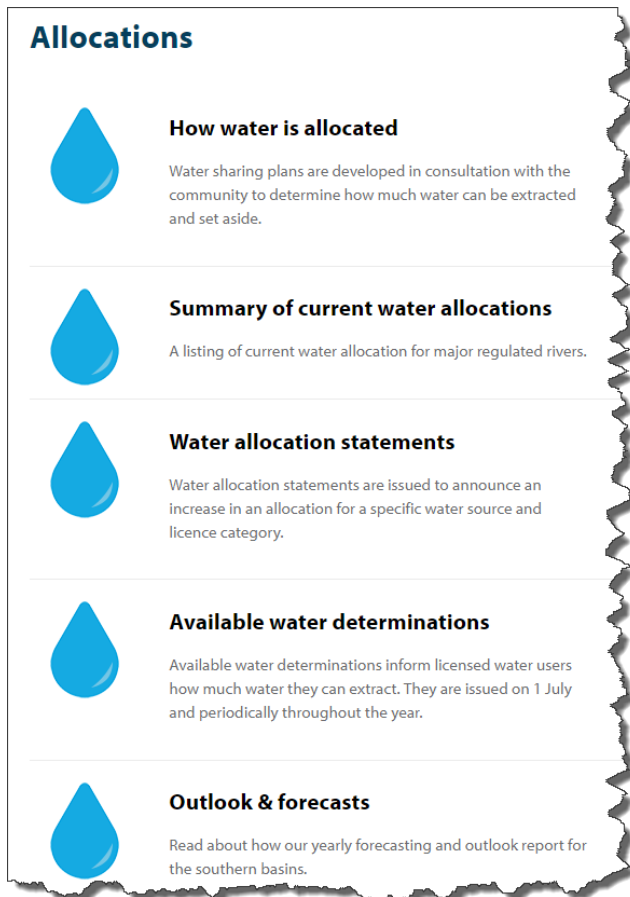
In lieu of this information, web links to information sources for the latest water availability information for the Cudgegong and Macquarie Water Sources are provided below. Carryovers and available water determinations at the time of reporting are also presented along with probability information pertaining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

¹⁶ 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 2021–22 available water determinations, on the NSW Department of Planning and Environment webpage at industry.nsw.gov.au/water/allocations-availability/allocations

You can also subscribe to receive the latest updates.



Significant events since 2021–22

Significant rainfall events from July 2021 to September 2021 resulted in Burrendong Dam spilling and hence maximum permissible allocations being made available. Further rain resulted in floods in the Macquarie River in November 2021 and Windamere Dam spilling by December 2021.

System reliability¹⁷

The latest long-term planning model (IQQM) reflecting a water sharing plan management scenario in the Macquarie–Cudgong system provide indicative system reliability information for the commencement and closure of a watering season¹⁸.

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

¹⁷ Models used by state water agencies are subject to continuous improvements and updates. The reliability described in this report represents the information available when the report was compiled and may vary from reliability computed in the latest version of the models.

¹⁸ Modelled data simulated as July to June water year. Simulation period 1 June 1892 to 30 June 2018.

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 49).

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 50).

Figure 49: Macquarie–Cudgegong start of water year simulated availability for General Security access licences

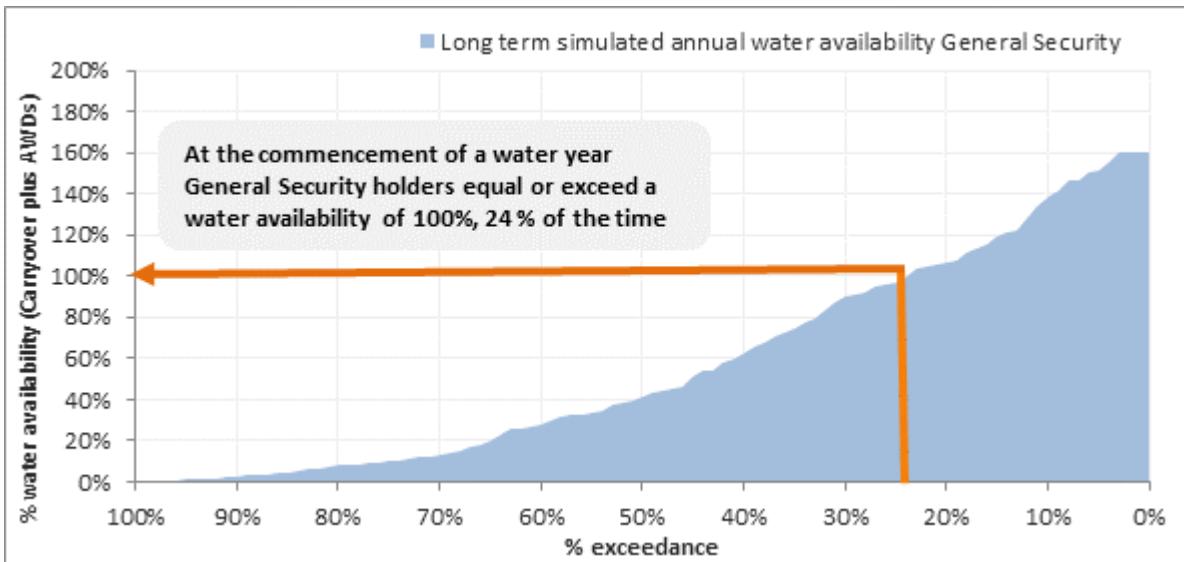
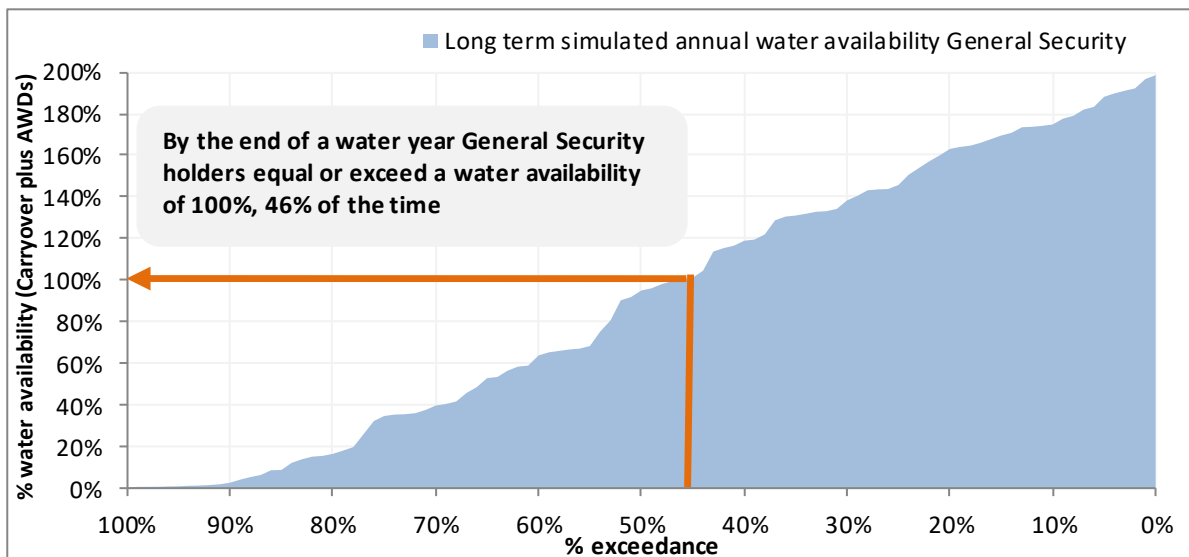


Figure 50: Macquarie–Cudgegong end of water year simulated availability for General Security access licences



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 Planning and Environment website at www.industry.nsw.gov.au/water

Data accuracy

A1—Nil inaccuracy +/- 0%

Providing agency

NSW Department of Planning and Environment

Data source

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

Methodology

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

- available water determination (AWD) (detailed in Note 2)
- allocation account usage (detailed in Note 3)
- forfeiture due to:
 - no or limited carryover being permitted (end of year forfeit)
 - account limit breaches
 - storage spills (detailed in Note 5)
 - evaporation reductions on carryover

- cancellation of licence
- trade of allocation water between accounts (detailed in Note 4)
- determined carryover volume.

