GENERAL PURPOSE WATER ACCOUNTING REPORT

NSW Lachlan and Belubula Catchments

2020–21

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Abbreviations

Abbreviation/acronym	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
CAIRO	computer-aided improvements to river operations
Ck	creek
D/S	downstream
DISV	dry inflow sequence volume
EWA	environmental water allowance
GPWAR	general purpose water accounting report
MDBA	Murray–Darling Basin Authority
MIL	Murray Irrigation Limited
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 Queensland government for the provision of both measured and modeled data.
U/S	upstream

Glossary

Term	Definition
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	Definition
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 several components including a contextual statement, a statement of water assets and water liabilities, a statement of change in water assets and water liabilities, a statement of physical water flows, notes and disclosures, and an assurance and accountability statement.
General Security licence	a category of water access licence implemented under the *Water Management Act 2000* This forms the bulk of the water access licence entitlement volume in NSW and is a low-priority entitlement (i.e. it only receives water once essential and High Security entitlements are met in the available water determination process).
Groundwater	Water location beneath the ground in soil pore spaces and in the fractures of rock formations
High Security licence	a category of water access licence implemented under the *Water Management Act 2000* It receives a higher priority than General Security licences but less priority than essential requirements in the available water determination process.
HYDSTRA database	a database used by NSW Department of 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	Definition
regulated river	a river system where flow is controlled via one or more major man-made structures such as dams and weirs For the purposes of the *Water Management Act 2000*, a regulated river is one that is declared by the minister to be a regulated river. Within a regulated river system, licence holders can order water against a held entitlement.
share component	an entitlement to water specified on the access licence, expressed as a unit share or, in the case of specific purpose licences (e.g. Local Water Utility, Major Water Utility and Domestic and Stock), a volume in megalitres The amount of water a licence holder is allocated as a result of an available water determination and the amount they can take in any year is based on their share component.
Storage	a state-owned dam, weir or other structure that is used to regulate and manage river flows in the catchment and the water bodies impounded by these structures
storage reserve	proportion of water in a storage reserved in the resource assessment process for future essential or High Security requirements (e.g. town water)
storage volume	the total volume of water held in storage at a specified time
supplementary water	unregulated river flow available for extraction under a Supplementary Water licence
surface water	all water that occurs naturally above ground including rivers, lakes, reservoirs, creeks, wetlands and estuaries
Tributary	a smaller river or stream that flows into a larger river or stream Usually, a number of smaller tributaries merge to form a river.
ungauged catchment	a catchment without a flow gauge to accurately record stream flows Modelled estimates must be used to approximate the contribution of ungauged catchments to the main river.
water accounting	the systematic process of identifying, recognising, quantifying, reporting, assuring and publishing information about water, the rights or other claims to that water, and the obligations against that water
water assets	the physical water held in storage, as well as any claims to water that are expected to increase the future water resource (e.g. external water entering the system through inter-valley trading)
water liabilities	claims on the water assets of the water report entity including water that has been allocated to licence holder accounts or environmental accounts, but yet to be taken at the end of the reporting period
water sharing plan	a water management plan that defines the rules for sharing of water within a region under the *Water Management Act 2000*

Acknowledgment 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 Nari Nari, Ngiyampaa, Wiradjuri, and Yita Yita Nations hold the land and waters of the Lachlan River catchment area is of spiritual, cultural, customary and economic importance.

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

Director's foreword

This is the 12th release of the annual general-purpose water accounting report (GPWAR) for the regulated component of the Lachlan and Belubula Regulated River Water Sources. It has been prepared for the accounting period 1 July 2020 to 30 June 2021 (the 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 licensed 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 (Belubula)
    - physical inflows and outflows to the system for the water year.

Quantification of the physical groundwater interactions between major connected groundwater sources and the Lachlan regulated river are also provided.

As Director of 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 Lachlan and Belubula Regulated River Water Sources for 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 Lachlan catchment occupies an area of around 90,000 square kilometres. The Lachlan River begins in the Great Dividing Range near Gunning and flows 1,400 kilometres across western NSW to its junction with the Murrumbidgee River near Oxley. Under normal conditions the Lachlan River is a terminal system with little water flowing past the Great Cumbung Swamp at the end of the river. Only in large flood events does water flow through into the Murrumbidgee River.

The Lachlan River moves through a diverse range of landscapes. The headwaters rise at elevations of up to 1,400 meters and are characterised by rapidly flowing streams with sandy and pebbly beds which flow through a mix of steep forested ranges and cleared grazing lands. The undulating landscape of the middle catchment has been extensively cleared but pockets of remnant vegetation remain. The extensive floodplain environment of the western part of the catchment is generally less than 200 metres in elevation and features many wetlands and effluent streams.

Water in the Lachlan catchment is regulated by Wyangala Dam which was built in 1935 and then enlarged in 1970 to provide a regulated source of water for irrigators and towns along the river. In the Belubula catchment, a tributary of the Lachlan, water is regulated by Carcoar Dam which was built in 1970 to supply water for irrigation and domestic and stock. Several natural lakes have also been modified for use as storages, the largest of these being Lake Cargelligo and Lake Brewster. Irrigated agriculture occurs along the river and its major effluents downstream of Wyangala Dam, and in the Jemalong–Wyldes Plains Irrigation District. Outside of these areas, land use is dominated by grazing and dryland cropping. Groundwater is an important source of water in the western part of the catchment, with a large irrigation industry in the Hillston area reliant on groundwater to produce citrus and vegetable crops.

The Lachlan catchment has been home to Aboriginal people for 40,000 years. Most of the catchment falls within Wiradjuri country but it also includes lands occupied by the Dhurug, Ngunawal and Gundungurra people of the upper catchment, and the Wongaibon, Barindji, Ngiyampaa, Yita Yita, Muthi Muthi and Nari Nari in the far west.

The catchment is home to approximately 106,000 people. Of these, around 30% live within the major rural centres of Cowra, Parkes, Forbes and Young which all have populations of 7,000-10,000 people. Smaller towns with populations ranging from 1,000 to 4,000 people include Blayney, Crookwell, Boorowa, Canowindra, Molong and Grenfell in the upper catchment, and Temora, West Wyalong, Condobolin, Lake Cargelligo and Hillston in the mid to lower catchment.

A number of significant wetlands in the catchment are considered of national significance, particularly as waterbird habitat. These include Lake Cowal near Forbes, Lake Brewster, and the Booligal wetlands and Great Cumbung Swamp in the lower Lachlan valley.

A more detailed description of the catchment can be found in the document *Water resources and management overview—Lachlan catchment* which is available from the NSW Department of Planning and Environment website.

Accounting extent

The accounted river extent is illustrated in Figure 1 and includes the area managed by the water sharing plan for the Lachlan Regulated River Water Source, and the water sharing plan for the Belubula Regulated River Water Source.

Given that these 2 water sources are managed under separate allocation schemes (and utilise separate physical resources), individual accounting statements have been provided for each.

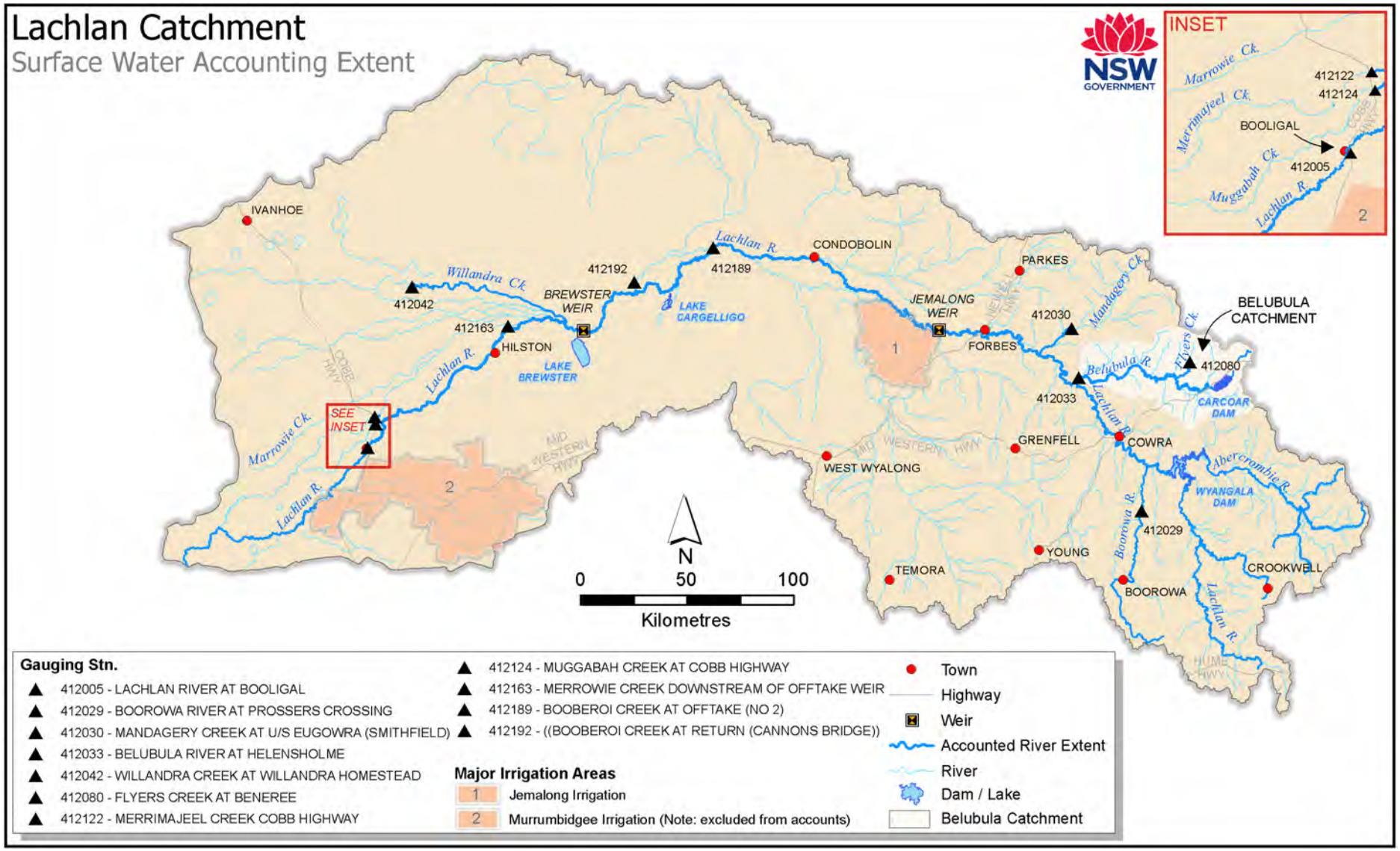
For the purposes of this GPWAR, the Lachlan accounting extent includes the Lachlan River from Wyangala Dam to Booligal, and Willandra Creek to the streamflow gauging station at Willandra Homestead.

While the unregulated licences and the associated allocations located on the effluents of Merrimajeel Creek and Muggabah Creek are not considered, the flow gauging sites available on these water courses form part of the end of system outflow calculated for the Lachlan Catchment. Gauged inflow for the Lachlan consists of inflow from the Belubula River, Mandagery Creek and the Boorowa River.

The Belubula accounting extent includes the Belubula River from Carcoar Dam to the Belubula River at Helensholme, situated near the river's junction with the Lachlan River. The only gauged inflow available for use in the Belubula is Flyers Creek.

Physical groundwater volumes that interact with the regulated river are included in GPWAR statements where possible. Other groundwater interactions not directly quantified form part of the unaccounted difference for the surface water balance. All other groundwater flows and groundwater management information are excluded from the GPWAR. Detailed annual reporting on groundwater is available at www.industry.nsw.gov.au/water/science/reporting

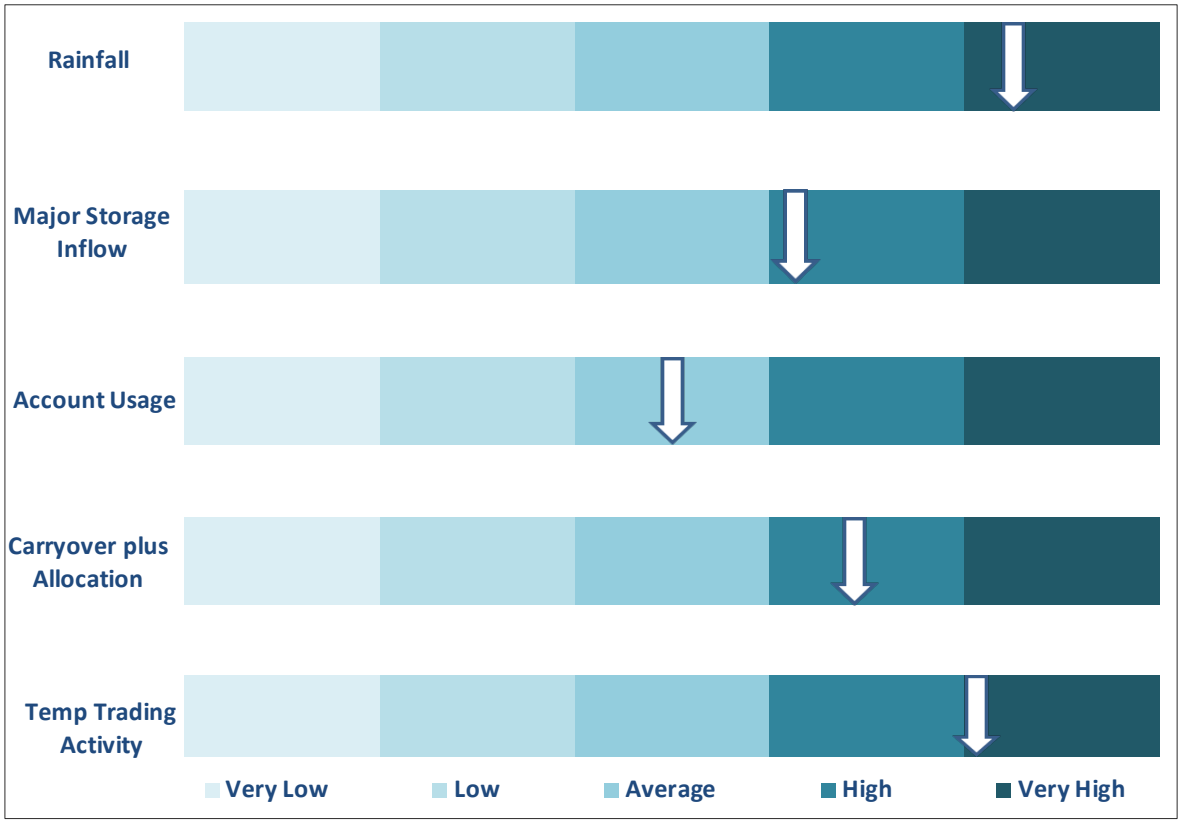
Figure 1: Surface water geographical extent of the accounts



Snapshot

The key indicators for 2020–21 relative to other years under water sharing plan management conditions are presented in Figure 2. The rainfall and temporary trading activities were very high in the water year, while major storage inflows and effective allocation (carryover plus allocation) were at the high end of average. The account usage was at the average usage.

Figure 2: 2020–21 Summary indicators



Climate

At Grenfell (middle-upper catchment), 857 mm of rainfall was recorded in the reporting period (Table 1, Figure 3 and Figure 4). Comparatively, this volume of rainfall is:

- 147% of the long-term median rainfall for this location
- 71% of the highest rainfall on record at the location.

The majority of rainfall fell in March (151 mm) and June (127 mm) of 2021.

At Booligal (lower catchment), 354 mm of rainfall was recorded in the reporting period (Table 2, Figure 3 and Figure 4). Comparatively, this volume of rainfall is:

- 114% of the long-term median rainfall for this location
- 38% of the highest rainfall on record at the location.

The majority of rainfall fell in October (67 mm) of 2020 and January (83 mm) of 2021.

Spatially, the rainfall was above the mean rainfall across the entire extent of the Lachlan (and Belubula) catchment (Figure 5 and Figure 6).