Additional information

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

Table 8: Explanatory information for allocation account summary

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

Table 9: Cudgegong account balance summary for the reporting period

Category	Share 30 June 2021	Opening balance	AWD	Licences		Drought suspension		Assignments		Account usage	Spill		During year forfeit	End of year balance		End of year forfeit	Carry forward
				New	Cancel	In	Out	In	Out		Increase	Decrease		Available	Non-available		
Domestic and Stock	656	0	664	0	8	0	0	0	0	259	0	0	0	397	0	397	0
Domestic and Stock [Domestic]	23	0	22	0	0	0	0	0	0	0	0	0	0	22	0	22	0
Domestic and Stock [Stock]	15	0	15	0	0	0	0	0	0	0	0	0	0	15	0	15	0
Local Water Utility	2,600	0	2,600	0	0	0	0	0	0	1,258	0	0	0	1,342	0	1,342	0
General Security	18,762	10,914	12,758	0	0	0	0	9,131	5,920	389	0	0	318	26,176	0	438	25,739
High Security	5,291	(0)	5,291	0	0	0	0	16	4,867	273	0	0	0	167	0	167	0
High Security [Research]	1	0	1	0	0	0	0	0	0	0	0	0	0	1	0	1	0
Supplementary Water	1,290	0	1,290	0	0	0	0	0	0	0	0	0	0	1,290	0	1,290	0

Table 10: Macquarie account balance summary for the reporting period

Category	Share 30 June 2021	Opening balance	AWD	Licences		Drought suspension		Assignments		Account usage	Spill		During year forfeit	End of year balance		End of year forfeit	Carry forward
				New	Cancel	In	Out	In	Out		Increase	Decrease		Available	Non-available		
Domestic and Stock	4,291	0	4,291	0	0	0	0	0	0	1,096	0	0	0	3,194	0	3,194	0
Domestic and Stock [Domestic]	801	0	800	0	0	0	0	0	0	86	0	0	0	715	0	715	0
Domestic and Stock [Stock]	165	0	165	0	0	0	0	0	0	22	0	0	0	143	0	143	0
Local Water Utility	16,205	0	16,205	0	0	0	0	0	0	8,607	0	0	0	7,598	0	7,598	0
General Security	613,704	101,495	417,319	0	7	0	99,494	100,396	97,369	117,717	0	0	2,672	401,445	0	1,872	399,572
High Security	8,537	0	8,537	0	0	0	0	211	1,599	4,887	0	0	2	2,260	0	2,262	(2)
High Security [Research]	4,044	0	4,044	0	0	0	0	0	0	1,649	0	0	0	2,395	0	2,395	0
High Security [Town Water Supply]	40	0	40	0	0	0	0	0	0	0	0	0	0	40	0	40	0
Supplementary Water	48,708	(1)	48,708	0	0	0	0	11,712	11,712	11,379	0	0	0	37,328	0	37,328	0

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

This is the process by which the regulated surface water asset available for use within the regulated system is determined and shared. The process calculates the volume of water that is to be added to an individual's licence allocation account. Announcements of allocations are made on a seasonal basis—usually corresponding with the financial year and are updated on a regular basis or following significant inflow events. Under the 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 Planning and Environment website at www.industry.nsw.gov.au/water

Data accuracy

A1—Nil inaccuracy +/- 0%

Providing agency

NSW Department of Planning and Environment.

Methodology

The AWD procedure itself is generally divided into 2 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 ¹⁹	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.

¹⁹ Domestic and Stock is further broken down into 3 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.

Table 12: Allocation summary report notes

Report heading	Description
Opening	Remaining allocation account balances at the conclusion of the previous season that is allowed to be carried forward to this season.
Individual announcement	Actual announcement made to each licence category
Share component (Entitlement)	Sum of the licensed volume of water within the licence category on the announcement date.
Allocation announced volume	Volume of water credited to accounts within a licence category as a result of the announcement made.
Allocation cumulative announced volume	Cumulative total of the announced volumes for the water year and licence category.
Allocation announced volume % of share	This is the announced volume expressed as a percentage of the entitlement applicable on the particular date.
Allocation cumulative announced volume % of share	This is the cumulative total percent (of total entitlement) that has been issued on the announcement date (inclusive)
Account balance available	Sum of water available in allocation accounts that has been made available to be taken during the season.
Account balance not available	Water allocated that is not accessible at this point in time.
Account balance total	Total balance of accounts (available plus not available)
Account balance available % of share	Account balance available expressed as a percentage of share component.
Account balance total % of share	Account balance expressed as a percentage of share component.
Supplementary water	Water that is not a stored source of water and is only made available if an uncontrolled flow event occurs.

Table 13: Allocation announcements for the reporting period—Cudgegong

Date	Individual announcement	Share component	Allocation volume (ML)	Cumulative volume (ML)	Allocation volume (%)	Cumulative volume (%)	Balance available (ML)	Balance not available (ML)	Balance total (ML)	Balance available (%)	Balance total (%)
Domestic and stock											
1-Jul-20	Opening	664	-	-	0.0%	0.0%	0	0	0	0.0%	0.0%
1-Jul-20	AWD 100.0 %	664	664	664	100.0%	100.0%	664	0	664	100.0%	100.0%
Domestic and stock[domestic]											
1-Jul-20	Opening	21	-	-	0.0%	0.0%	0	0	0	0.0%	0.0%
1-Jul-20	AWD 100.0 %	21	21	21	100.0%	100.0%	21	0	21	100.0%	100.0%
Domestic and stock[stock]											
1-Jul-20	Opening	15	-	-	0.0%	0.0%	0	0	0	0.0%	0.0%
1-Jul-20	AWD 100.0 %	15	15	15	100.0%	100.0%	15	0	15	100.0%	100.0%
Local water utility											
1-Jul-20	Opening	2,600	-	-	0.0%	0.0%	0	0	0	0.0%	0.0%
1-Jul-20	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-20	Opening	18,812	-	-	0.0%	0.0%	10,914	0	10,914	58.0%	58.0%
1-Jul-20	AWD 0.0 ML per Share	18,812	0	0	0.0%	0.0%	10,914	0	10,914	58.0%	58.0%
14-Aug-20	Drought Suspension Re-credit 100.0 %	18,812	-	-	0.0%	0.0%	10,914	0	10,914	58.0%	58.0%
8-Sep-20	AWD 0.12 ML per Share	18,762	2,252	2,252	12.0%	12.0%	13,166	0	13,166	70.2%	70.2%
13-Oct-20	AWD 0.06 ML per Share	18,762	1,125	3,377	6.0%	18.0%	14,291	0	14,291	76.2%	76.2%
11-Nov-20	AWD 0.05 ML per Share	18,762	939	4,316	5.0%	23.0%	15,230	0	15,230	81.2%	81.2%
15-Jan-21	AWD 0.05 ML per Share	18,762	937	5,253	5.0%	28.0%	16,167	0	16,167	86.2%	86.2%
10-Feb-21	AWD 0.02 ML per Share	18,762	376	5,629	2.0%	30.0%	16,543	0	16,543	88.2%	88.2%
10-Mar-21	AWD 0.04 ML per Share	18,762	750	6,379	4.0%	34.0%	17,293	0	17,293	92.2%	92.2%
14-Apr-21	AWD 0.29 ML per Share	18,762	5,442	11,821	29.0%	63.0%	22,735	0	22,735	121.2%	121.2%
12-May-21	AWD 0.04 ML per Share	18,721	751	12,572	4.0%	67.1%	23,486	0	23,486	125.5%	125.5%
10-Jun-21	AWD 0.01 ML per Share	18,762	186	12,758	1.0%	67.8%	23,672	0	23,672	126.2%	126.2%
Regulated river (high security)											
1-Jul-20	Opening	5,291	-	-	0.0%	0.0%	0	0	0	0.0%	0.0%
1-Jul-20	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%
Regulated river (high security) [research]											
1-Jul-20	Opening	1	-	-	0.0%	0.0%	0	0	0	0.0%	0.0%
1-Jul-20	AWD 100.0 %	1	1	1	100.0%	100.0%	1	0	1	100.0%	100.0%
Supplementary water											
01-Jul-20	Opening	1,290	-	-	0.0%	0.0%	0	0	0	0.0%	0.0%
01-Jul-20	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 (%)
Domestic and stock											
1-Jul-20	Opening	4,291	-	-	0.0%	0.0%	0	0	0	0.0%	0.0%
1-Jul-20	AWD 100.0 %	4,291	4,291	4,291	100.0%	100.0%	4,291	0	4,291	100.0%	100.0%
Domestic and stock[domestic]											
1-Jul-20	Opening	797	-	-	0.0%	0.0%	0	0	0	0.0%	0.0%
1-Jul-20	AWD 100.0 %	797	798	798	100.1%	100.1%	798	0	798	100.1%	100.1%
Domestic and stock[stock]											
1-Jul-20	Opening	165	-	-	0.0%	0.0%	0	0	0	0.0%	0.0%
1-Jul-20	AWD 100.0 %	165	165	165	100.0%	100.0%	165	0	165	100.0%	100.0%
Local water utility											
1-Jul-20	Opening	16,205	-	-	0.0%	0.0%	0	0	0	0.0%	0.0%
1-Jul-20	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-20	Opening	613,654	-	-	0.0%	0.0%	2,001	99,494	101,495	0.3%	16.5%
1-Jul-20	AWD 0.0 ML per Share	613,654	0	0	0.0%	0.0%	2,001	99,494	101,495	0.3%	16.5%
14-Aug-20	Drought Suspension Re-credit 100.0 %	613,654	-	-	0.0%	0.0%	101,495	0	101,495	16.5%	16.5%
8-Sep-20	AWD 0.12 ML per Share	613,704	73,645	73,645	12.0%	12.0%	175,140	0	175,140	28.5%	28.5%
13-Oct-20	AWD 0.06 ML per Share	613,704	36,822	110,467	6.0%	18.0%	211,962	0	211,962	34.5%	34.5%
11-Nov-20	AWD 0.05 ML per Share	613,704	30,687	141,154	5.0%	23.0%	242,649	0	242,649	39.5%	39.5%
15-Jan-21	AWD 0.05 ML per Share	613,704	30,684	171,838	5.0%	28.0%	273,333	0	273,333	44.5%	44.5%
10-Feb-21	AWD 0.02 ML per Share	613,704	12,275	184,113	2.0%	30.0%	285,608	0	285,608	46.5%	46.5%
10-Mar-21	AWD 0.04 ML per Share	613,704	24,549	208,662	4.0%	34.0%	310,157	0	310,157	50.5%	50.5%
14-Apr-21	AWD 0.29 ML per Share	613,704	177,974	386,636	29.0%	63.0%	488,131	0	488,131	79.5%	79.5%
12-May-21	AWD 0.04 ML per Share	613,704	24,548	411,184	4.0%	67.0%	512,679	0	512,679	83.5%	83.5%
10-Jun-21	AWD 0.01 ML per Share	613,704	6,136	417,320	1.0%	68.0%	518,815	0	518,815	84.5%	84.5%
Regulated river (high security)											
1-Jul-20	Opening	8,537	-	-	0.0%	0.0%	0	0	0	0.0%	0.0%
1-Jul-20	AWD 1.0 ML per Share	8,537	8,537	8,537	100.0%	100.0%	8,537	0	8,537	100.0%	100.0%
Regulated river (high security)[research]											
1-Jul-20	Opening	4,044	-	-	0.0%	0.0%	0	0	0	0.0%	0.0%
1-Jul-20	AWD 100.0 %	4,044	4,044	4,044	100.0%	100.0%	4,044	0	4,044	100.0%	100.0%

Table 15: Allocation announcements for the reporting period—Macquarie (continued)

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 (%)
Regulated river (high security)[town water supply]											
1-Jul-20	Opening	40	-	-	0.0%	0.0%	0	0	0	0.0%	0.0%
1-Jul-20	AWD 100.0 %	40	40	40	100.0%	100.0%	40	0	40	100.0%	100.0%
Supplementary water											
01-Jul-20	Opening	48,708	-	-	0.0%	0.0%	(1)	0	(1)	0.0%	0.0%
01-Jul-20	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 Planning and Environment

Data source

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

Methodology

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

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

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

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

Table 16: 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 17: Account usage summary for the reporting period

Licence category	Macquarie account usage (ML)	Cudgegong account usage (ML)
Domestic and Stock	1,096	259
Domestic and Stock [Domestic]	86	0
Domestic and Stock [Stock]	22	0
Local Water Utility	8,607	1,258
General Security	117,717	389
High Security	4,887	273
High Security (Research)	1,649	0
High Security (Town Water Supply)	0	N/A
Supplementary Water	11,379	0
Total usage	145,444	2,180

Note 4—Internal trading (allocation assignments)

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

Data type

Administration

Policy

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

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

Data accuracy

A1—Nil inaccuracy +/- 0%

Providing agency

NSW Department of Planning and Environment

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

Table 18: Macquarie catchment allocation assignments summary for reporting period

From/To			To					Total	
			Macquarie			Cudgegong			
			General security	High security	Supplementary water	General security	High security		
From	Macquarie	General security	93,800	186	-	3,383	-	97,369	
		High security	963	25	-	611	-	1,599	
		Supplementary water	-	-	11,712	-	-	11,712	
	Cudgegong	General security	4,870	-	-	1,033	16	5,920	
		High security	763	-	-	4,104	-	4,867	
		Supplementary water	-	-	-	-	-	0	
	Total			100,396	211	11,712	9,131	16	121,467

Note 5—Storage spill account reset

Windamere Dam

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

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

Burrendong Dam

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

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

Data type

Administration

Policy

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

- Part 9 Rules for Managing Access Licences
 - Division 2 Water Allocation Account Management
 - Clause 44 Carrying over of water allocation credits, water allocation account limits and withdrawal of water allocations
- Part 8 Limits to the availability of water
 - Division 2 Available water determinations
 - Clause 36 Available water determinations for regulated river (high security) access licences
 - Clause 37 Available water determinations for regulated river (general security) access licences
- Part 3 Environmental water provisions
 - Clause 14 Planned environmental water

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

Data accuracy

A1—Nil inaccuracy +/- 0%

Providing agency

NSW Department of Planning and Environment

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 19: Storage Spill forfeitures and resets for the reporting period

Catchment	Licence type	Spill forfeiture	Spill AWD reset
Cudgegong	General Security	0	0
Cudgegong	High Security	0	0
Macquarie	General Security	0	0
Macquarie	High Security	0	0
Macquarie	EWA	0	0

Note 6—Held environmental water

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

These licences are held within the same licence categories as all other water access licences 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 Planning and Environment website at www.industry.nsw.gov.au/water

Data accuracy

A1—Estimated in the range +/- 10%

Providing agency

NSW Department of Planning and Environment

Data source

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

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

Methodology

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

Below is list of typical transactions that can apply to an environmental allocation account:

- available water determination (AWD) (detailed in Note 2)
- allocation account usage (detailed in Note 3)
- forfeiture due to:
 - no or limited carryover being permitted (end of year forfeit)
 - account limit breaches
 - storage spills (detailed in Note 5)
 - evaporation reductions on carryover
 - cancellation of licence
- trade of allocation water between accounts (detailed in Note 4)
- determined carryover volume.