Figure 3: Reporting period monthly rainfall data against historical median rainfall at Grenfell and Booligal

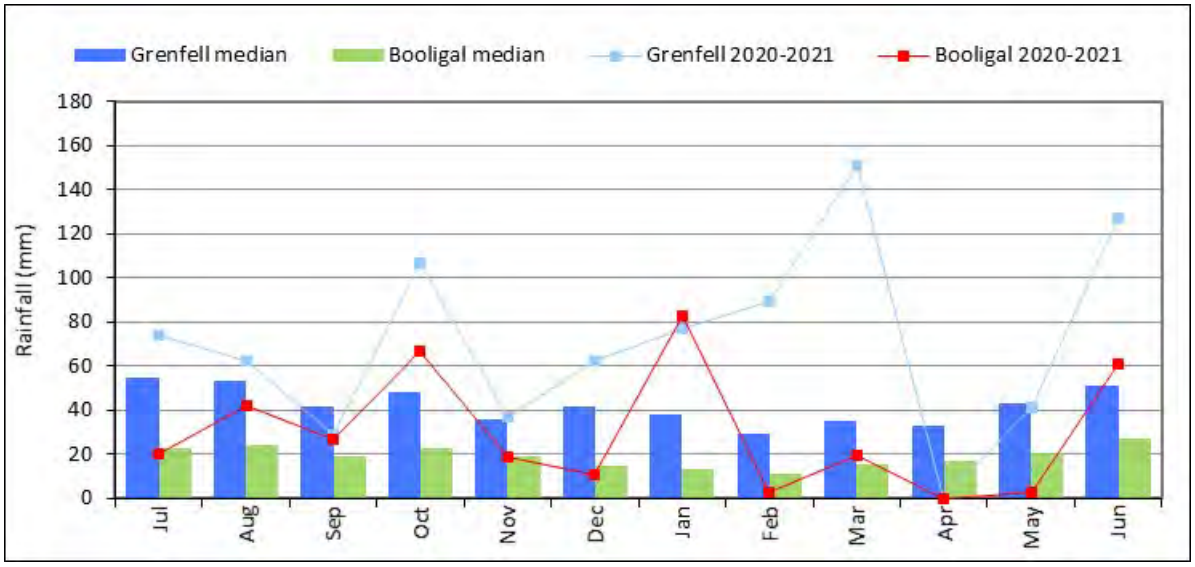


Figure 4: Reporting period monthly rainfall data deviations from historical median at Grenfell and Booligal

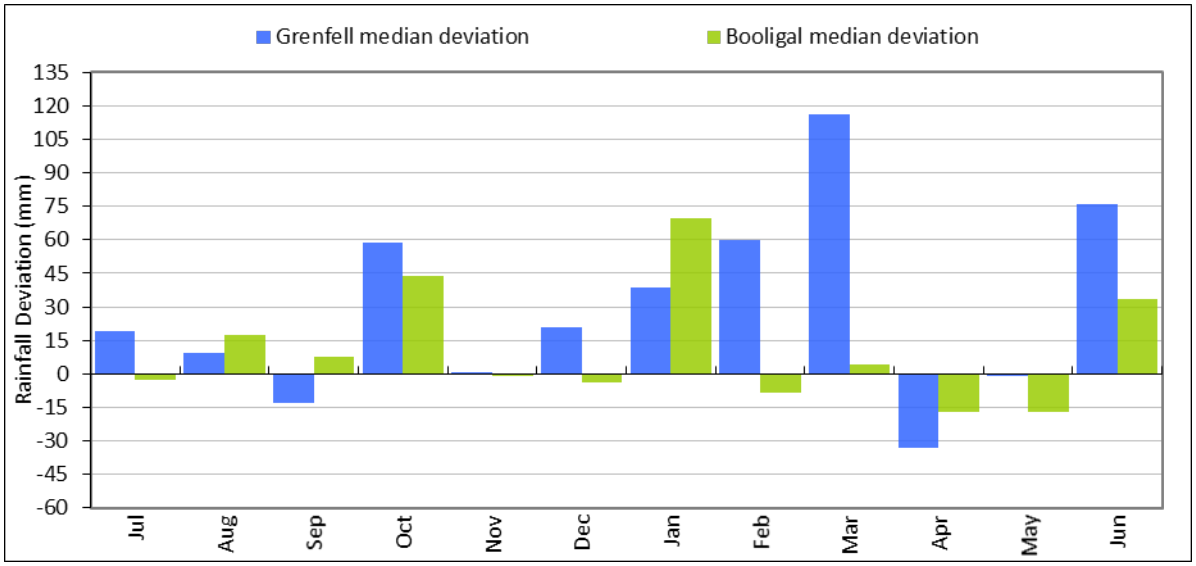


Table 1: 2020–21 monthly rainfall and historic monthly rainfall statistics at Grenfell[1]

Grenfell	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	June	Annual
2020–21	**73.9**	**62.4**	**29.0**	**107.0**	**36.6**	**62.4**	**77.0**	**89.0**	**151.0**	**0.0**	**41.6**	**127.2**	**857.1**
Historic mean	56.0	55.3	50.4	54.5	50.1	55.5	51.8	47.8	49.9	46.5	49.2	58.4	625.5
Historic median	54.9	53.0	41.9	48.1	35.8	41.7	38.3	29.3	35.0	33.2	42.9	51.4	583.5
Historic low	2.0	0.0	1.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	2.2	297.2
Historic high	189.8	144.6	233.8	180.2	230.4	239.1	289.8	223.9	236.4	344.4	200.9	176.2	1203.9
Year of high[2]	1993	1886	2016	1973	2010	1947	1984	1959	1950	1990	1931	1923	1886-87

Table 2: 2020–21 monthly rainfall and historic monthly rainfall statistics at Booligal[2]

Booligal	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	June	Annual
2020–21	**20.0**	**41.9**	**26.4**	**66.8**	**18.5**	**10.6**	**83.0**	**2.8**	**19.8**	**0.0**	**3.0**	**60.7**	**353.5**
Historic mean	26.5	27.2	25.5	31.8	25.1	25.8	26.7	24.8	29.7	24.2	31.0	31.6	328.4
Historic median	22.6	24.4	18.8	22.9	19.4	14.6	13.6	11.2	15.5	17.1	20.3	27.2	311.0
Historic low	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	107.3
Historic high	90.9	73.2	110.3	168.1	132.0	152.6	257.0	159.0	263.8	136.5	127.6	139.5	932.1
Year of high	1956	1907	1998	2010	1912	1992	1974	1947	1989	1988	1968	1923	1973-74

[1] Long-term statistics are from the Bureau of Meteorology using the climatic stations '73014—Grenfell (Manganese Road)' and '75007—Booligal (Belmont)'. Historic record statistics are 1886 to current for Grenfell and 1890 to current for Booligal

[2] Calendar year for monthly high and water year (July to June) for annual high

Figure 5: Annual rainfall for 2020–21

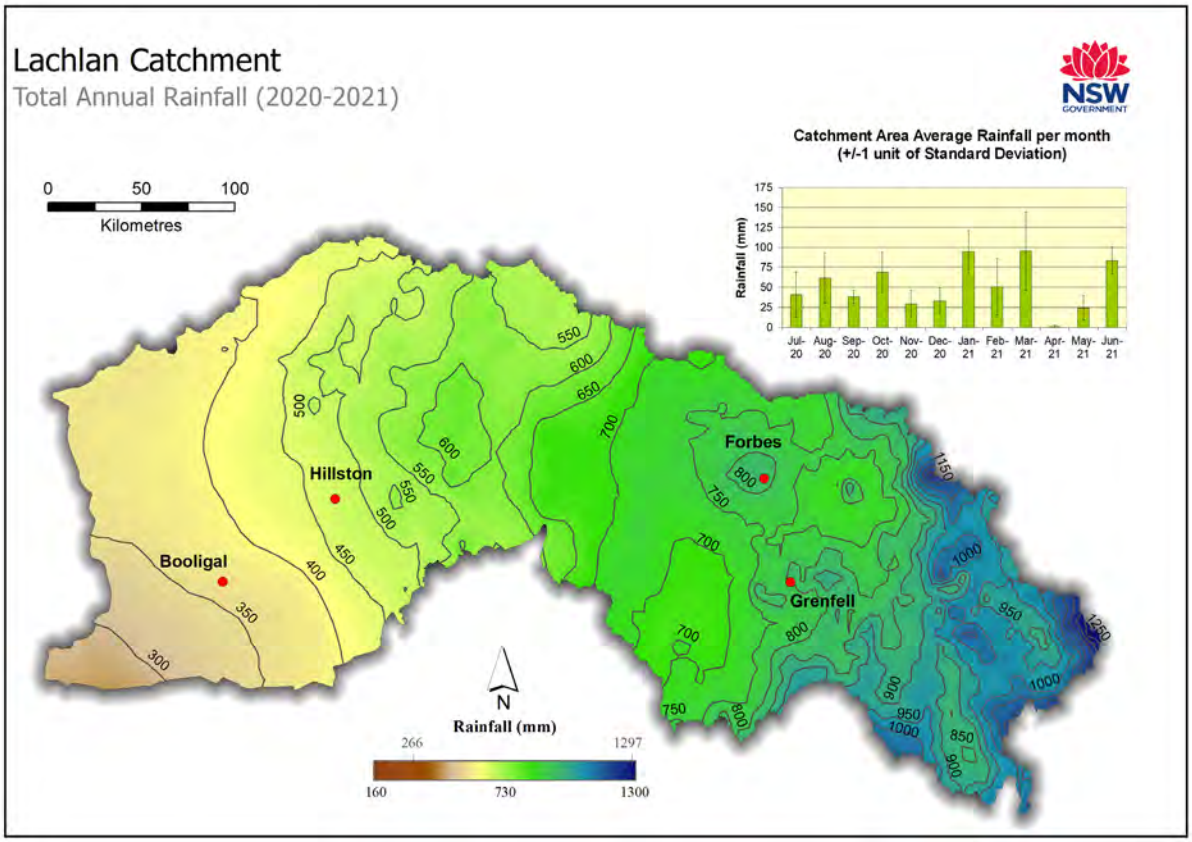
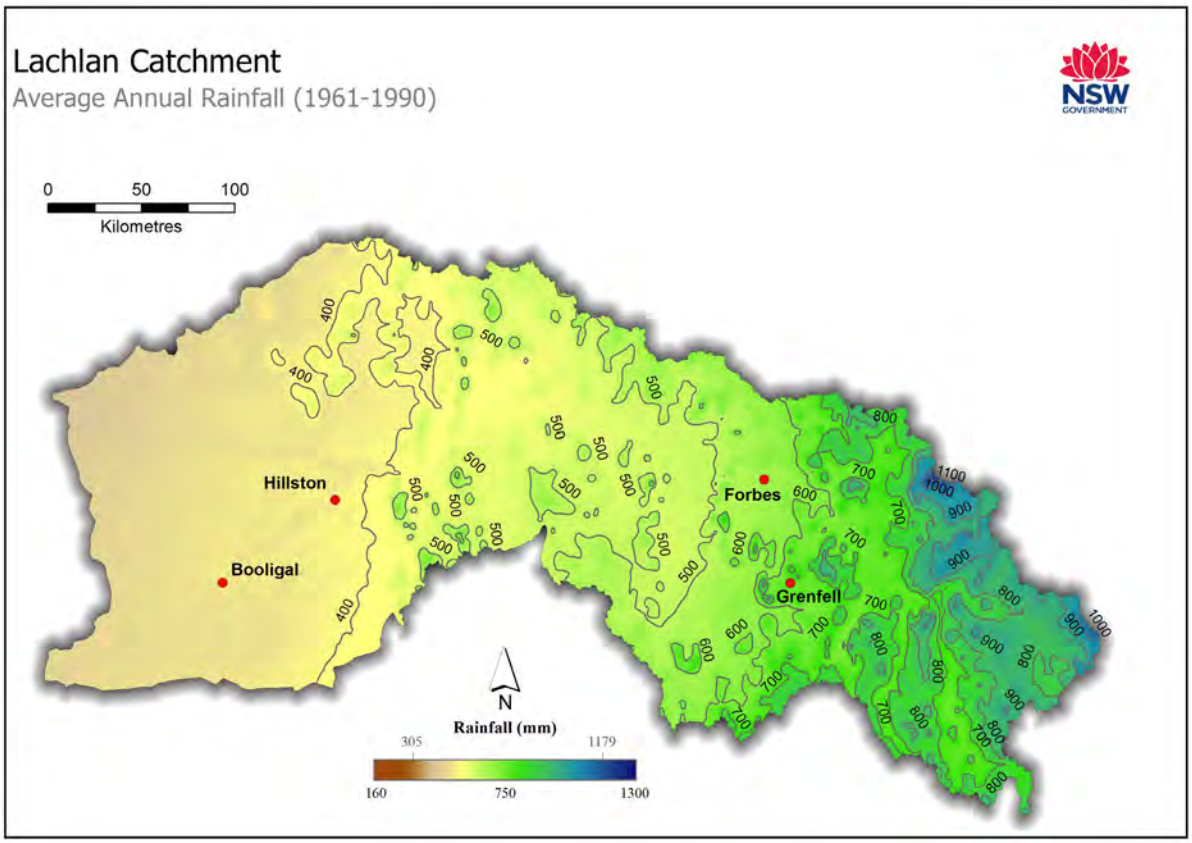


Figure 6: Average annual rainfall in the Lachlan catchment (1961–90)



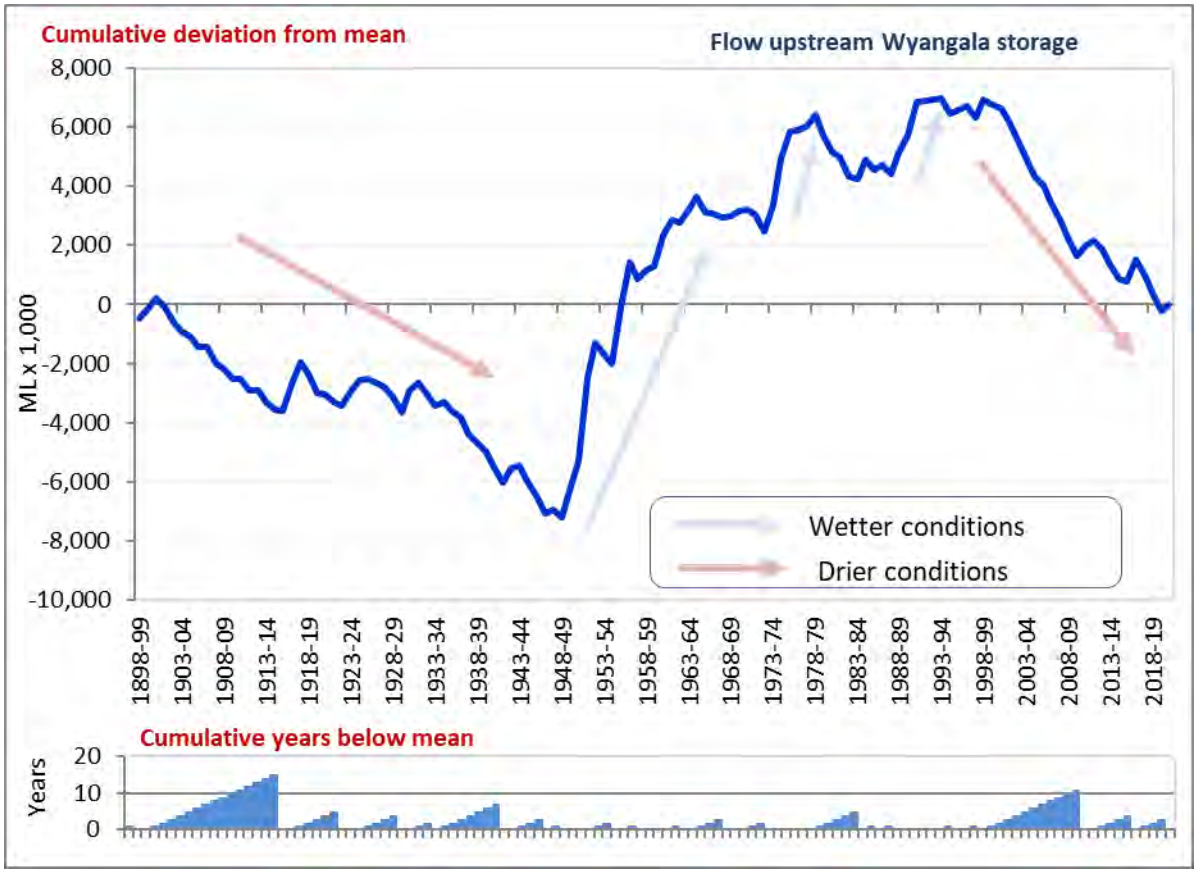
Storage volumes and inflows

Inflow

Historically long-term average annual inflow[3] at the Wyangala storage site has varied significantly cycling through prolonged periods of wet and dry flow regimes. Broadly the data (Figure 7) illustrates predominantly:

- dry conditions 1900 to 1950
- wet conditions 1950 to 2000
- dry conditions 2000 to present.

Figure 7: Long-term annual inflow at Wyangala storage site, cumulative deviation from mean



Wyangala

For the reporting period, the total inflow to Wyangala dam was 920,786 megalitres, which was:

- 161% of the long-term median annual inflow of 571,390 megalitres (Figure 8)
- high relative to the long-term data set exceeding 75% of years in the dataset (1898–99 to 2020–21)
- the end of a 3-year sequence of below average inflow (713,942 megalitres) Figure 8.

The maximum daily inflow rate for the reporting period was 66,876 megalitres, occurring on 10 August 2020 (Figure 9)

[3] Inflows are back-calculated storage inflow for the period from storage construction to present and gauged or rainfall runoff model estimates for the prior period.

Carcoar

For the reporting period, the total inflow to Carcoar dam was 11,069 megalitres, which was:

- 101% of the long-term median annual inflow of 11,021 megalitres (Figure 10)
- average relative to the long-term data set exceeding 51% of years in the dataset (1894–95 to 2020–21)
- the fourth consecutive year of below average (16,138 megalitres) inflow.

The maximum mean daily inflow rate for the reporting period was 1,144 megalitres, occurring on 23 August 2020 (Figure 11).