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

Additional information

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

Table 20: Explanatory information for Environmental Account Summary

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

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

Category	Share 30 June 2021	Opening balance	AWD	Licences		Drought Suspension		Assignments		Account usage	During year forfeit	End of year balance		End of year forfeit	Carry forward
				New	Cancelled	In	Out	In	Out			Available	Not available		
General Security	173,742	34,030	118,145	0	0	0	34,030	71,915	71,689	51,868	285	100,248	0	0	100,248
Supplementary Water	9,744	0	9,744	0	0	0	0	9,080	9,080	1,250	0	8,494	0	8,494	0

Table 22: Environmental account balance summary for reporting period—Cudgegong

Category	Share 30 June 2021	Opening balance	AWD	Licences		Drought Suspension		Assignments		Account usage	During year forfeit	End of year balance		End of year forfeit	Carry forward
				New	Cancelled	In	Out	In	Out			Available	Not Available		
General Security	901	40	613	0	0	0	0	0	226	0	0	426	0	0	426
Supplementary Water	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Table 23: Annual change in held environmental water—Macquarie

Category	Volume 30 June 2020	Volume 30 June 2021	Volume difference	No. licences 30 June 2020	No. licences 30 June 2021	No. licence difference
General Security	173,742	173,742	0	11	10	1
Supplementary Water	9,744	9,744	0	6	4	2

Table 24: Annual change in held environmental water—Cudgegong

Category	Volume 30 June 2020	Volume 30 June 2021	Volume difference	No. licences 30 June 2020	No. licences 30 June 2021	No. licence difference
General Security	901	901	0	4	4	0
Supplementary Water	0	0	0	1	1	0

Table 25: Macquarie and Cudgegong environmental temporary trading summary

To/From				To								
				Consumptive					Environmental			Total
				Macquarie			Cudgegong		Macquarie			
				General security	High security	Supplementary water	General security	High security	General security	Supplementary water		
From	Consumptive	Macquarie	General security	22,111	186	-	3,383	-	-	-	25,680	
			High security	963	25	-	611	-	-	-	1,599	
			Supplementary water	-	-	2,632	-	-	-	-	2,632	
		Cudgegong	General security	4,644	-	-	1,033	16	-	-	5,693	
			High security	763	-	-	4,104	-	-	-	4,867	
		Environmental	Macquarie	General security	-	-	-	-	-	71,689	-	71,689
	Supplementary water			-	-	-	-	-	-	9,080	9,080	
	Cudgegong		General security	-	-	-	-	-	226	-	226	
	Total				28,481	211	2,632	9,131	16	71,915	9,080	121,466

Component summaries

Environment to environment trade	80,995
Environment to consumptive trade	0
Consumptive to environment trade	0
Consumptive to consumptive trade	40,471

Note 7—Environmental provisions

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

A long-term extraction limit

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

Increased natural flows in the upper reaches of the Cudgegong River

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

Establish an environmental water allowance for the Macquarie River

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

Data type

Measured

Policy

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

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

Available on the NSW Department of Planning and Environment website at

www.industry.nsw.gov.au/water

Data accuracy

A1—Nil inaccuracy +/- 0%

Providing agency

NSW Department of Planning and Environment

Data source

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

WaterNSW annual compliance report (internal document)

Additional information

Table 26: 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

Table 27: Environmental water allowance usage and balances by sub account

Water year	Active sub-account usages	Active sub-account balance as at 30 June	Translucent sub-account usages	Translucent sub-account as at 30 June
2011–12	68,064	96,000	20,168	64,000
2012–13	117,436	5,761	10,683	71,449
2013–14	27,861	23,091	15,810	18,163
2014–15	17,746	17,176	0	8,016
2015–16	36,392	0	0	0
2016–17	23,189	72,812	3,186	60,813
2017–18	64,232	75,623	0	50,415
2018–19	51,072	41,623	0	27,749
2019–20	0	41,623	0	27,749
2020–21	44,794	61,902	52,748	18,394

Note 8—Surface water storage

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

Data type

Derived from measured data

Policy

Not applicable

Data accuracy

A—Estimated in the range +/- 10%

Providing agency

NSW Department of Planning and Environment

Data source

NSW Department of Planning and Environment— HYDSTRA

Methodology

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

Additional information

Table 28: Storage summary table

Name	Capacity (ML)	Dead storage (ML)
Windamere Dam	368,120	1,130
Burrendong Dam	1,190,060 ²⁰	33,730

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

²⁰ Burrendong also has a flood mitigation storage zone of 489,940 megalitres. Combined capacity is 1,680,000 megalitres.

Note 9—River channel storage

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

Policy

Not applicable

Data type

Derived from measured data

Data accuracy

B—Estimated in the range +/- 25%

Providing agency

NSW Department of Planning and Environment

Data sources

NSW Department of Planning and Environment: HYDSTRA, CAIRO

Methodology

For each river section S(n):

$$V = Q \times T$$

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

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

Table 29: 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 Planning and Environment

Data sources

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

Methodology

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

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

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

Table 30: 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 12 and Figure 9 earlier in this report.

Note 11—Storage evaporation and storage rainfall

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

Data type

Derived from measured data

Policy

Not applicable

Data accuracy

B—Estimated in the range +/- 25%

Providing agency

NSW Department of Planning and Environment

Data source

NSW Department of Planning and Environment— IQQM backcalculation, HYDSTRA

Methodology

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

Rainfall:

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

Evaporation:

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

Table 31: Components for storage evaporation and rainfall

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

Note 12—River evaporation and river rainfall

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

Data type

Derived from measured data

Policy

Not applicable

Data accuracy

C—Estimated in the range +/- 50%

Providing agency

NSW Department of Planning and Environment

Data source

NSW Department of Planning and Environment: HYDSTRA, ARCGIS

QLD Department of Natural Resources: SILO

Methodology

The volume applied for evaporation and rainfall on the regulated river is achieved by first calculating a daily time-series of river area. This is achieved by breaking the river up into reaches and utilising the cross sections recorded at river gauging locations to determine the average width of the river with a given daily flow. River length is then determined between 2 gauging locations using ARCGIS and as such an area for each reach can be defined.

Area (m²) = Average W (m) x L (m)

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

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

Rainfall:

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

Evaporation:

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

Table 32: Components for storage evaporation and rainfall

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

Note 13—Gauged tributary inflow

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

Policy

Not applicable

Data type

Measured data

Data accuracy

A—Estimated in the range +/- 10%

Providing agency

NSW Department of Planning and Environment

Data sources

NSW Department of Planning and Environment: HYDSTRA

Methodology

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

Additional information

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

Table 33: Summary of gauged tributary inflow for the reporting period

Station	Name	Catchment area (km ²)	Inflow (ML)
421048	Little River at Obley No.2	612	36,350
421042	Talbragar River at Elong Elong	3,050	60,161
421018	Bell River at Newrea	1,620	60,217
421055	Coolbaggie Creek at Rawsonville	626	36,904
Total Gauged Inflow			196,632

Note 14—Ungauged runoff estimate

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

Policy

Not applicable

Data type

Estimated

Data accuracy

C—Estimated in the range +/- 50%

Providing agency

NSW Department of Planning and Environment

Data sources

NSW Department of Planning and Environment

Methodology

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

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

Where:

UI = Ungauged Inflow Estimate

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

SR_k = Storage release

GI = Gauged inflows

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

LE = Estimated losses. This was assumed to be 5% of the measured (gauged flow plus storage releases) entering the system for the Cudgegong and 10% for the Macquarie. The relatively low loss was assumed with most flow occurring in event based, in-channel flows.

Table 34: Summary of ungauged inflow estimates for reporting period

Catchment	Volume (ML)
Cudgegong	55,400
Macquarie	60,500

Note 15—Dam releases, river inflow from dam releases

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

Policy

Not applicable

Data type

Measured data

Data accuracy

A—Estimated in the range +/- 10%

Providing agency

NSW Department of Planning and Environment

Data sources

NSW Department of Planning and Environment: HYDSTRA

Methodology

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

Additional information

Figure 51: Burrendong Dam releases during reporting period

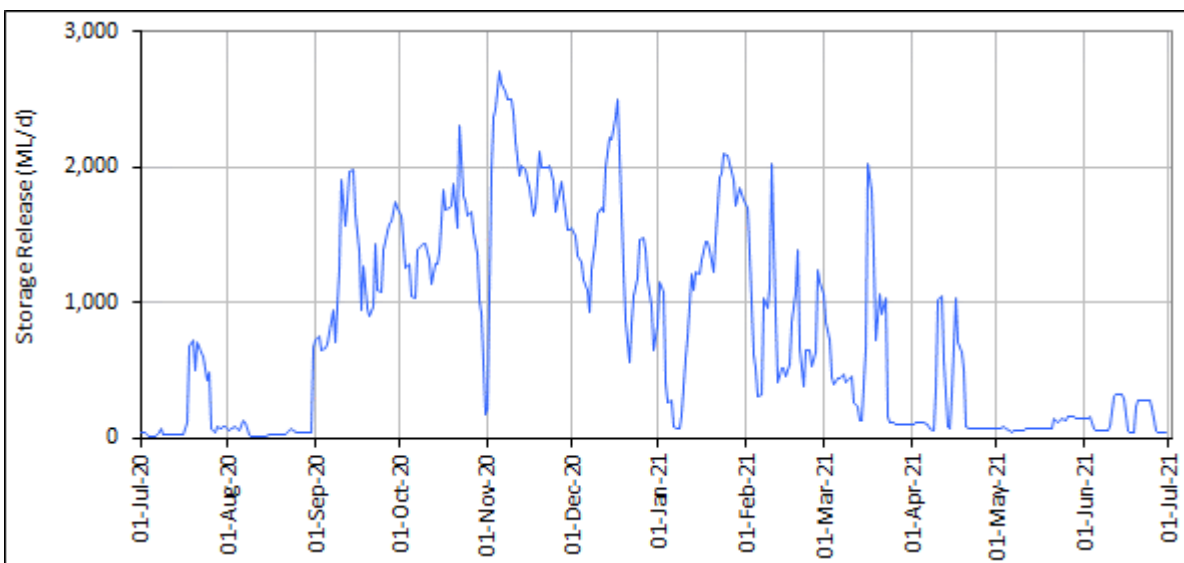
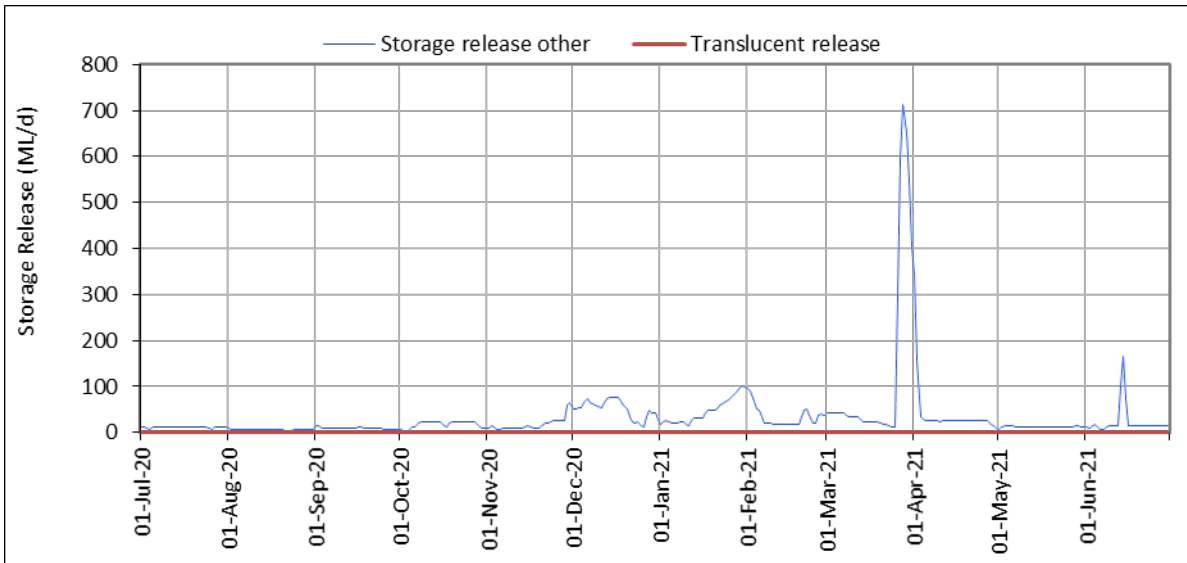


Figure 52: Windamere Dam releases during reporting period



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 Planning and Environment

Data source

NSW Department of Planning and Environment– HYDSTRA

Methodology

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

For the Macquarie reporting entity of this GPWAR the end of system is considered to be the Macquarie River at Miltara (421135)²¹. 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 which receive replenishment supplies from the regulated system (closest offtake measurement is used).

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

Additional information

Table 35: Accounted system outflows during reporting period

Station	Location	Total flow (ML)
421166	Gunningbar Creek at Fairview Dam	21,842
421016	Crooked Creek at Profile	11,242
421164	Duck Creek at Napali	11,167
421097	Marra Creek at Carinda Road	12,118
421135	Macquarie River at Miltara	41,233
Total		97,602