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

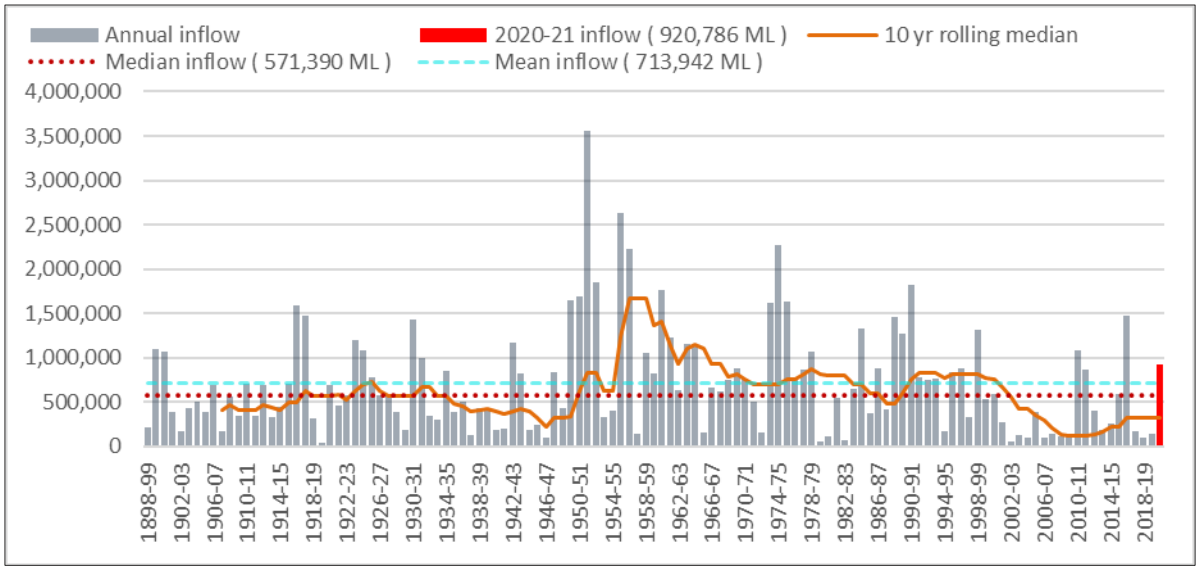


Figure 9: Daily inflows and rainfall at Wyangala Dam 2020–21

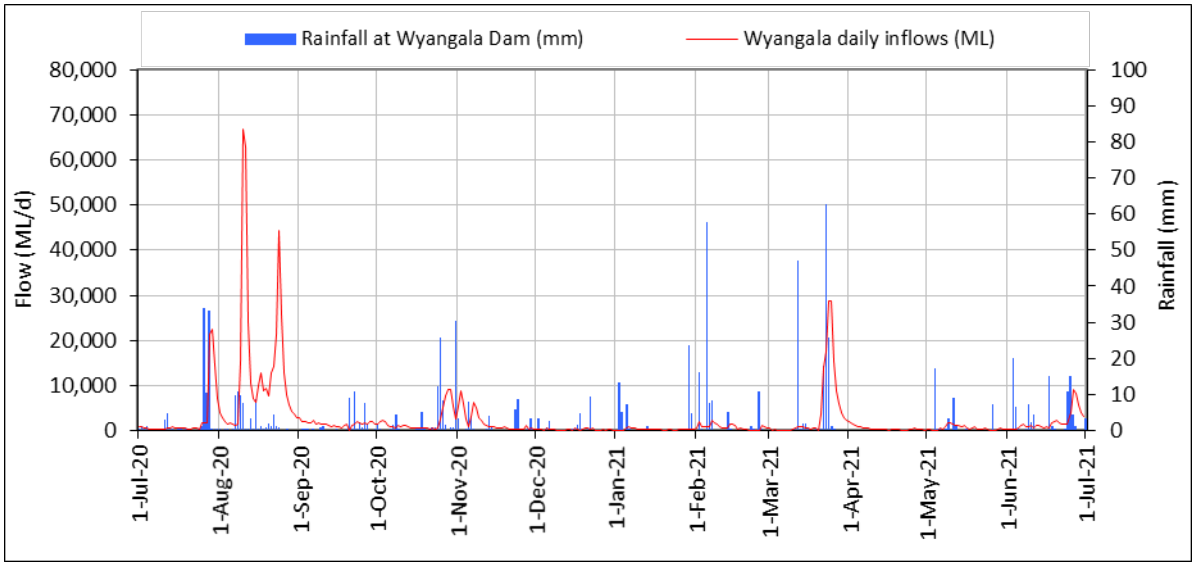


Figure 10: Long-term inflows to Carcoar Dam against mean and reporting year inflow

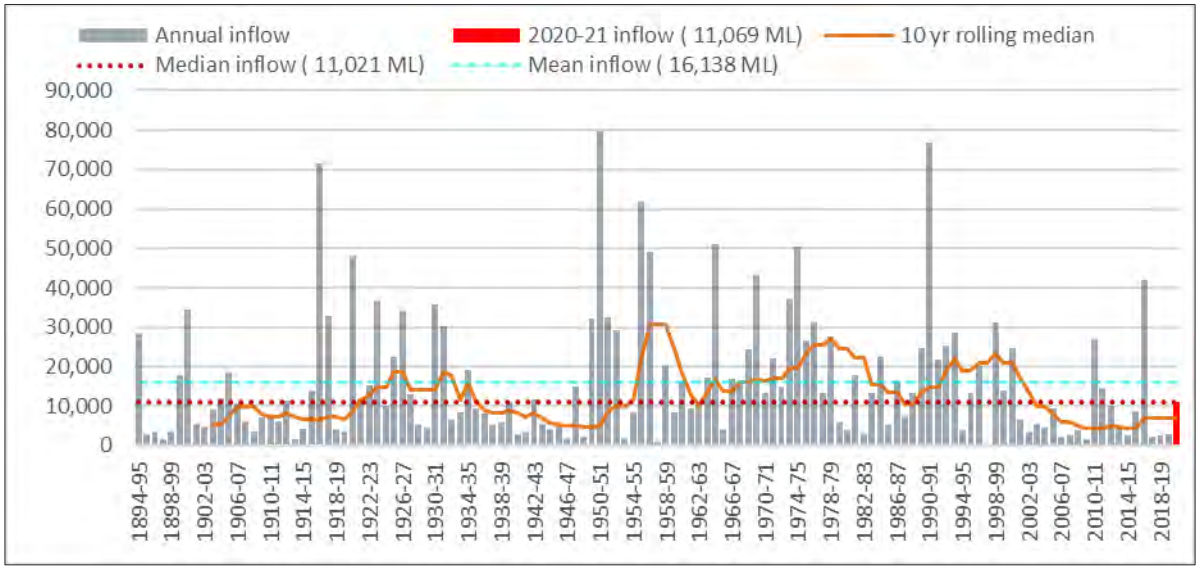
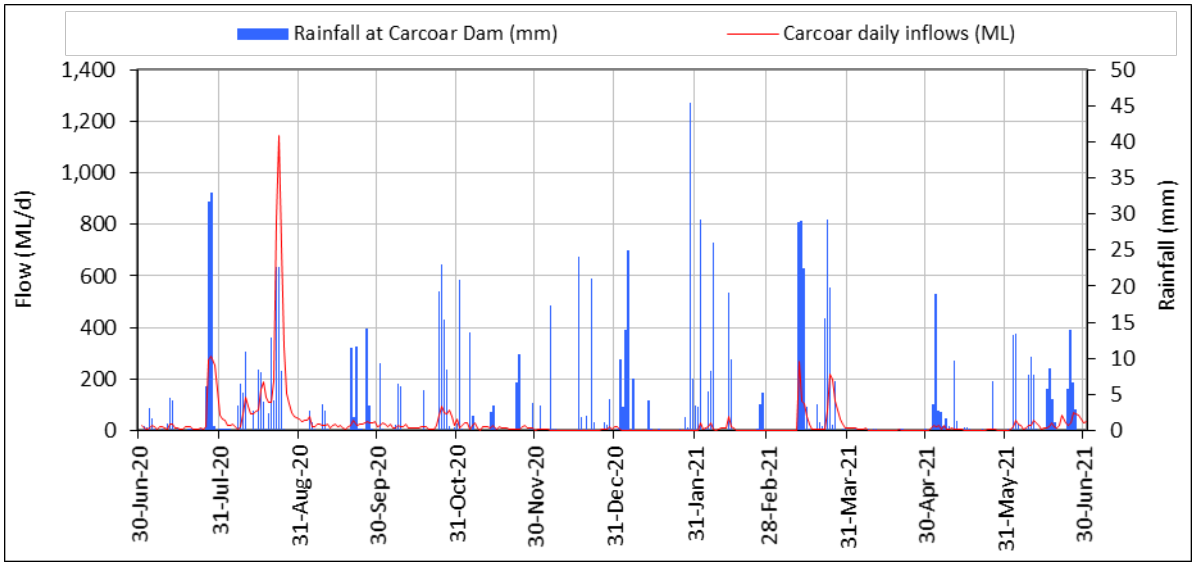


Figure 11: Daily inflows and rainfall at Carcoar Dam 2020–21



Volume

Wyangala

Wyangala storage volume:

- commenced the reporting period at 203,955 megalitres or 17% of full supply capacity (Figure 12)
- ended the reporting period at 913,580 megalitres or 75% of full supply, an increase of 58% for the water year
- had a maximum volume during the reporting period of 913,580 megalitres, occurring on 30 June 2021.

Carcoar

Carcoar storage volume:

- commenced the reporting period at 6,133 megalitres or 17% of full supply capacity (Figure 13)
- ended the reporting period at 12,256 megalitres or 34% of full supply, an increase of 17% for the water year
- had a maximum volume during the reporting period of 12,256 megalitres, occurring on 30 June 2021.

Figure 12: Wyangala Dam storage volume and per cent full for 2020–21

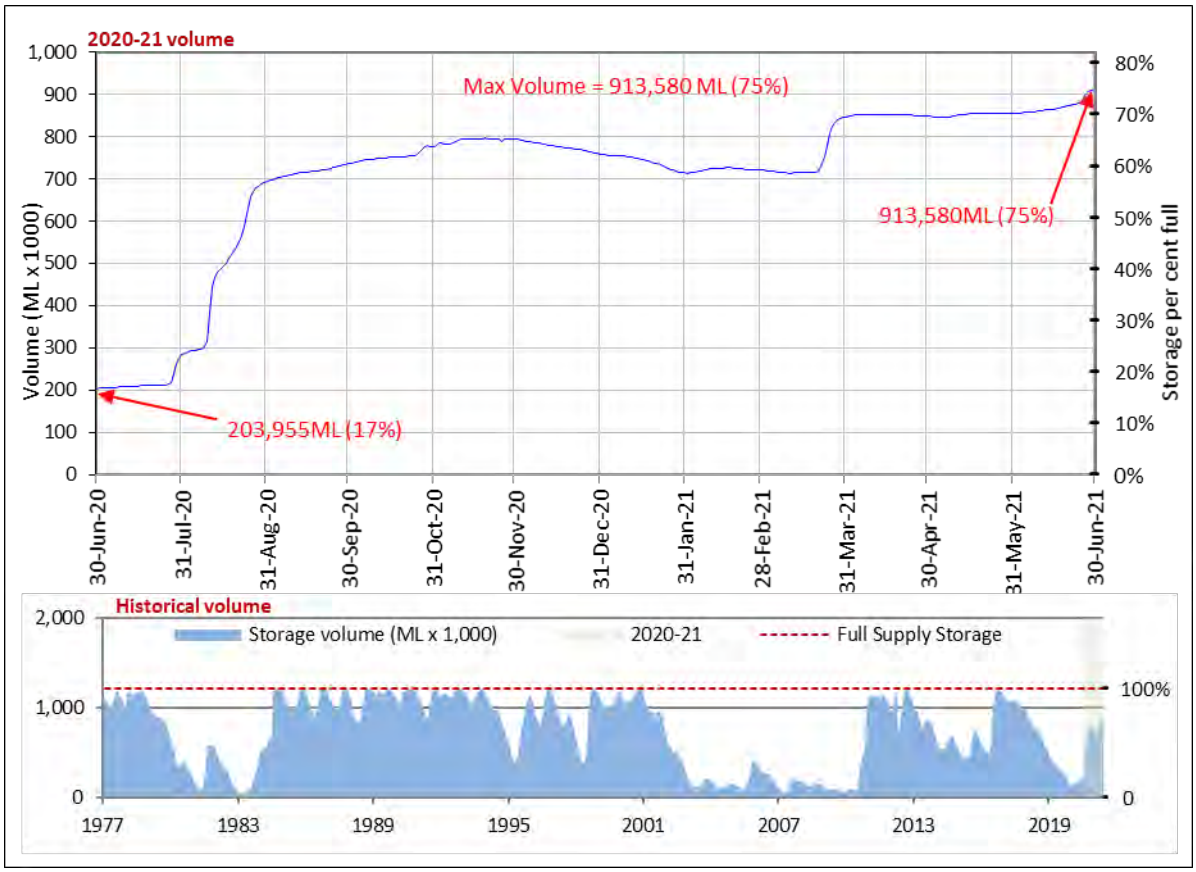
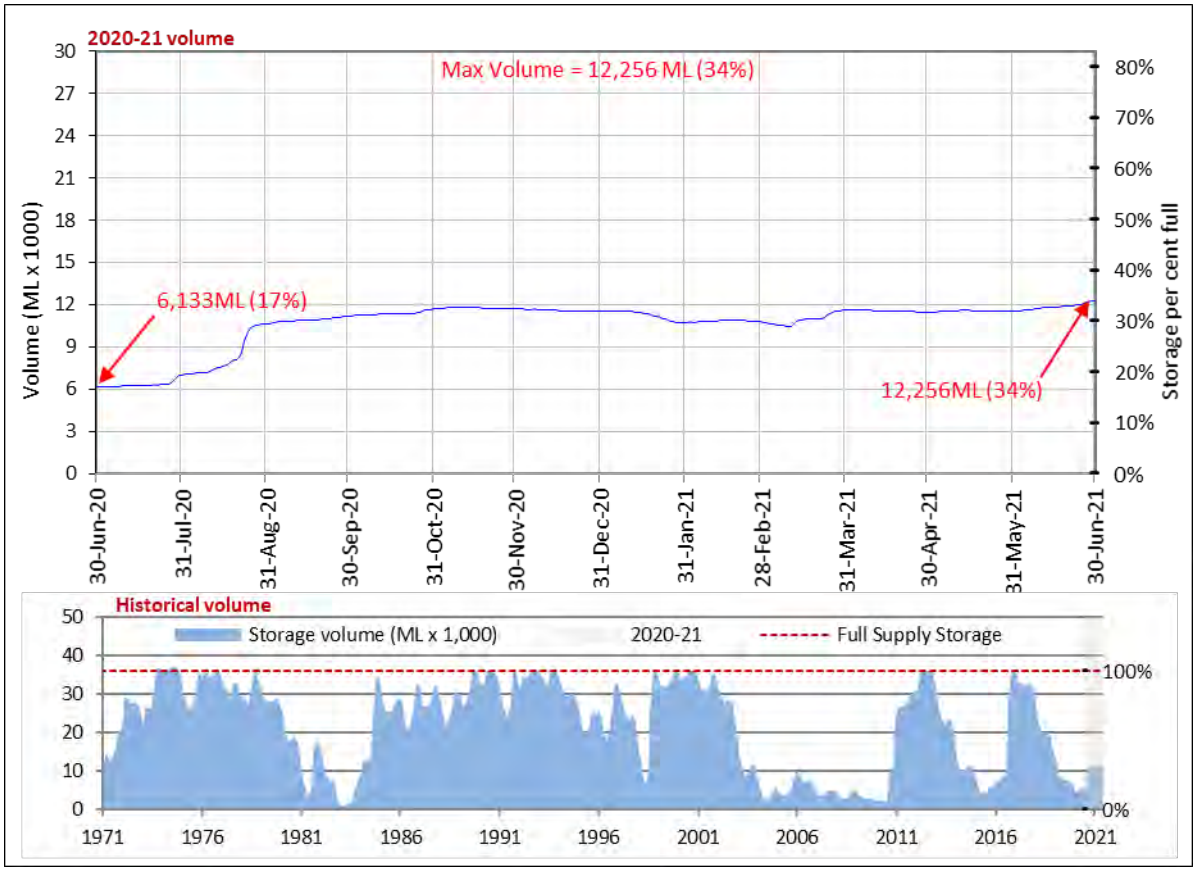


Figure 13: Carcoar Dam storage volume and per cent full for 2020–21



Major flow events

There were no major high flow events in the Lachlan and Belubula systems during the reporting period.

The river height at Forbes remained below the minor flooding level (3.5 m) for the entirety of the reporting period except for 13 August 2020, where the river height was slightly above (3.706 m) the minor flooding levels (Figure 14).

There were 2 moderate flood events, in the Belubula catchments during 2020–21. The river level at Lyndon (upstream Canowindra) on the Belubula reached the moderate flood level (3.3 m) once in July 2020 and once in August 2020 (Figure 15).

Figure 14: Maximum daily river heights at Forbes

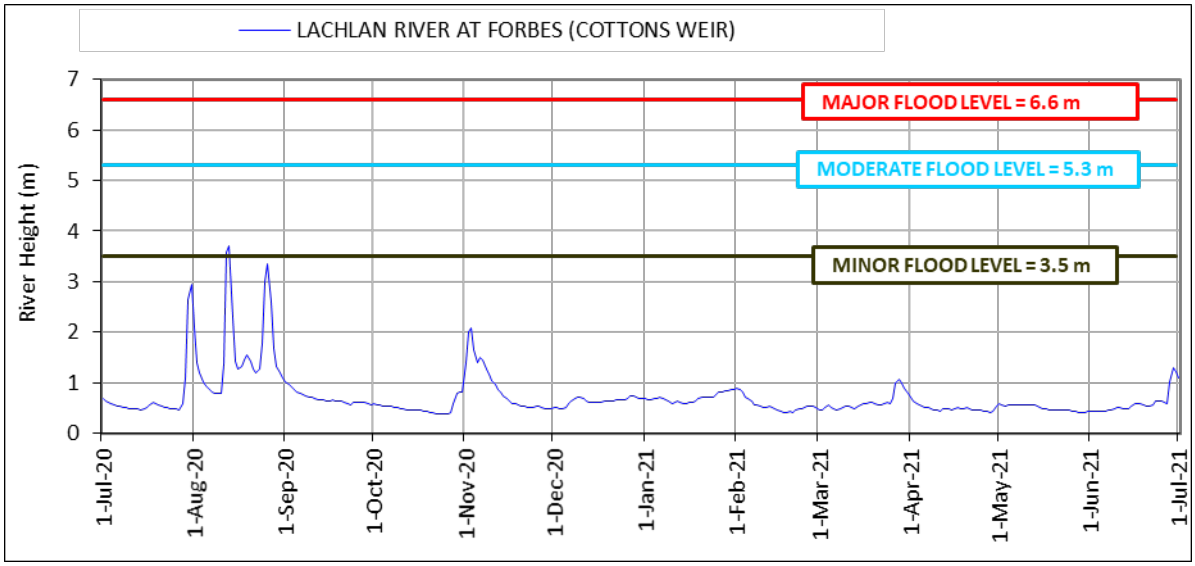
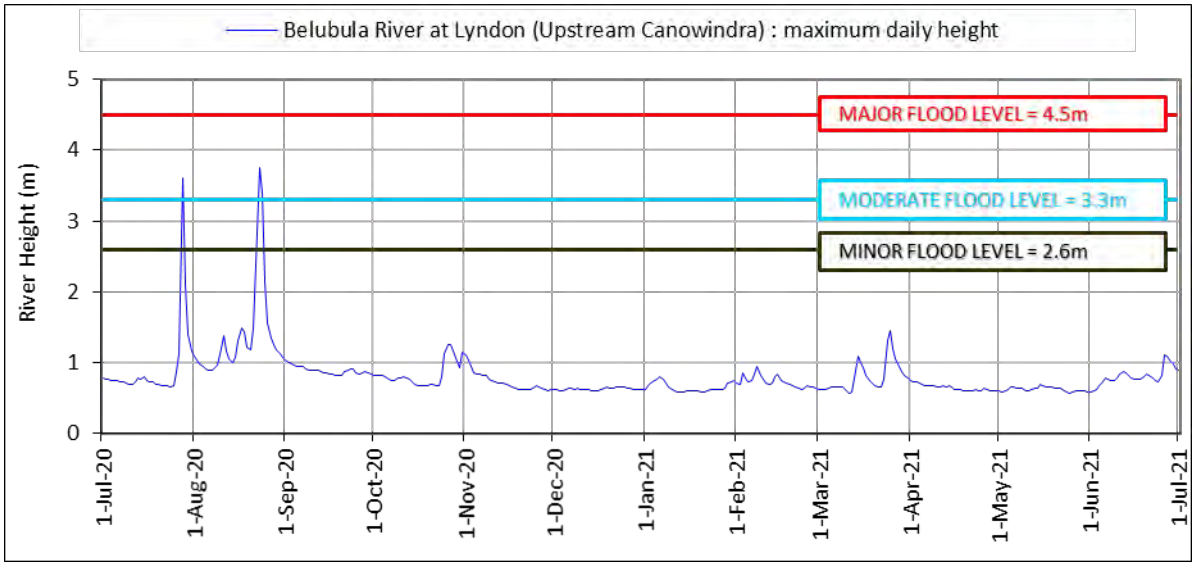