²¹ Revised accounting extent commencing in the 2019-20 GPWAR

Figure 53: Macquarie end of system flow

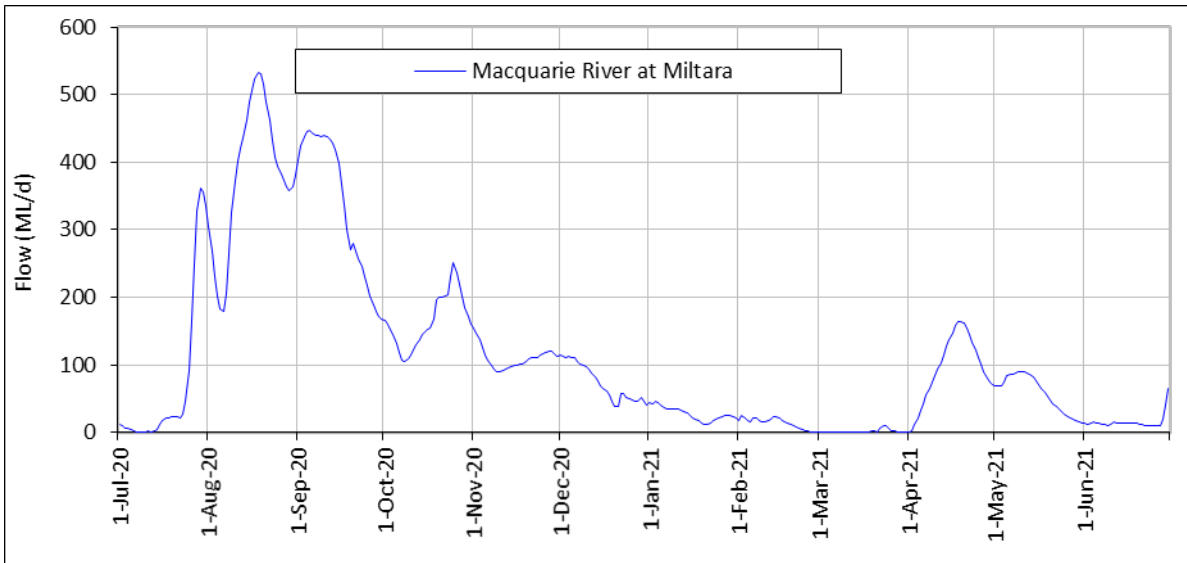
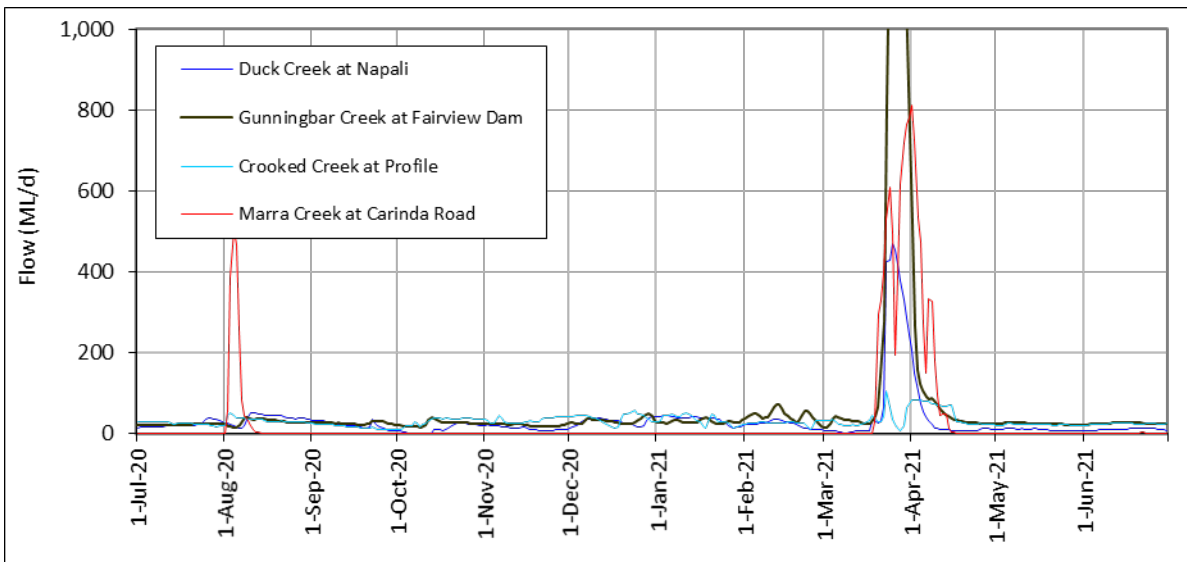


Figure 54: Macquarie regulated effluents



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 Planning and Environment

Data sources

NSW Department of Planning and Environment: HYDSTRA, WaterNSW: annual compliance report (internal document) and Water Accounting System

Methodology

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.

The calculation is summarised below:

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

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)

E_{Con} = Measured licence extractions below Marebone Weir (regulated consumptive use only)

Q_{out1} = Total flow passing at Miltara (421135) (inclusive of replenishment deliveries to the Lower Macquarie unregulated)

Q_{Rep} = Estimated replenishment deliveries in the Gum Cowl 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 Ginghet 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 36: Flow to Macquarie Marshes for the reporting period

Item	Volume (ML)
Macquarie River at downstream Marebone Weir	284,583
Marebone Break at downstream Marebone Weir	105,696
Total flow downstream of Marebone Weir	390,279
Macquarie River at Miltara (replenishment delivery)	33,296
Macquarie River at Miltara (other flow)	7,937
minus Total outflow at Miltara	41,233
<i>minus</i> regulated extractions downstream Marebone Weir	7,944
<i>minus</i> baseflow delivery	3,650
<i>minus</i> Gum Cowal and Terrigal Creek replenishment flow	27,395
<i>equals</i> net flow to Macquarie Marshes	310,056

Note 18—Extractions from river

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

Data type

Measured data

Policy

Not applicable

Data accuracy

A—Estimated in the range +/- 10%

Providing agency

NSW Department of Planning and Environment

Data source

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

Methodology

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

Additional information

Table 37: Reconciliation of physical extraction to account usage (ML)

Calculation	Macquarie	Cudgegong
Licenced extractions from River ²²	96,166	2,180
plus		
Licenced flow leaving System ²³	49,278	0
plus		
In stream licenced usage ²⁴	0	0
equals		
Total account usage ²⁵	145,444	2,180

²² Direct licenced extractions from the river excluding basic rights usage estimate

²³ 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

²⁴ Water ordered and used within the accounted system for environmental benefit (not extracted from the river)

²⁵ The total amount of water accounted for usage against the allocation accounts

Note 19—Basic rights extractions

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

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

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

Data Type

Estimated

Policy

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

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

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

Data accuracy

C—Estimated in the range +/- 50%

Providing agency

NSW Department of Planning and Environment

Data source

Water Sharing Plan for the Macquarie Regulated River Water Source 2016

Methodology

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

Note 20—Supplementary extractions

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

Data type

Measured data

Policy

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

- Part 8 Limits to the availability of water
 - Division 2—Available water determinations
 - Clause 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 Planning and Environment website at www.industry.nsw.gov.au/water

Data accuracy

A—Estimated in the range +/- 10%

Providing agency

NSW Department of Planning and Environment

Data source

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

Methodology

Supplementary water extraction and diversion data is collected by either on farm meters that measure extraction or gauges on diversion works. Meter readings are collected for individual licence holders at intervals during the year and converted via a calibration factor to a volume of water extracted. Water diverted from the river is measured by recording the height at either the gauge or weir with the volume diverted being derived by passing these heights through a rating table. However, with supplementary water being extracted through the same pumps as those extracting water under other categories of access licences additional information is required to separate out supplementary extraction.

Basically, licence holders provide notification of their intention to pump prior to pumping or diverting water during the declared supplementary event and provide meter readings both at the commencement and conclusion of pumping. This enables the supplementary flow extraction to be assessed independent of other categories of access licences.

Additional information

The operational supplementary announcements for the reporting period are presented in Table 38. Account usage by river section and total daily usage is provided in Figure 55 and Figure 56 respectively.

Table 38: Supplementary Announcements for reporting period

Announce date	% use limit	Section	Start date	End date	Usage
29-Jul-20	100	Gunningbar Ck Junc (Start 22c) to Monkey Bridge	3-Aug-20	4-Aug-20	0
29-Jul-20	100	Marebone to Bifurcation (Gs421145)	2-Aug-20	5-Aug-20	518
29-Jul-20	100	Bifurcation (Gs421145) to Macquarie Junction	3-Aug-20	5-Aug-20	0
29-Jul-20	100	Gunningbar O/T to Gunningbar Weir (Gs421017)	3-Aug-20	4-Aug-20	35
29-Jul-20	100	Gunningbar Weir (Gs421017) to Fairview (Gs421166)	3-Aug-20	4-Aug-20	78
29-Jul-20	100	Fairview (Gs421166) to Bogan Junction	31-Jul-20	1-Aug-20	0
29-Jul-20	100	Crooked Creek	3-Aug-20	4-Aug-20	0
29-Jul-20	100	Duck Creek to Napali (Gs421164)	3-Aug-20	4-Aug-20	0
29-Jul-20	100	Napali (Gs421164) to Bogan Junction	3-Aug-20	4-Aug-20	0
29-Jul-20	100	Gunningbar to Creek Cutting 2	3-Aug-20	4-Aug-20	0
29-Jul-20	100	Marebone Break	3-Aug-20	4-Aug-20	0
29-Jul-20	100	Burrendong Dam to Bell River	30-Jul-20	30-Jul-20	0
29-Jul-20	100	Bell River to Little River	30-Jul-20	30-Jul-20	0
29-Jul-20	100	Little River to Dubbo (Gs421001)	30-Jul-20	30-Jul-20	0
29-Jul-20	100	Dubbo (Gs421001) to Talbragar River	30-Jul-20	30-Jul-20	0
29-Jul-20	100	Talbragar River to Coolbaggie Creek	30-Jul-20	31-Jul-20	10
29-Jul-20	100	Coolbaggie Creek to Baroona (Gs421127)	30-Jul-20	31-Jul-20	0
29-Jul-20	100	Baroona (Gs421127) to Narromine (Gs421006)	30-Jul-20	31-Jul-20	0
29-Jul-20	100	Narromine (Gs521006) to Gin Gin Weir	30-Jul-20	31-Jul-20	364
29-Jul-20	100	Gin Gin Weir to Reddenville Break	30-Jul-20	31-Jul-20	270
29-Jul-20	100	Reddenville Break to Beleringar O/T	30-Jul-20	31-Jul-20	248
29-Jul-20	100	Beleringar O/T to Gunningbar O/T	30-Jul-20	31-Jul-20	500
29-Jul-20	100	Gunningbar O/T to Warren Weir	30-Jul-20	31-Jul-20	0
29-Jul-20	100	Warren Weir to Junction Creek Confluence	31-Jul-20	2-Aug-20	0
29-Jul-20	100	Junction Creek Confluence to Marebone Weir	31-Jul-20	2-Aug-20	736
29-Jul-20	100	Marebone Weir to Oxley (Gs421022)	1-Aug-20	3-Aug-20	1,305
29-Jul-20	100	Oxley (Gs421022) to Castlereagh River	4-Aug-20	5-Aug-20	0
29-Jul-20	100	Cumboogle Creek	4-Aug-20	5-Aug-20	0
23-Mar-21	100	Marebone to Bifurcation (Gs421145)	28-Mar-21	1-Apr-21	1,223
23-Mar-21	100	Bifurcation (Gs421145) to Macquarie Junction	29-Mar-21	2-Apr-21	0
23-Mar-21	100	Gunningbar O/T to Gunningbar Weir (Gs421017)	26-Mar-21	29-Mar-21	133
23-Mar-21	100	Gunningbar Weir (Gs421017) to Fairview (Gs421166)	26-Mar-21	29-Mar-21	8
23-Mar-21	100	Fairview (Gs421166) to Bogan Junction	26-Mar-21	29-Mar-21	11
23-Mar-21	100	Crooked Creek	26-Mar-21	29-Mar-21	0
23-Mar-21	100	Duck Creek to Napali (Gs421164)	26-Mar-21	29-Mar-21	0
23-Mar-21	100	Napali (Gs421164) to Bogan Junction	26-Mar-21	29-Mar-21	0
23-Mar-21	100	Gunningbar to Creek Cutting 2	26-Mar-21	29-Mar-21	0

Announce date	% use limit	Section	Start date	End date	Usage
23-Mar-21	100	Marebone Break	30-Mar-21	2-Apr-21	0
23-Mar-21	100	Burrendong Dam to Bell River	23-Mar-21	26-Mar-21	0
23-Mar-21	100	Bell River to Little River	23-Mar-21	26-Mar-21	0
23-Mar-21	100	Little River to Dubbo (Gs421001)	23-Mar-21	26-Mar-21	0
23-Mar-21	100	Dubbo (Gs421001) to Talbragar River	23-Mar-21	26-Mar-21	0
23-Mar-21	100	Talbragar River to Coolbaggie Creek	23-Mar-21	26-Mar-21	0
23-Mar-21	100	Coolbaggie Creek to Baroona (Gs421127)	23-Mar-21	26-Mar-21	0
23-Mar-21	100	Baroona (Gs421127) to Narromine (Gs421006)	23-Mar-21	26-Mar-21	0
23-Mar-21	100	Narromine (Gs521006) to Gin Gin Weir	23-Mar-21	26-Mar-21	2,701
23-Mar-21	100	Gin Gin Weir to Reddenville Break	24-Mar-21	28-Mar-21	250
23-Mar-21	100	Reddenville Break to Beleringar O/T	24-Mar-21	28-Mar-21	0
23-Mar-21	100	Beleringar O/T to Gunningbar O/T	24-Mar-21	28-Mar-21	0
23-Mar-21	100	Gunningbar O/T to Warren Weir	24-Mar-21	28-Mar-21	0
23-Mar-21	100	Warren Weir to Junction Creek Confluence	26-Mar-21	29-Mar-21	0
23-Mar-21	100	Junction Creek Confluence to Marebone Weir	26-Mar-21	29-Mar-21	1,662
23-Mar-21	100	Marebone Weir to Oxley (Gs421022)	27-Mar-21	30-Mar-21	1,330
23-Mar-21	100	Oxley (Gs421022) to Castlereagh River	27-Mar-21	30-Mar-21	0
23-Mar-21	100	Cumboogle Creek	23-Mar-21	26-Mar-21	0