Figure 15: Maximum daily river heights at Lyndon



Surface water resources and management—Lachlan Catchment

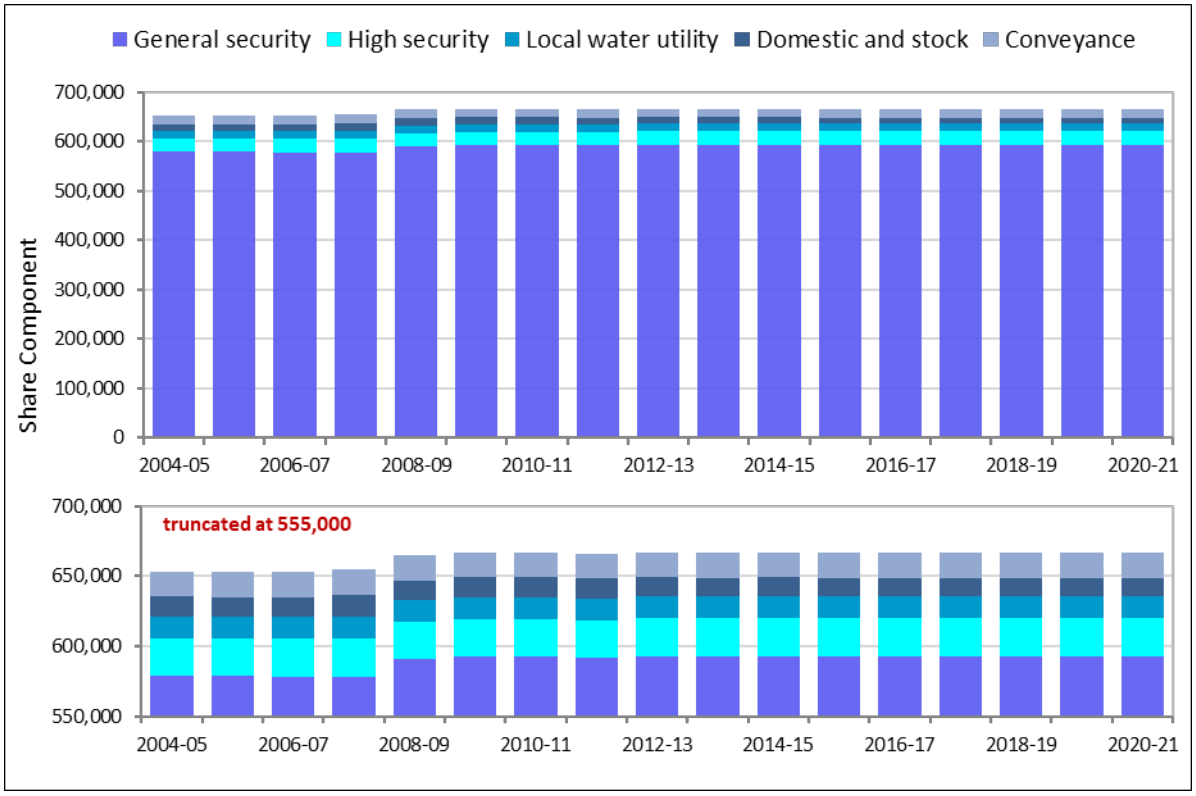
Legislation

The Lachlan water source was managed under the conditions set out in the *Water Sharing Plan for the Lachlan Regulated River Water Source 2016*. 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 rights

- Issued access licence share component remained constant in the reporting period.
- Considering all categories of access licence, the total issued share component was 666,666 shares on 30 June 2020 (Figure 16).

Figure 16: Lachlan total issued share component since introduction of the water sharing plan



Access licence account management

The account management rules applied to an access licence in the Lachlan regulated river water source is presented, by access licence category, in Table 3. General security access licence management adopts a flexible, continuous accounting approach, with licence holders able to store (and carry forward) up to 2 megalitres per share. Accounts are subject to a reset rule when Wyangala storage spills. Annual usage for this category is restricted to 1 megalitre per share, plus allocation assignments in minus allocation assignments out.

All other categories of access licence are effectively limited to a maximum available water determination (AWD) of 1 megalitre per share (or 100%) and are not allowed to carryover unused water to the following water year.

Table 3: Lachlan water 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 (Conveyance)	1 ML/share	0 ML/share[4]	1 ML/share	1 ML/share
Regulated River (General Security)	2 ML/share	2 ML/share[5]	1 ML/share	N/A
Regulated River (High Security)	1 ML/share	0 ML/share	N/A	1 ML/share

Extreme events stage and temporary water restrictions (Lachlan)

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 can be implemented to manage a water shortage. These restrictions issued under section 324 of the Water Management Act 2000 were imposed in several river valleys in 2019–20 to preserve water for critical needs. However, by July 2020, restrictions on general security account water were still in place in the Lachlan regulated river valley and these restrictions were fully lifted in August 2020.

Similarly, in 2019–20, some water sharing plans had provisions suspended because of the critical drought conditions, but in 2020–21 only the Belubula regulated river water sharing plan had its end of system flow requirement still suspended. This plan clause suspension ceased at the end of December 2020.

Table 4 outlines the conditions that may be associated with different stages of criticality for surface water shortages. 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[6]

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.

[4] Carryover was permitted into the 2011-12 water year for Conveyance access licences
[5] Inferred from account limit
[6] Valleys may be declared in Stage 2 Recovering after good inflows when conditions are improving but are not yet back to normal operations.

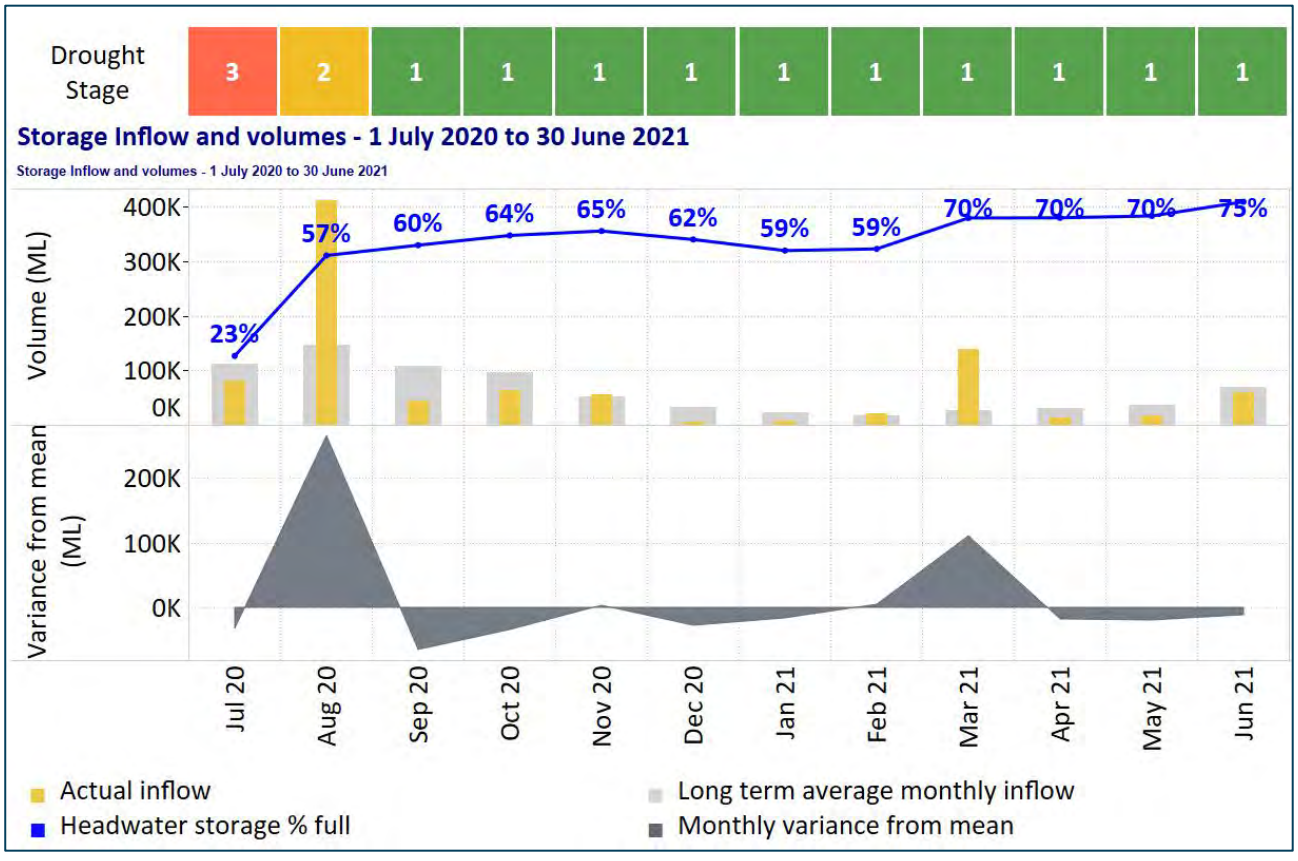
Extreme events stage

- At the start of July 2020 Wyangala Dam was only at 17% and still rated as in Stage 3 Severe Drought. Full town, domestic and stock allocations were announced, but high security allocations were only 70% and no general security allocation was available, and restrictions were in place on accessing most of the remaining account water.
- In August 2020 Wyangala Dam had improved to 31% capacity and the Lachlan Valley was rated in Stage 2 Recovering Drought. High security allocations were increased to 100%.
- In September 2020 with Wyangala Dam at 57% capacity Stage 1 Normal Operations resumed (Figure 17) and a 28% general security allocation was announced. By the end of the water year general security allocations had increased to 70%.

Drought measures

- The temporary water restriction which applied to 57% of water held in general security accounts (access to 43% allowed) during 2019–20 was extended and further tightened to restrict access to remaining volumes in the active account by 50% for the start of the 2020–21 water year. However, with improvements in storage levels, all the temporary water restrictions were fully repealed in August 2020.

Figure 17: Lachlan drought stage for the reporting period referenced with monthly headwater storage inflows, and monthly storage inflow variance from mean



Allocation account summary

A summary illustration of the accounting for General Security and High Security access licence categories in the Lachlan is provide in Figure 18 and Figure 19 respectively. Detailed information on the water accounts for all categories of licence issued are provided in Note 1 of this report.

Figure 18: Annual water account summary Lachlan General Security

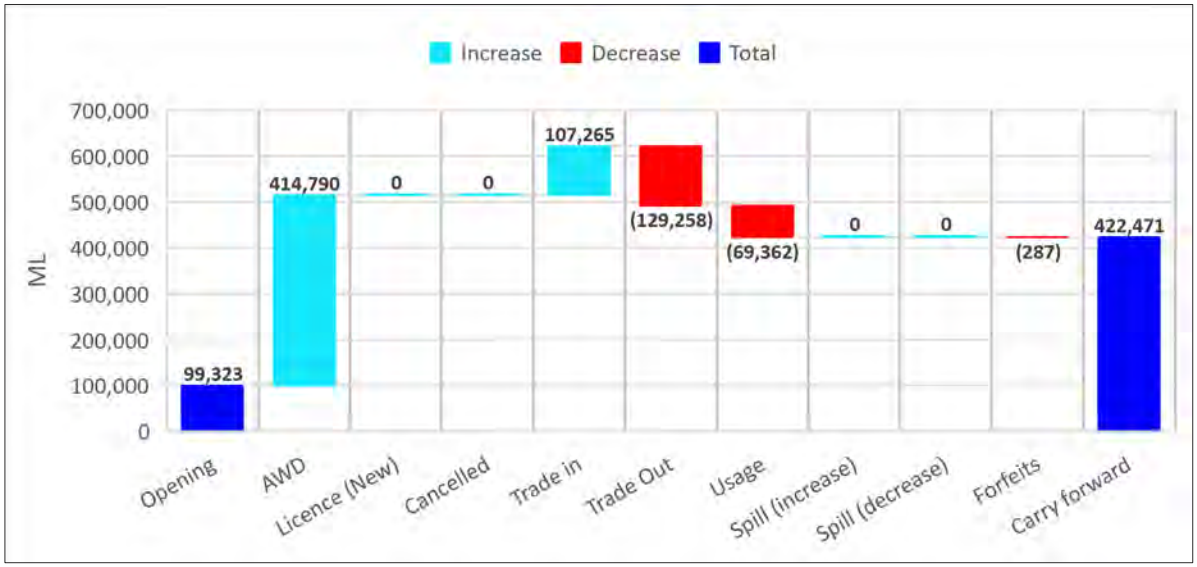
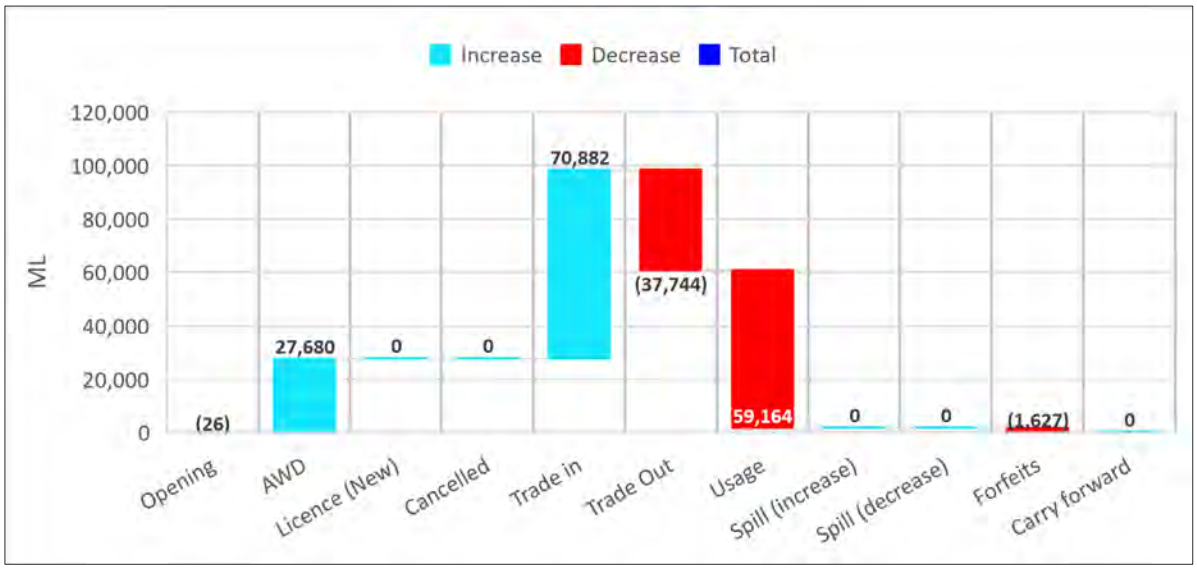


Figure 19: Annual water account summary Lachlan High Security

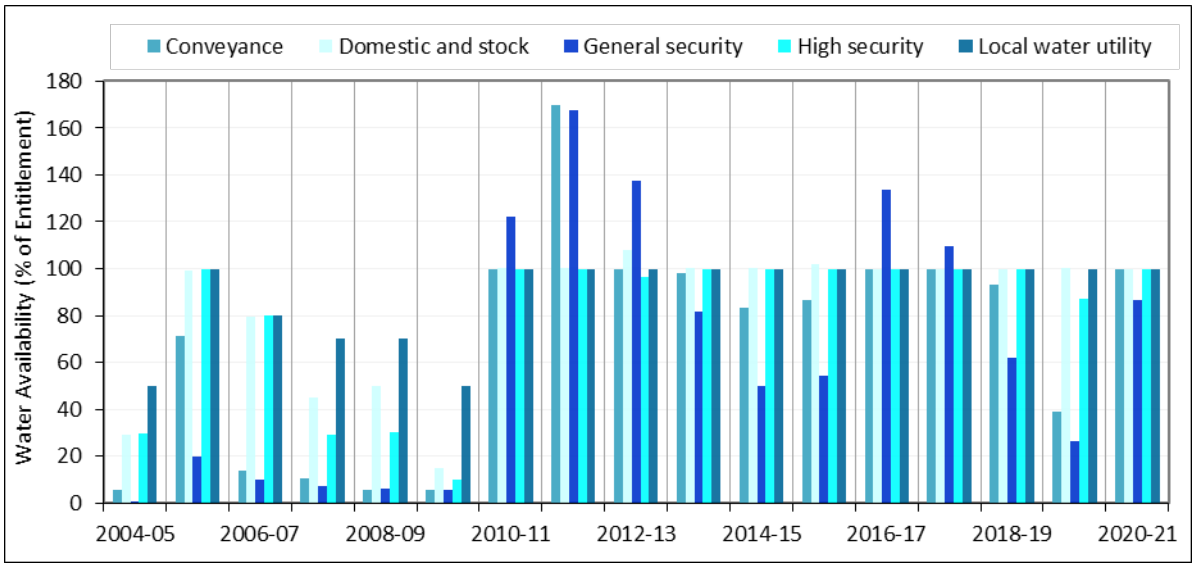


Water availability

- Domestic and Stock, and Local Water Utility access licences (including sub-categories of these) received an opening available water determination (AWD) of 100% or 1 megalitre per share, the maximum amount allowable under the water sharing plan (Figure 20).
- Regulated River (Conveyance) access licence holders received an opening AWD of 0.1658 megalitre per share on 1 July 2020 (2,970 megalitres). Additional 4 AWD announcements has increased the total AWD for the year to 0.875 megalitre per share (15,669 megalitres).
- Regulated River (High Security) access licence holders received an opening AWD of 0.7 megalitre per share on 1 July 2020 (27,680 megalitres). Another AWD announcement of 0.3 megalitre per share was made on 10 August 2021, which brought the total the AWD for the year to 1.0 megalitre per share, the maximum amount allowable under the water sharing plan.