Figure 55: Total supplementary usage for reporting period, by river section

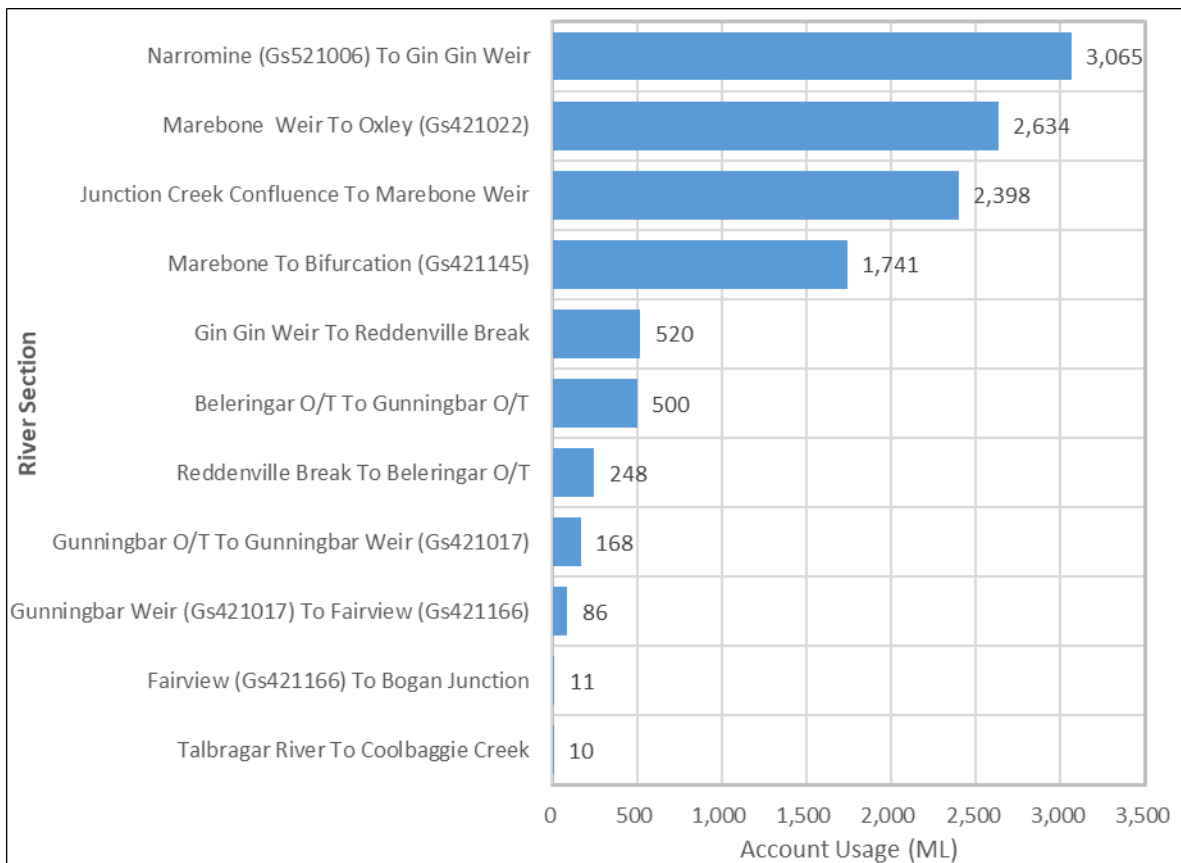
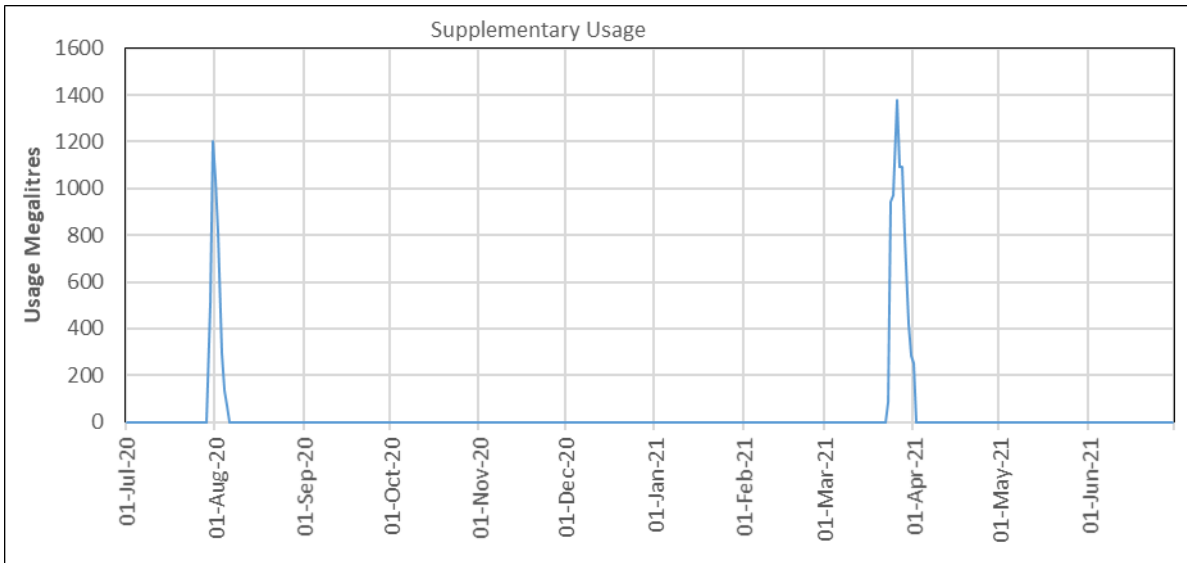


Figure 56: Supplementary water daily usage



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 Planning and Environment website at www.industry.nsw.gov.au/water

Data accuracy

A—Estimated in the range +/- 10%

B—Estimated in the range +/- 25%

Providing agency

NSW Department of Planning and Environment

Data source

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

Methodology

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

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

Additional information²⁶

Table 39: Replenishment flow summary for uncontrolled flow requirements

2020–21	Annual requirement	Estimated replenishment delivery	Event period	Source of supply	Performance
a) Gum Cowal / Terrigal system	Up to 10000 ML/yr.	20,068 ML (Env Water) 7,327 ML (S&D) approximately	16/09/2020 to 14/11/2020 26/03/2021 to 15/04/2021	Environmental Water Replenishment provided by rain and downstream tributary flows, combined with local rainfall runoff	System completely replenished
b) Crooked Ck. below Mumblebone	Up to 4000 ML/yr.	1,313 ML	30/03/2021 to 17/04/2021	Replenishment provided by rain and downstream tributary flows	The creek was sectionally 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 1,000ML.	19/03/2021 to 30/03/2021	Replenishment provided by rain 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	22/03/2021 to 27/03/2021	System replenished with flow coming down from Belaringar creek	System completely replenished
e) Ewenmar Ck. (Reddenville Break)	Up to 1500 ML/yr.	Unable to estimate exact volumes. However as per our best estimate ~5000ML was diverted.	24/03/2021 to 30/03/2021	Both pipe and road crossing flowed during period. No estimate.	Reddenville Break flowed for period shown and replenished Birchell's Plain Ck. Ewenmar Ck. replenished by this flow along with flow from its own catchment.
f) Belaringar Ck. U/S	Up to 5000 ML/yr.	Estimated over 5,000 ML diverted	24/03/2021 to 27/03/2021	Replenishment provided by rain and downstream tributary flows.	System completely replenished

²⁶ Table 39, Table 40 and Table 41 extracted from Water NSW, Annual Compliance Report

Table 40: Replenishment flow summary for water made available from storage (or supplemented from uncontrolled flows)

2020–21	Annual requirement	Estimated replenishment delivery	Event period	Source of supply	Performance
Marra Ck.	Up to 15,000 ML/yr.	Estimated volume measured at Carinda Rd (421097) 10,221ML	20/03/2021 to 10/04/2021	Replenishment provided by rain and tributary flows.	System completely replenished
Lower Bogan River	Up to 15,000 ML/yr.	Estimated volume measured at d/s. Fairview (421166) In excess of 13,263ML	21/03/2021 to 13/04/2021	Replenishment provided by rain and tributary flows. Approx. 4,235 ML measured at Fairview provided from tributaries joining Macquarie River. Additional flow was provided from the Bogan River.	System completely replenished

Table 41: Replenishment flows downstream of Macquarie Marshes

2020–21	Annual requirement	Volume diverted	Event period	Source of supply	Performance
Macquarie River D/S Macquarie Marshes.	Twice yearly	Measured at Pillicawarrina (421147) Total measured over 191,504ML. 158,208 ML 33,296 ML)	06/07/20 to 17/02/21 21/03/2021 to 25/05/2021	NMBC opened to connect flows with Marthaguy CK flow, flows provided by tributaries; Active and translucent flows, and environmental licenced flow releases. Flows draining out of the Marshes maintained an average flow of 340 ML/d for 128 days between July and November 2020 and average flow of 90 ML/d for 53 days between April and May 2021	System completely replenished

Note 22—River and groundwater interaction

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

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

Data type

Modelled

Policy

Not applicable

Data accuracy

D—Estimated in the range +/- 100%

Providing agency

NSW Department of Planning and Environment

Data source

NSW Department of Planning and Environment 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 Planning and Environment MODFLOW model for the Lower Macquarie Groundwater Management Area (for a more detailed explanation of the Method, see 'Method A' in the document NSW General Purpose Water Accounting Reports—Groundwater Methodologies, available for download from the NSW Department of Planning and Environment 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. The resulting equations used for estimating the accounting inputs are as follows:
 - River Outflow to Aquifer = $4,464.6 \times \text{Ln}(\text{Annual Flow}) - 41,757$
 - Inflow to River from Aquifer = $5,082 \times \text{Ln}(\text{Annual Flow}) - 5,4044$

Where Ln represents the natural logarithm

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

Data type

Not applicable

Policy

Not applicable

Data accuracy

D—Estimated in the range +/- 100%

Providing agency

Not applicable

Data source

Not applicable

Methodology

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

Surface Water Unaccounted difference

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

Where:

UVSW = Unaccounted difference for Surface Water

Rs = Opening river volume estimate

Rc = Closing river volume estimate

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

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

Note 24—Adjusting entry

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

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

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

Data type

Calculated

Accuracy

A1—Nil inaccuracy +/- 0%

Providing agency

NSW Department of Planning and Environment.

Data source

Not applicable

Methodology

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

Additional information

There were no adjusting entries applicable for the reporting period (Table 42)

Table 42: 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