- General security access licences had a carryover of 99,323 megalitres into the reporting period, equating to approximately 17% of total issued general security share component.
- General security access licence holders received an opening AWD announcement of 0 megalitres per share. A further 7 AWD announcements increased the total AWD for the year to 0.7 megalitre per share (Figure 21).
- Restriction on the use of allocation were applied to General Security licences at beginning of the of the year but were fully lifted in August 2020 (refer to *Temporary water restrictions for the reporting period*).
- No storage spill reset transactions were applicable in the reporting period.
- Overall water availability (carryover plus available water determination) was high (Figure 20).
- By volume 71% of the 278,141 megalitres of tributary inflows to the Lachlan River downstream of Wyangala dam was contributed by the Boorowa and Belubula Rivers (Figure 22)

Figure 20: Lachlan account water availability (carryover plus available water determinations)[7]



[7] The 2011–12 and 2016–17 General Security availability takes into account water that was allocated but then withdrawn (forfeited) due to the storage spill accounting rules Information is inclusive of licences held by an environmental holder (see note 5 of this report for further clarification).

Figure 21: Incremental available water determination and carryover volumes for general security as a proportion of share component

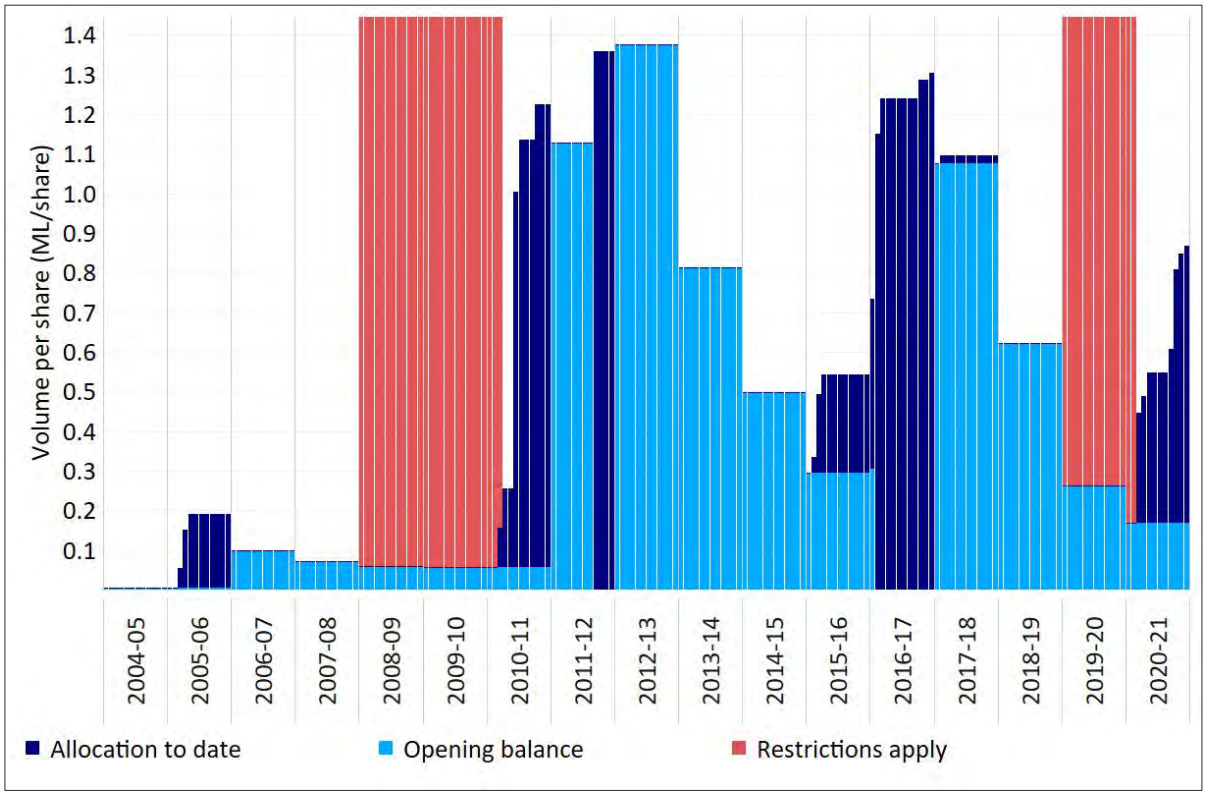
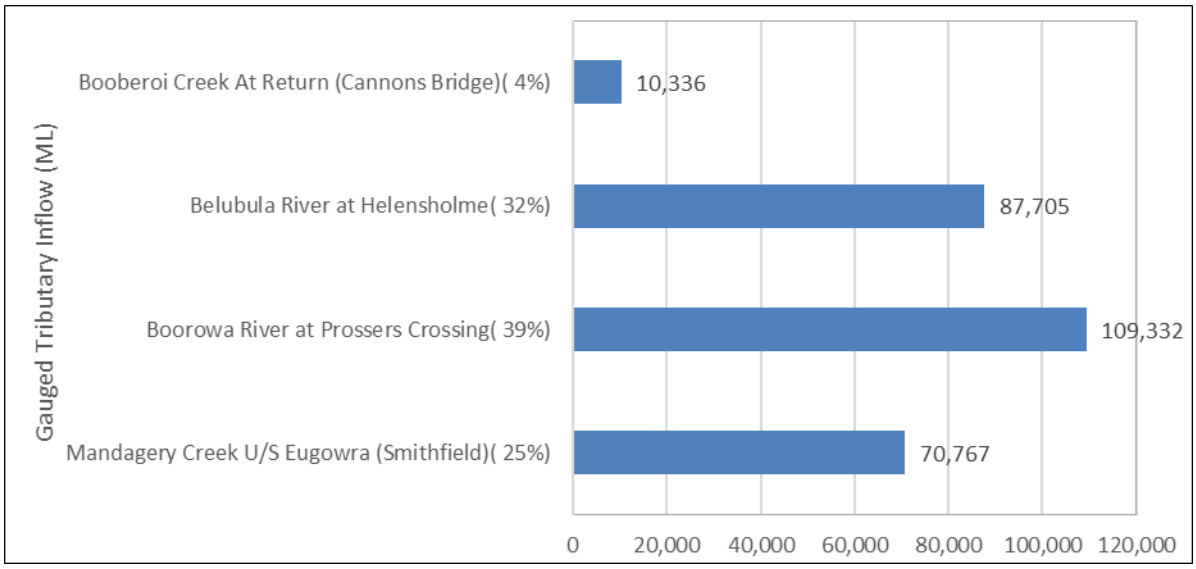


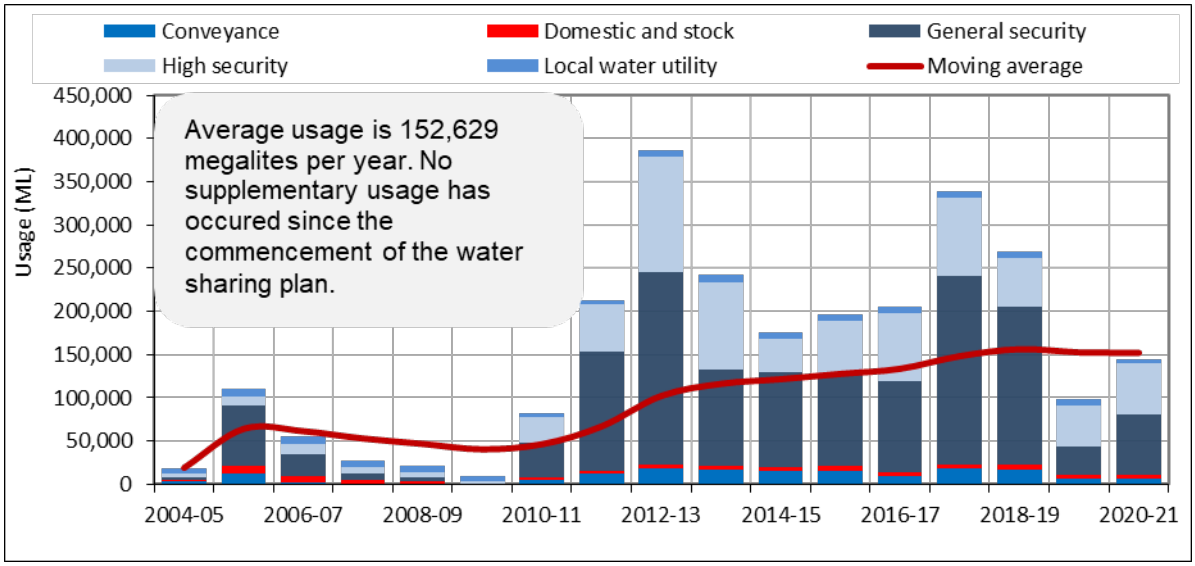
Figure 22: Measured tributary inflow contributions



Account usage

- Total account usage from regulated supply totalled 144,408 megalitres for the reporting period (Figure 23).
- Average account usage (all categories) under water sharing plan management conditions is 152,629 megalitres.

Figure 23: Lachlan average annual account usage versus account usage



Utilisation and inactive share

- 18% of general security share component was inactive[8] for the reporting period, an decrease of 11% on the prior reporting period (Table 5) reflecting the lifting of the temporary water restrictions.
- Considering all categories of access licence, 17% of issued share component was inactive, a decrease of 10% on the prior reporting period.
- Utilisation of available water[9] from regulated supplies decreased (by 44%) to 25%, the lowest since 2011–12, reflecting wet conditions and low demand for licensed water (Figure 24).

[8] An access licence is considered to be inactive for the reporting period if the holding does not use water or access the temporary trade market for the reporting period.
[9] Unrestricted water in accounts available to order for use

Figure 24: Percentage utilisation (water availability plus trade in from external water sources against account usage and trade out to external water sources)

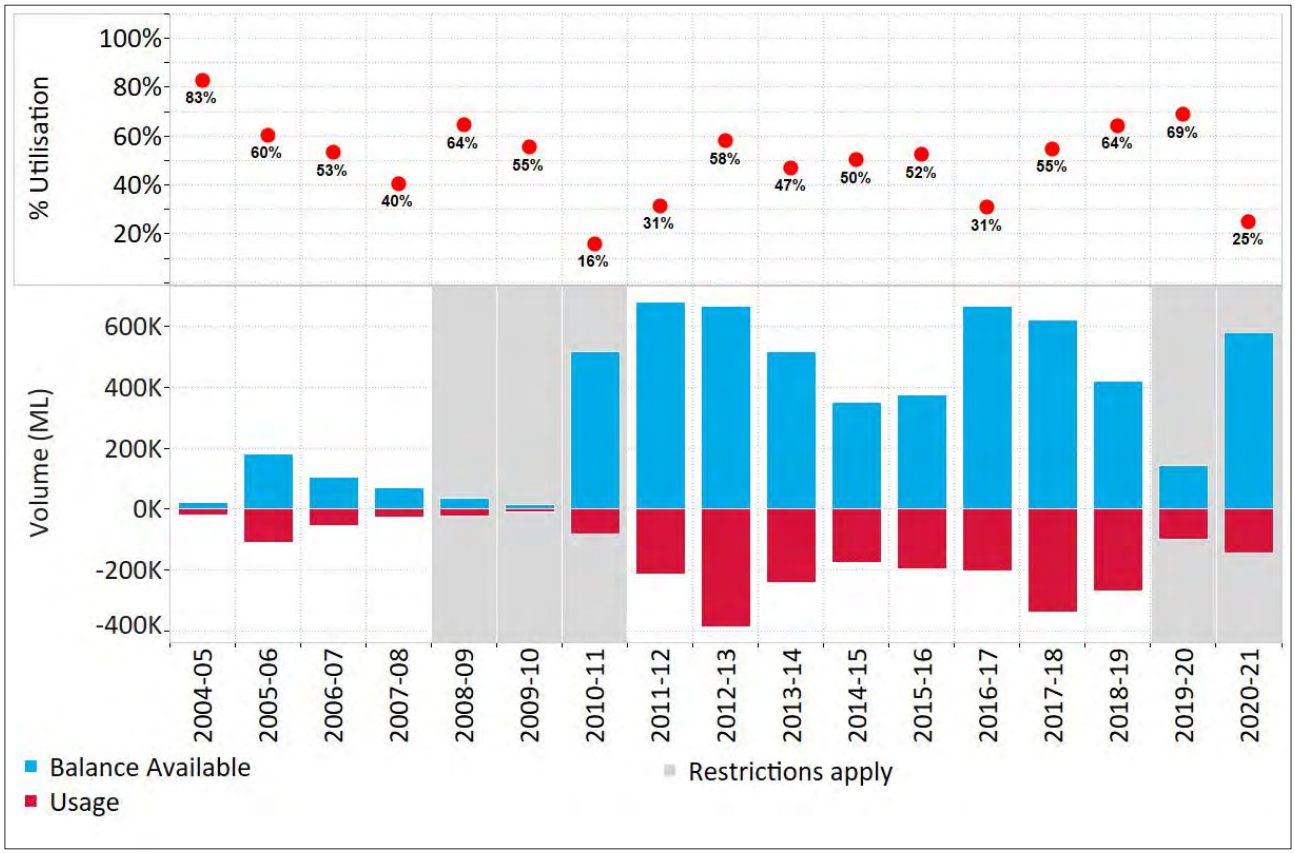


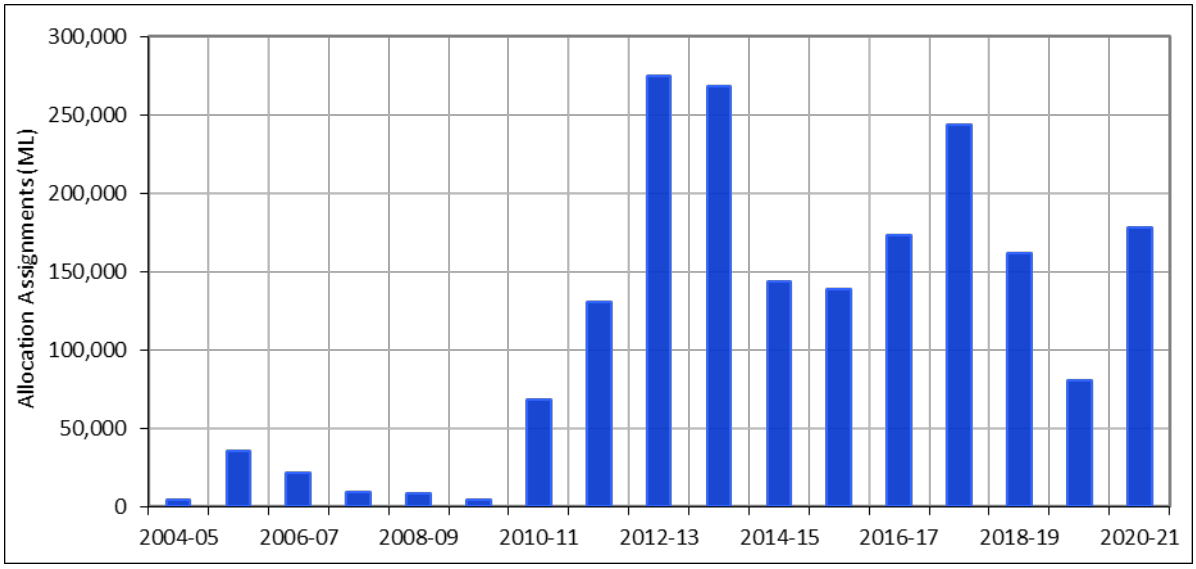
Table 5: Lachlan inactive licence summary

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	289	4,661	43%	49%
Domestic and Stock [Stock]	153	1,418	89%	77%
Domestic and Stock [Domestic]	75	169	98%	97%
Local water utility	2	725	5%	3%
Regulated river (General Security)	498	106,001	18%	29%
Regulated river (High Security)	85	512	2%	2%
Regulated river (Conveyance)	0	0	0%	0%
Total regulated supply	**1,102**	**113,486**	**17%**	**27%**

Temporary trading (allocation assignments)

- The total volume of allocation assignments for the reporting period was 178,146 megalitres which was higher than the prior 2 water years (Figure 25).
- Water is not permitted to be traded between the Lachlan Regulated River Water Source and external water sources.

Figure 25: Total allocation assignments

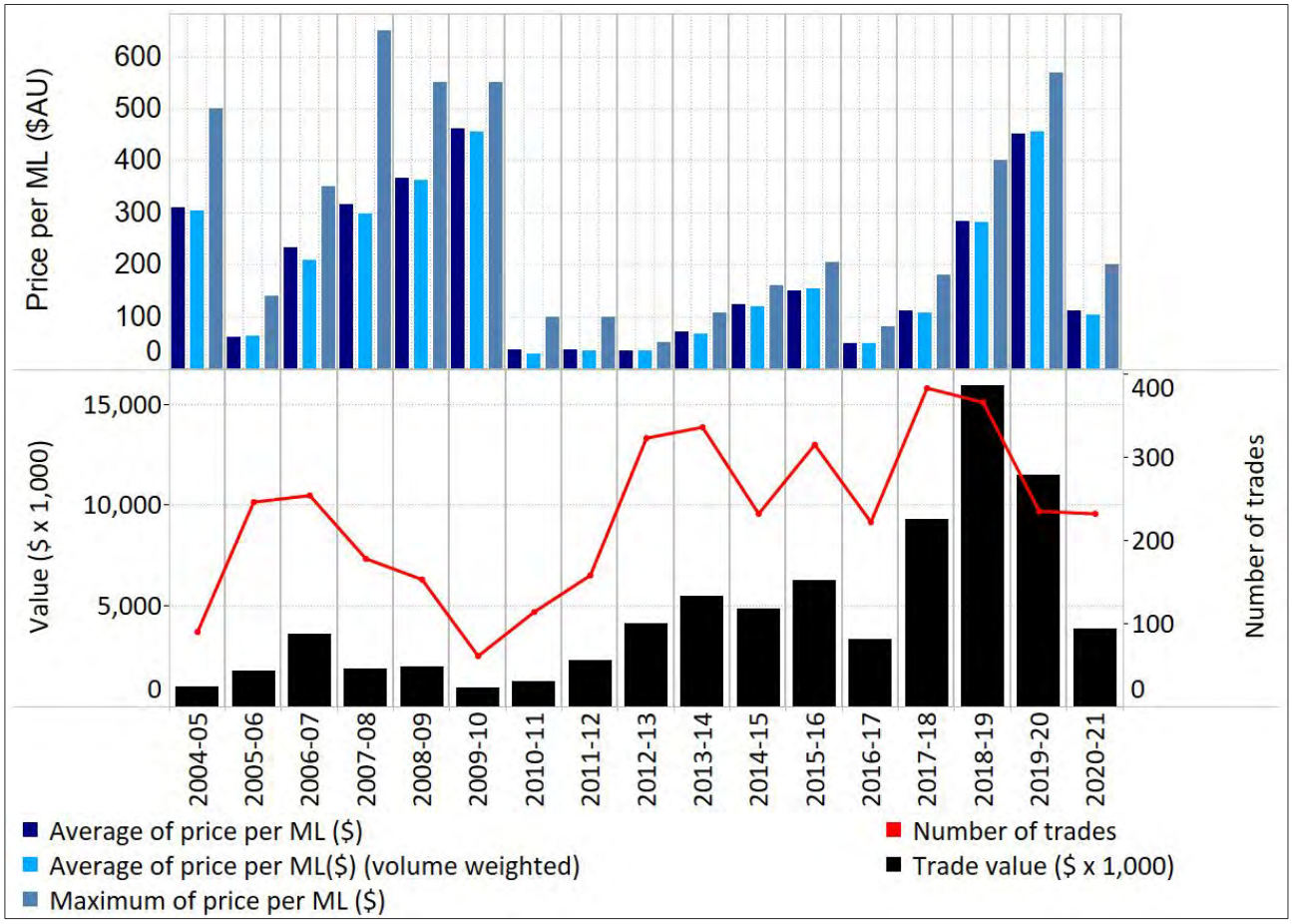


Temporary commercial statistics

For the reporting period, considering commercial trades only (> $1 per megalitre), 232 transactions were processed. Temporary trading for the reporting period indicates that the:

- average price for water was $110 per megalitre (weighted average $103), a 76% decrease on the prior year
- maximum price for water was $200 per megalitre
- total trade value being $3,872,000 a 66% decrease on the prior water year, the lowest in the last 4 water years (Figure 26).

Figure 26: Allocation assignment commercial statistics—Lachlan



Permanent trading

Permanent commercial statistics

For the reporting period, considering commercial trades only (> than $1 per megalitres), 10 general security share assignment transactions (Figure 27) were processed. Permanent trading for the reporting period indicates that the:

- average price for general security was $1,220 per share (weighted average $1,220), a 9% increase on the prior year
- maximum price was $1,250 per share
- total trade value was $3,736,000, the second highest since 2009–10 and a 0.3% decrease on the prior reporting period.
- 3 high security share assignment of 124 shares (Figure 29) was processed for an exchange of $4,403 per share.
- general security and high security sale price within the Lachlan relative to other NSW regulated river water sources selling share in the reporting period is provided in Figure 28 and Figure 30 respectively.

In addition to permanent assignments of share, a total of 11,712 shares (all categories of licence considered) were subject to a change of holder for commercial purposes through 34 transactions. Note that reliable pricing information for change of holder dealings is unavailable as often the sale is bundled with land (Figure 31).

Figure 27: Share assignments commercial statistics—Lachlan, General Security

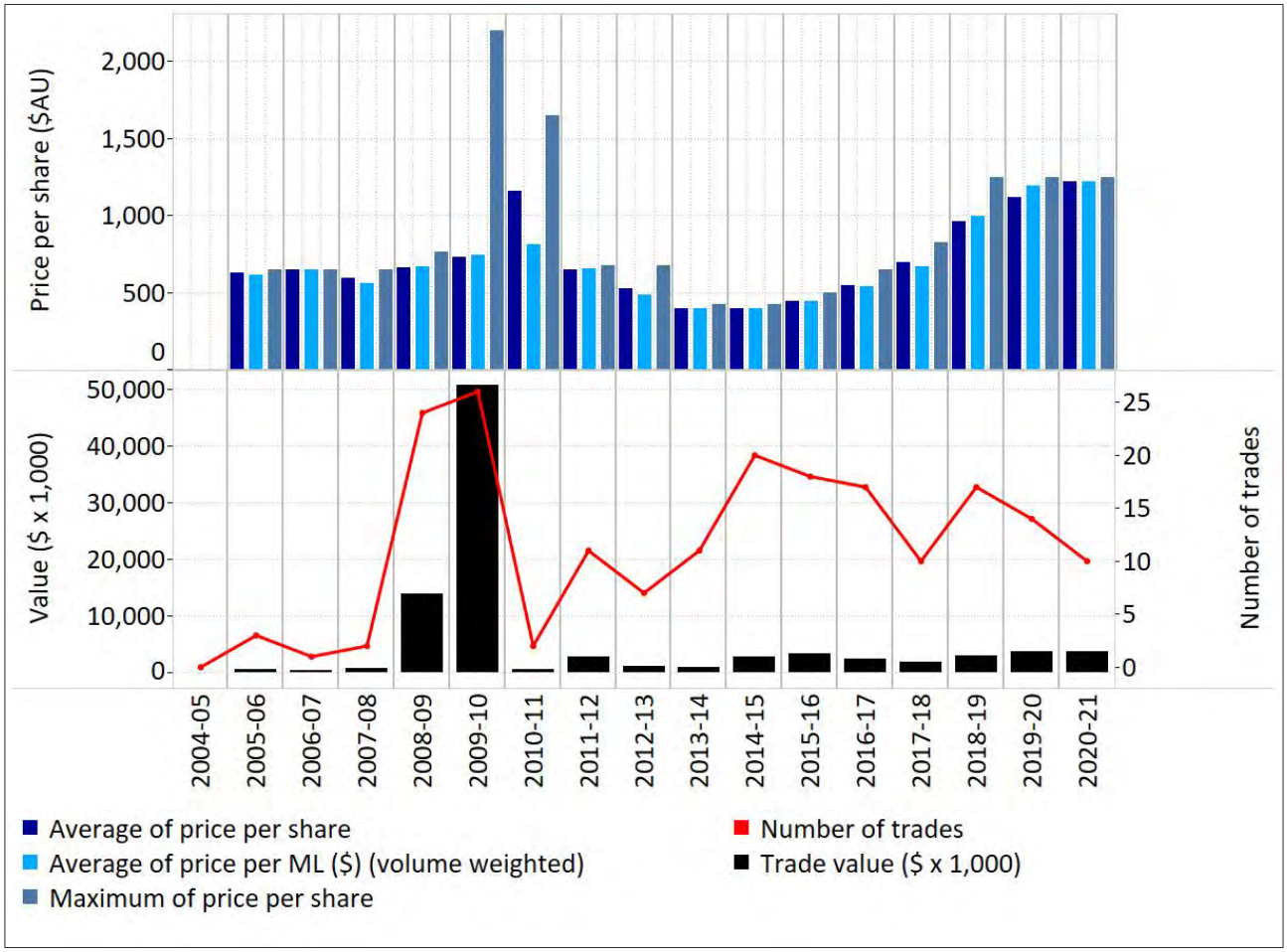


Figure 28: General Security average share price relative comparison for reporting period

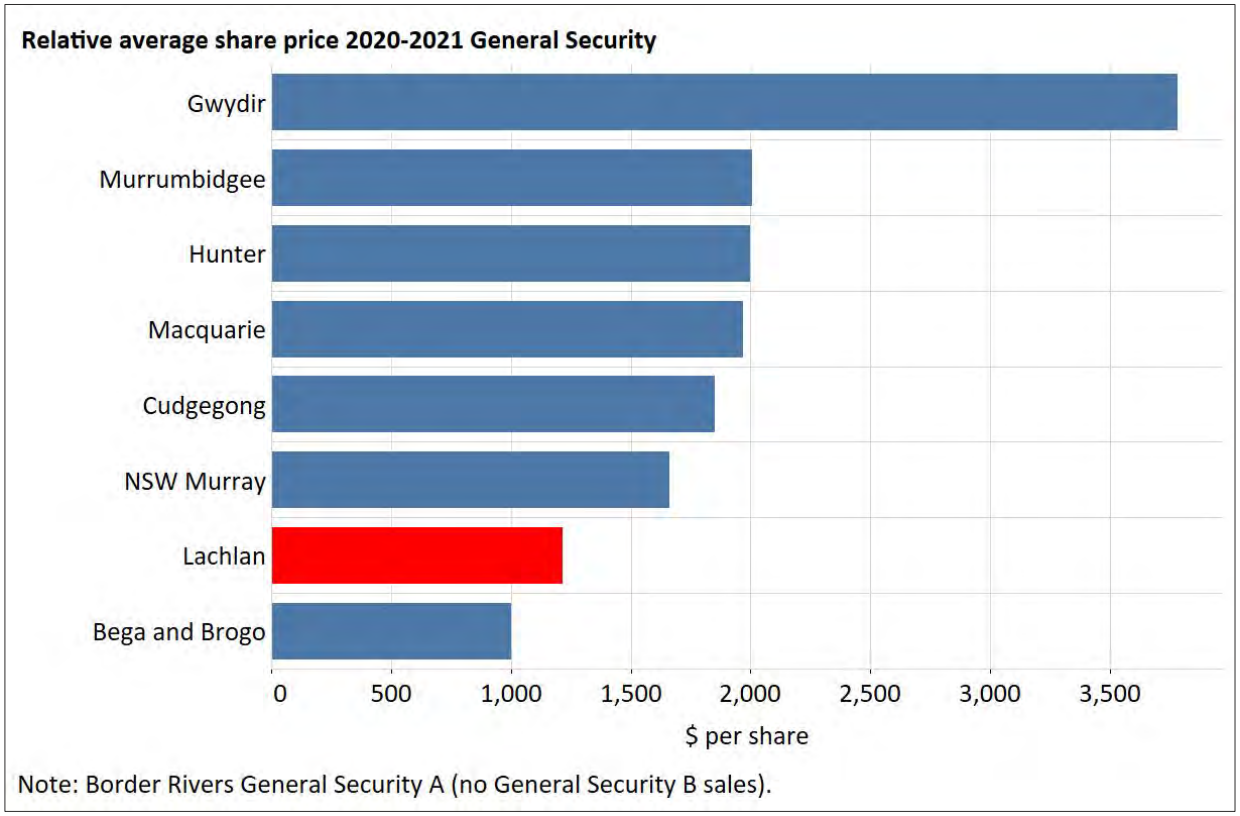


Figure 29: Share assignments commercial statistics—Lachlan, High Security

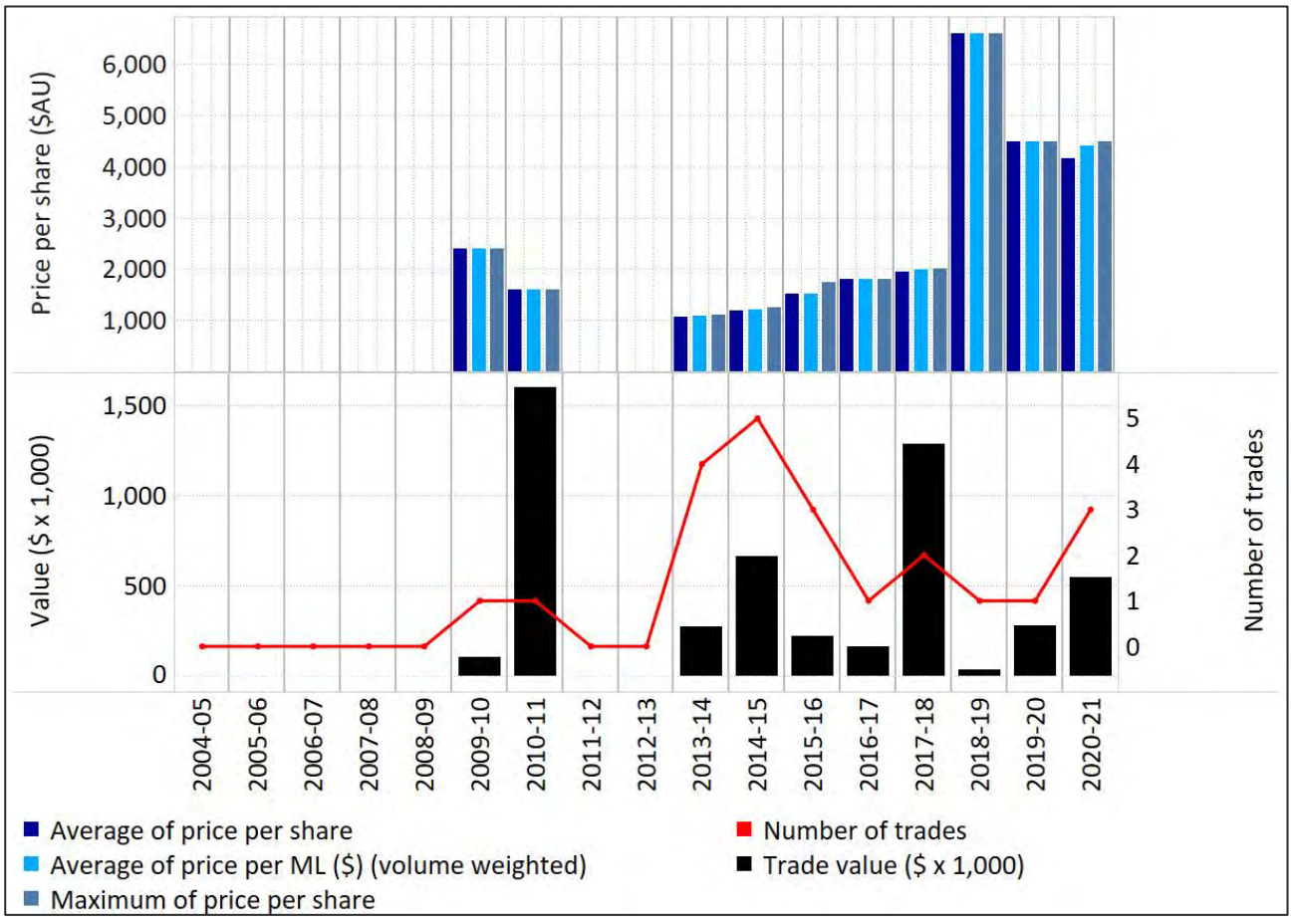


Figure 30: High Security average share price relative comparison for reporting period

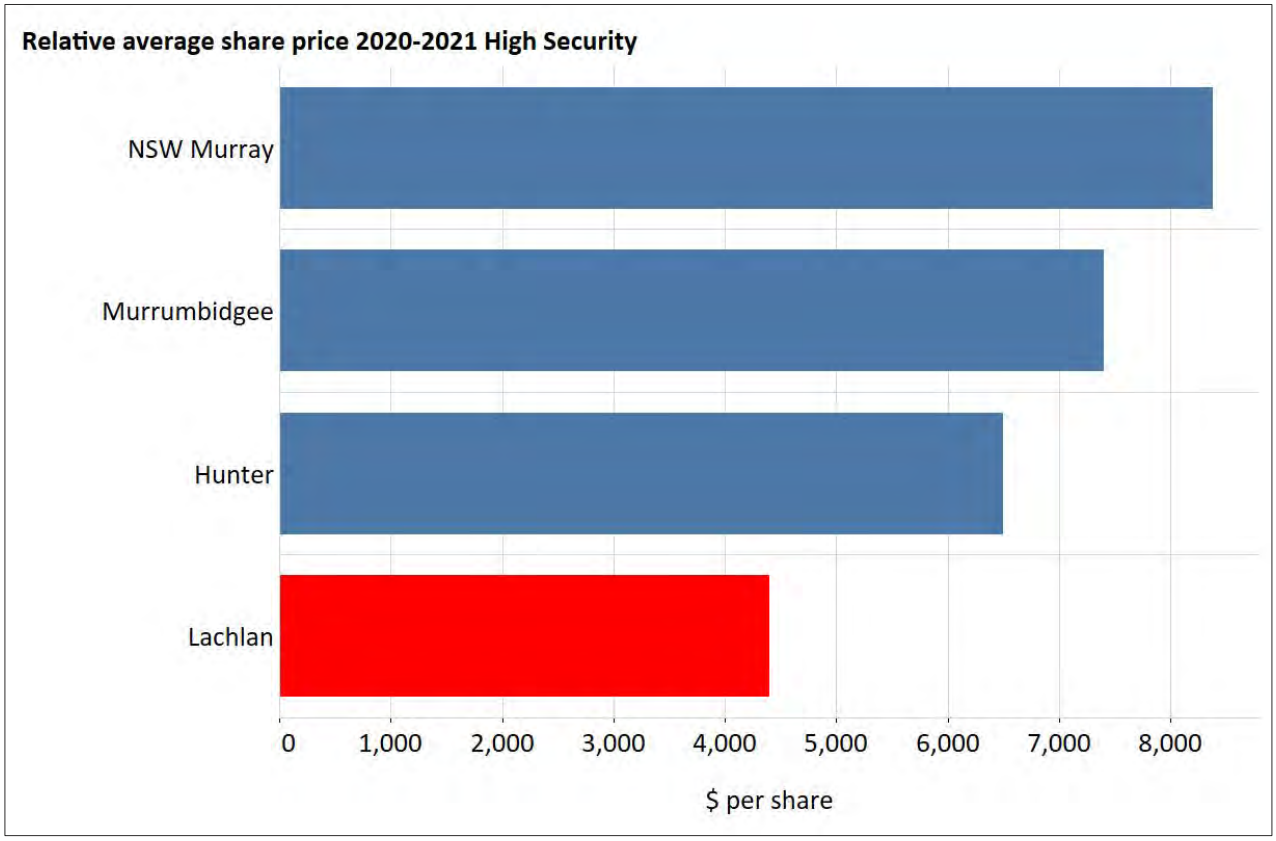


Figure 31: Change of holder commercial statistics, Lachlan

Replenishment flows

Throughout the reporting period the following volumes were delivered to replenish river volumes for stock and domestic access in line with the requirements of the water sharing plan:

- 8,072 megalitres to Willandra Creek
- 5,829 megalitres to Merrimajeel and Muggabah creeks
- 11,666 megalitres to Booberoi Creek
- 8,883 megalitres to Merrowie Creek.

Minimum flows

- A visible flow at Geramy was successfully achieved for the entirety of the reporting period[10].

[10] Typically, an average flow of about 20 to 30 megalitres per day in cooler months and about 70 to 80 megalitres per day in warmer months at Booligal would maintain a visible flow at Geramy.

Surface water resources and management—Belubula Catchment

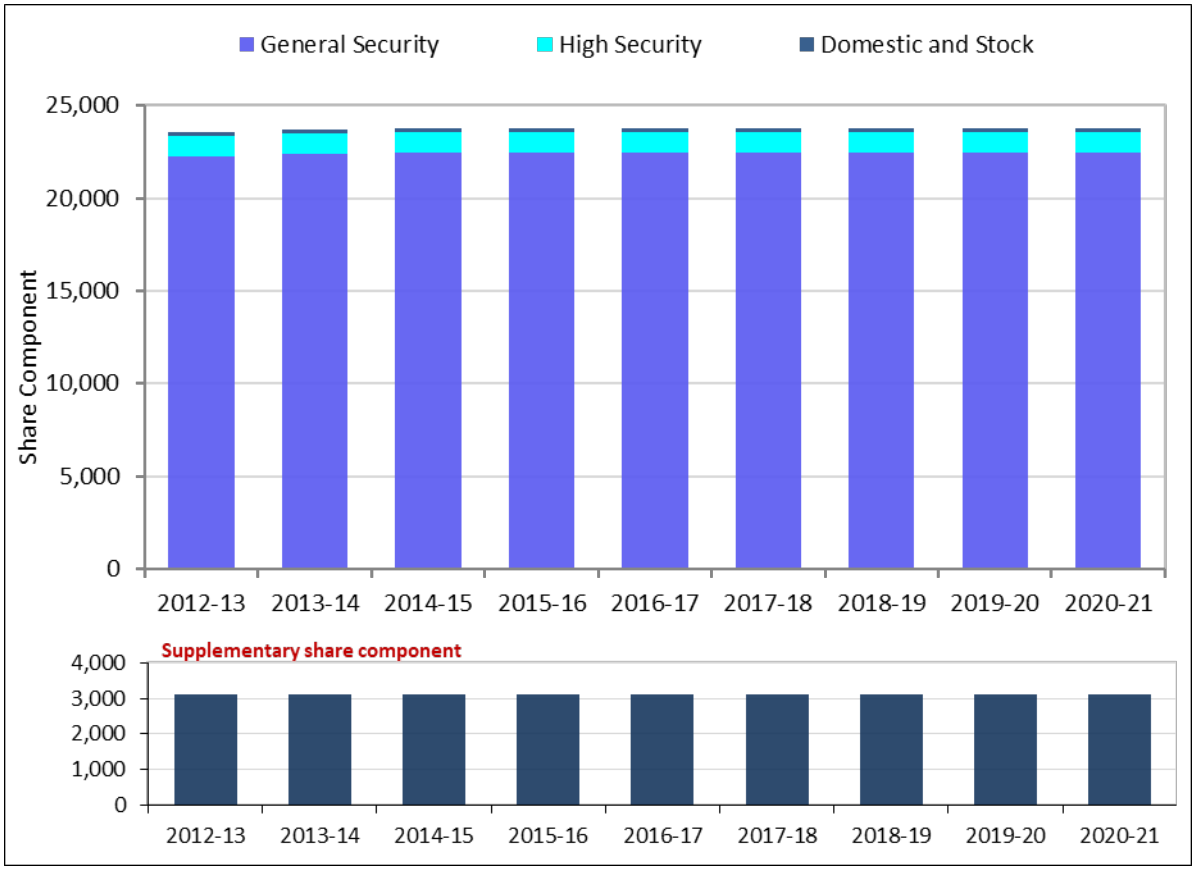
Legislation

The Belubula water source was managed under the conditions set out in the *Water Sharing Plan for the Belubula Regulated River Water Source 2012*. The water sharing plan commenced on 4 October 2012 and will remain active until 30 June 2023, or alternatively until a replacement plan is gazetted. The water sharing plan was produced to meet the water management principles outlined in the *Water Management Act 2000*.

Access rights

- Issued access licence share component remained constant in the reporting period.
- Total issued share component was 26,894 shares on 30 June 2020, which included 3,125 shares of supplementary water access licences (Figure 32).

Figure 32: Belubula total share component since the commencement of the water sharing plan



Access licence account management

The account management rules applied to an access licence in the Belubula regulated river water source is presented, by access licence category in Table 6. General security access licence management adopts a flexible, continuous accounting approach, with licence holders able to store (and carry forward) up to 1.3 megalitres per share. Annual usage for this category is restricted to 1 megalitre per share, plus allocation assignments in from the A sub account (water that can be used in the current water year), minus allocation assignments out of the A sub account.

All other categories of access licence are effectively limited to a maximum available water determination (AWD) of 1 megalitre per share (or 100%) and are not allowed to carryover unused water to the following water year[11].

Table 6: Belubula water 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%
Regulated River (General Security)	1.3 ML/Share	N/A	1 ML/Share	N/A
Regulated River (High Security)	1 ML/Share	0 ML/Share	N/A	1 ML/Share
Supplementary Water	1 ML/Share	0 ML/Share	N/A	1 ML/share

Extreme events stage and temporary water restrictions (Belubula)

Generic policy background on the NSW extreme events policy and temporary water restrictions is provided under 'Extreme events stage and temporary water restrictions (Lachlan)' of this document.

Extreme events stage

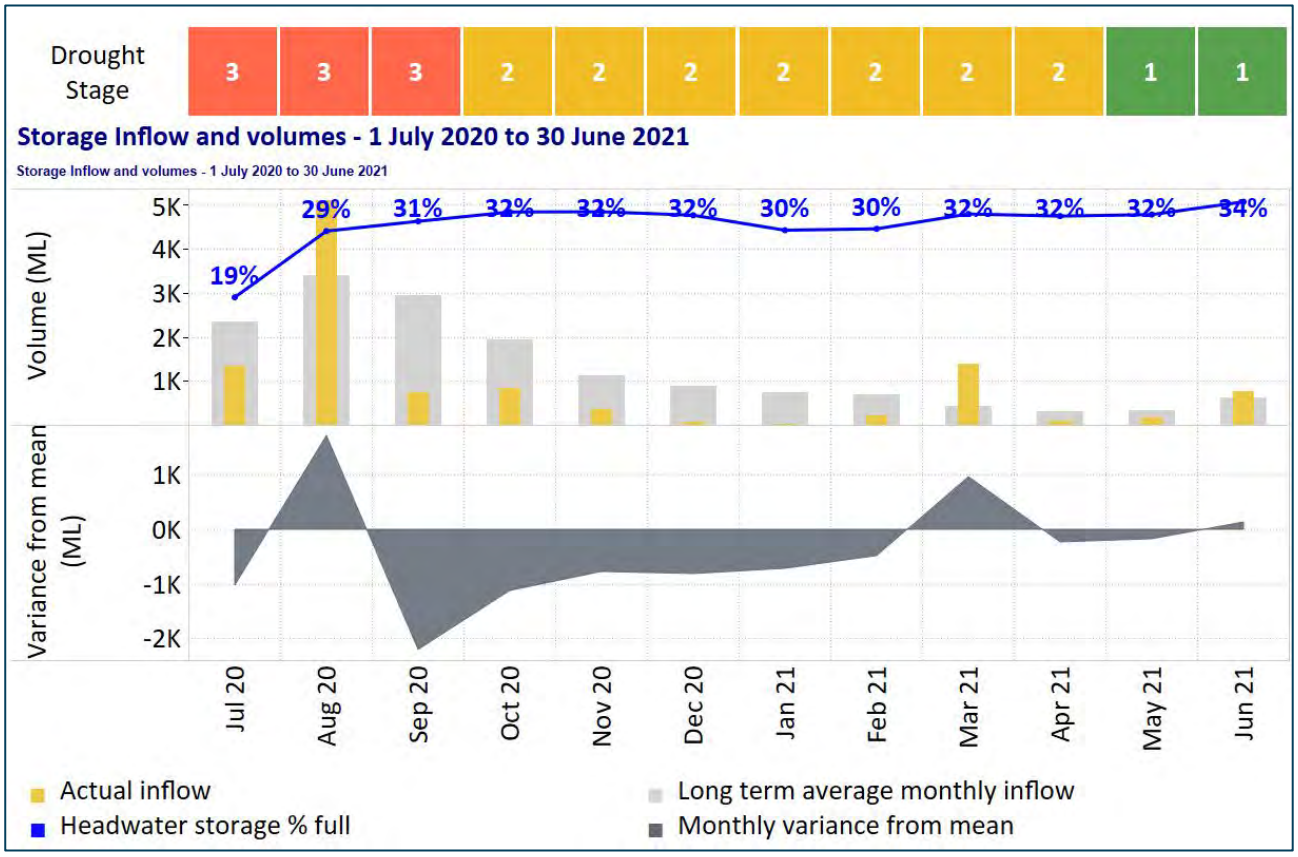
- The Belubula River was still in Stage 3 Severe Drought at the start 2020–21 water year with Carcoar Dam at 16% holding 6 GL.
- With Carcoar Dam increasing to 31%, the valley was rated Stage 2 Recovering Drought in October 2020 (Figure 33).
- A Stage 1 Normal Operations Drought declaration was made in April 2021 with water users able to access good volumes of supplementary flows. However, while high security allocations were 100% for the water year, no general security allocations were made.

Drought Measures

- The suspension of the end of system flow requirement in the Belubula was extended until the end of December 2020 and then expired. End of system flow requirements were met by downstream tributary flows as there was insufficient water in storage to provide this via regulated releases.

[11] An exception was applied to the 2013-14, 2014-15 and 2015-16 water years

Figure 33: Drought stage for the reporting period referenced with monthly headwater storage inflows, and monthly storage inflow variance from mean



Allocation account summary

A summary illustration of the accounting for General Security and High Security access licence categories in the Belubula is provide in Figure 34 and Figure 35 respectively. Detailed information on the water accounts for all categories of licence issued are provided in Note 1 of this report.

Figure 34: Annual water account summary Belubula General Security

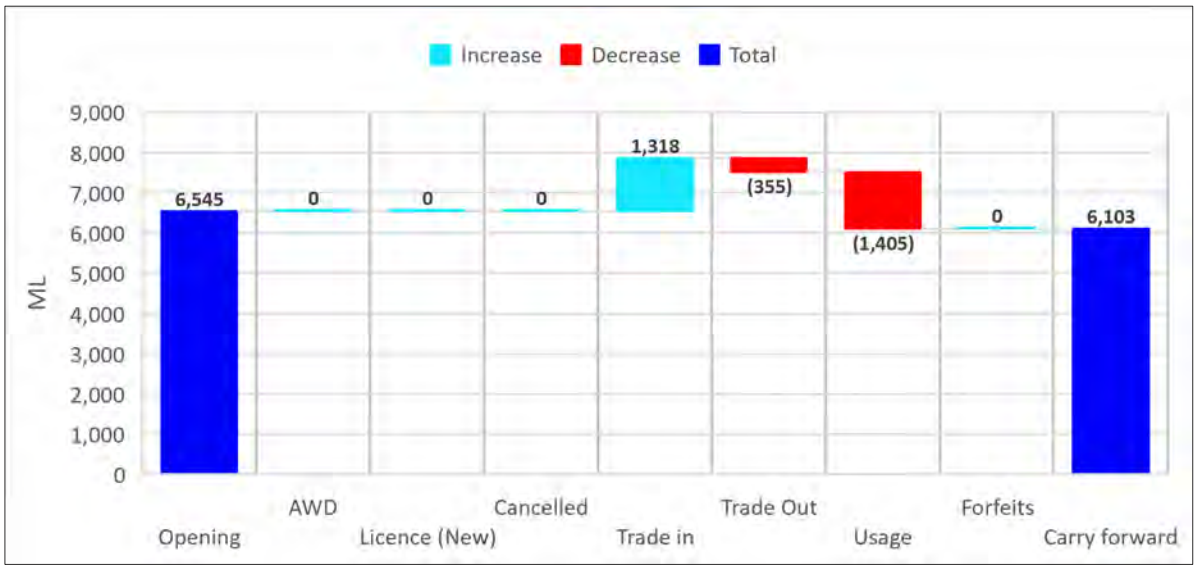
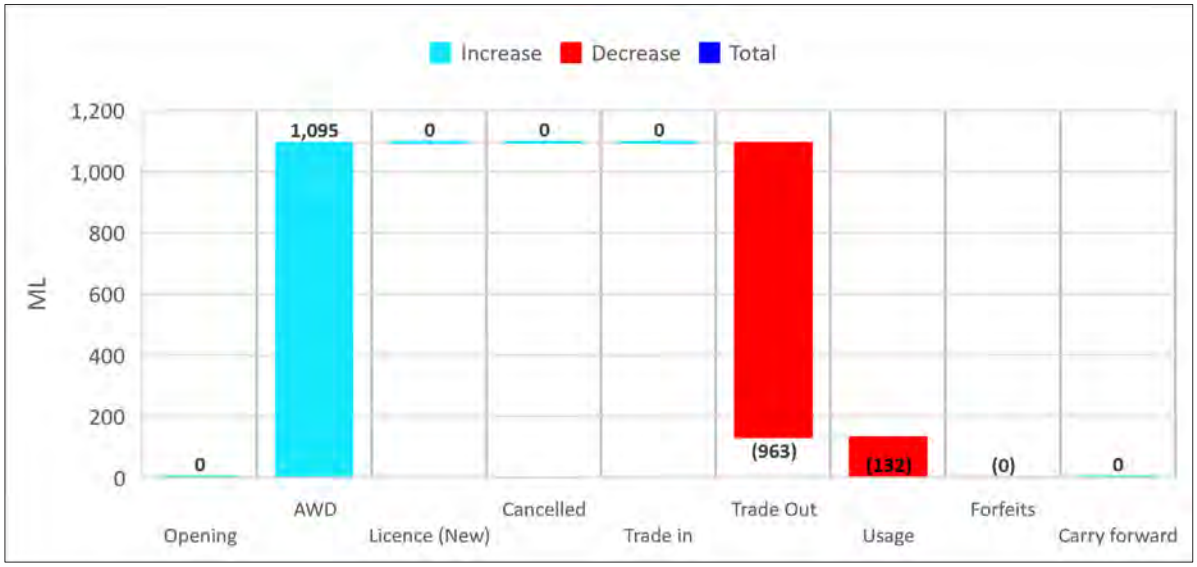


Figure 35: Annual water account summary Belubula High Security



Water availability

- Domestic and Stock and High Security access licences received an opening available water determination of 100% and 1 megalitre per share respectively, the maximum amount allowable under the water sharing plan.
- Supplementary access licences received an opening available water determination of 1 megalitre per share, the maximum amount allowable under the water sharing plan.
- At the water source level 293 days of supplementary access was available in the reporting period. Historical and reporting period supplementary access periods are illustrated in Figure 38.
- General security access licences had a carryover of 6,545 megalitres into the reporting period, equating to 29% of total issued general security share component (Figure 36).
- General security access licence holders received an opening AWD 0.0 megalitre per share. No additional water was made available to this category throughout the water year and restrictions were required to be put in place on the use of account water due to ongoing water shortage (refer to *Temporary water restrictions for the reporting period*).

The total water availability by licence category under water sharing plan management conditions is presented in Figure 37. Water availability for the reporting period was the lowest under water sharing plan management conditions (Figure 37).

Figure 36: Belubula incremental available water determination and carryover volumes for general security as a proportion of share component

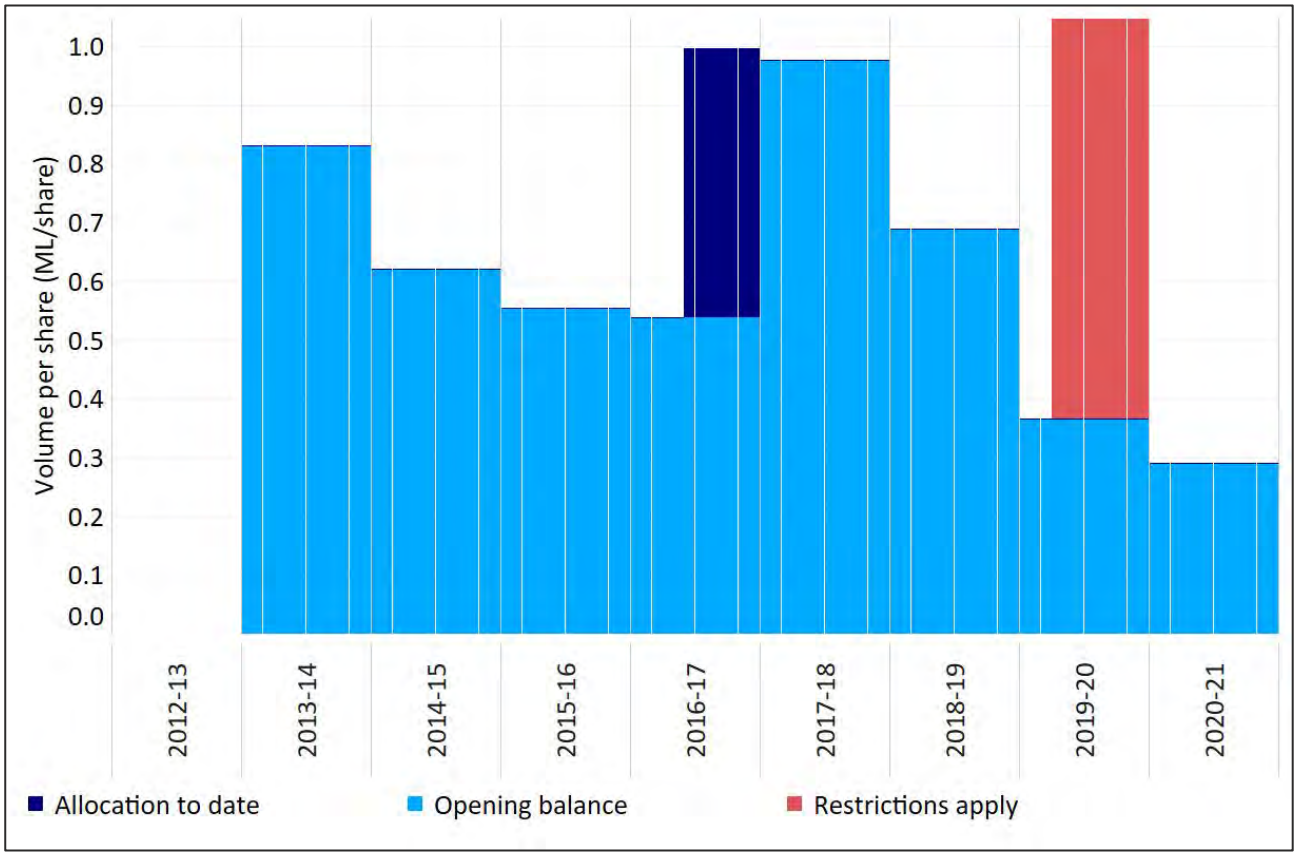
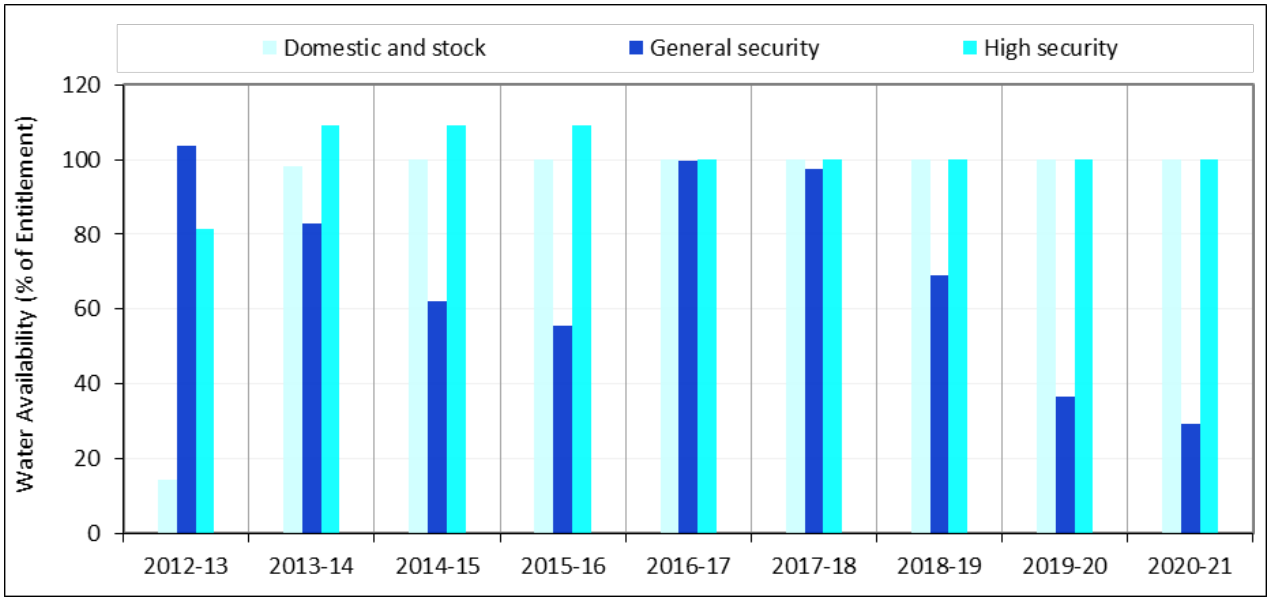
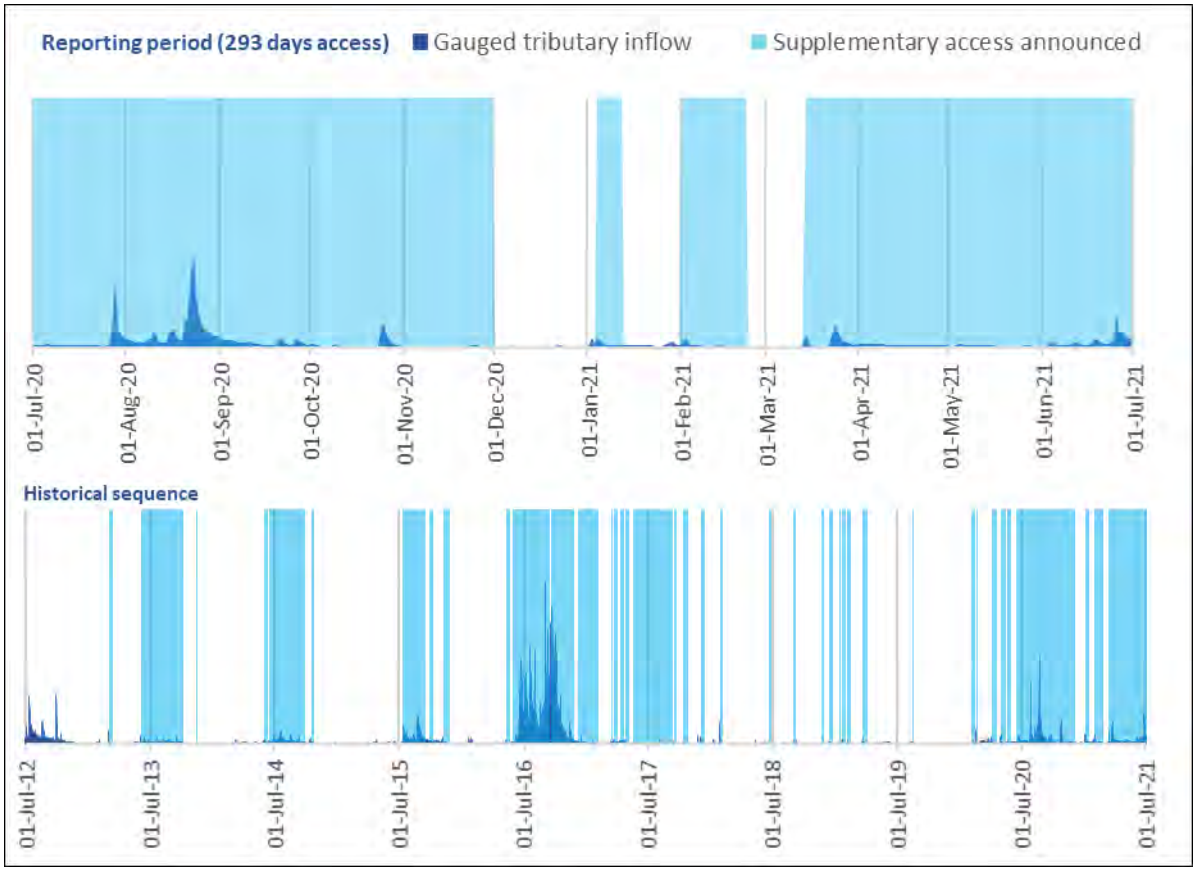


Figure 37: Belubula Account Water Availability (Carryover + Available Water Determinations)[12]



[12] Water availability also includes adjustments made as a result of the storage spill in 2012–13 and during year forfeits while still operating under the *Water Act 1912*. In addition, the 2012-13 figures have been adjusted to take into account the period of operation under the Water Act being 1 July 2012 to 4 October 2012.

Figure 38: Supplementary event access

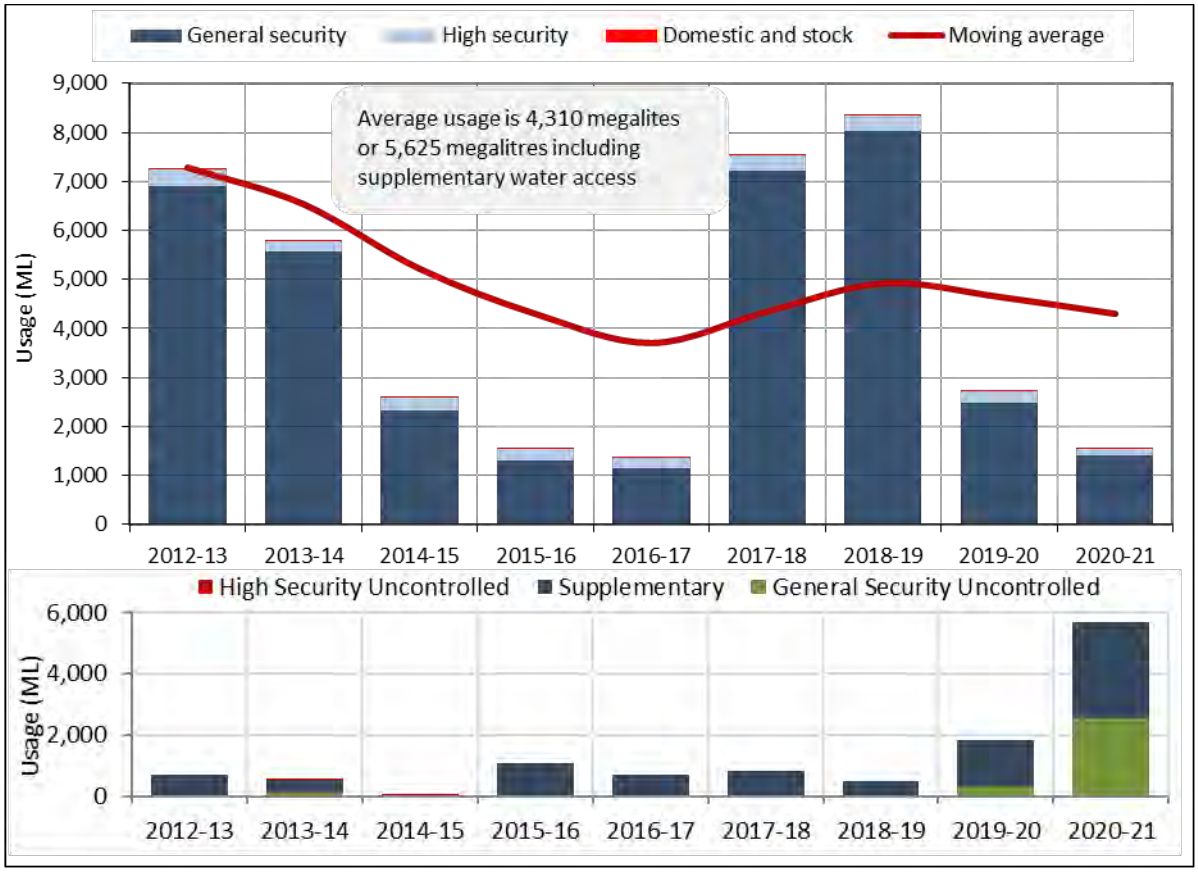


Account usage

Total account usage (all forms of take) was 4,678 megalitres for the reporting period including 3,125 megalitres supplementary usage. There was an additional 2,541 megalitres of uncontrolled flow usage (Figure 39).

Average usage (all categories of licence plus uncontrolled flow access) under water sharing plan management conditions is 5,625 megalitres per year and 4,310 megalitres per year excluding supplementary and uncontrolled flow access.

Figure 39: Belubula average annual account usage versus account usage



Utilisation and inactive share

- 59% of share component for licence categories with regulated supply was inactive[13] for the reporting period, an increase of 33% on the prior reporting period (Table 7).
- Utilisation[14] of available water from regulated supplies decreased (by 11%) to 20%, however restrictions on the use of Belubula general security allocations (60% of account water restricted, 40% available) were in place for a considerable portion of the water year (Figure 40).

[13] An access licence is considered to be inactive for the reporting period if the holding does not use water or access the temporary trade market for the reporting period. Regulated supply excludes supplementary access licences
[14] Carryover plus available water determinations for all categories of licence

Figure 40: Percentage utilisation (water availability plus trade in against usage and trade out external water sources). Excludes supplementary and uncontrolled flow access

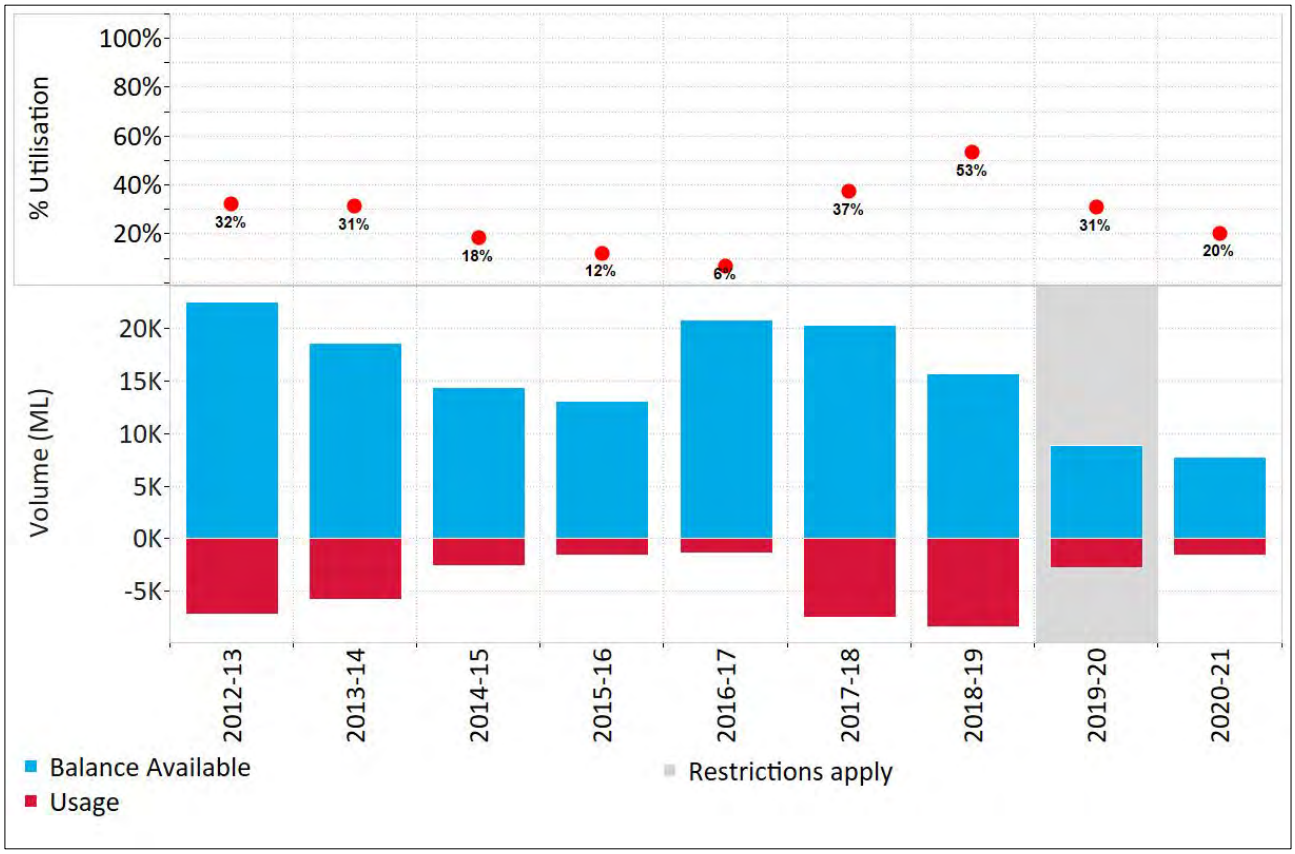


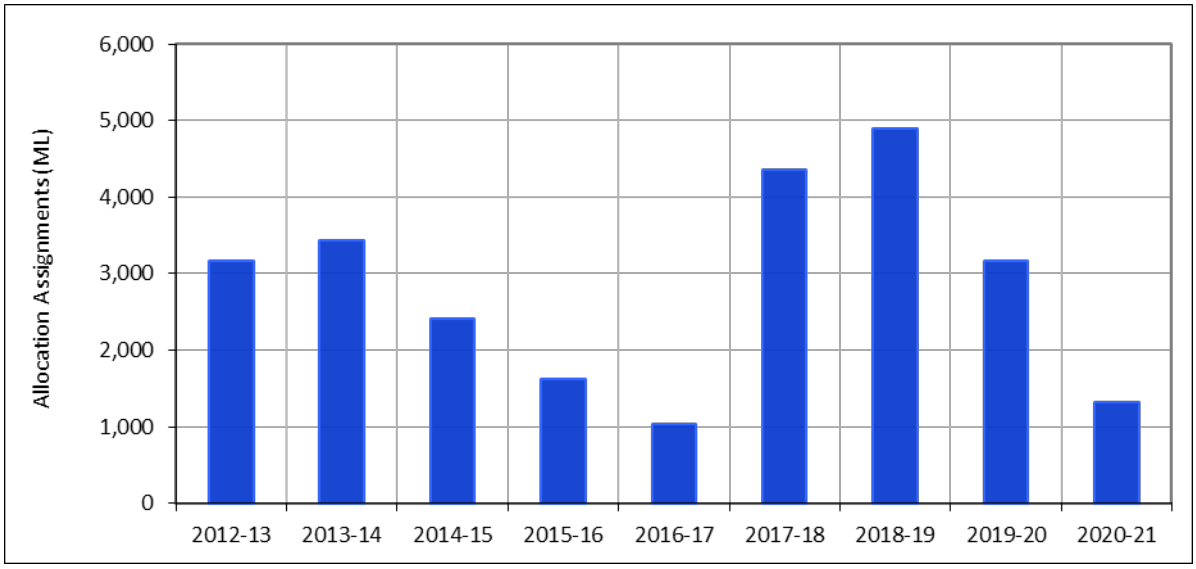
Table 7: Belubula inactive licence summary

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	17	146	86%	86%
Domestic and Stock [Stock]	8	44	100%	89%
Domestic and Stock [Domestic]	2	6	100%	100%
General Security	61	13,830	62%	27%
High Security	0	0	0%	0%
Total regulated supply	**88**	**14,026**	**59%**	**26%**

Temporary trading (allocation assignments)

- The total volume of allocation assignments for the reporting period was 1,318 megalitres (a drop of 1,843 since the previous year reporting period) (Figure 41).
- Water is not permitted to be traded between the Belubula Regulated River Water Source and external water sources.

Figure 41: Total allocation assignments

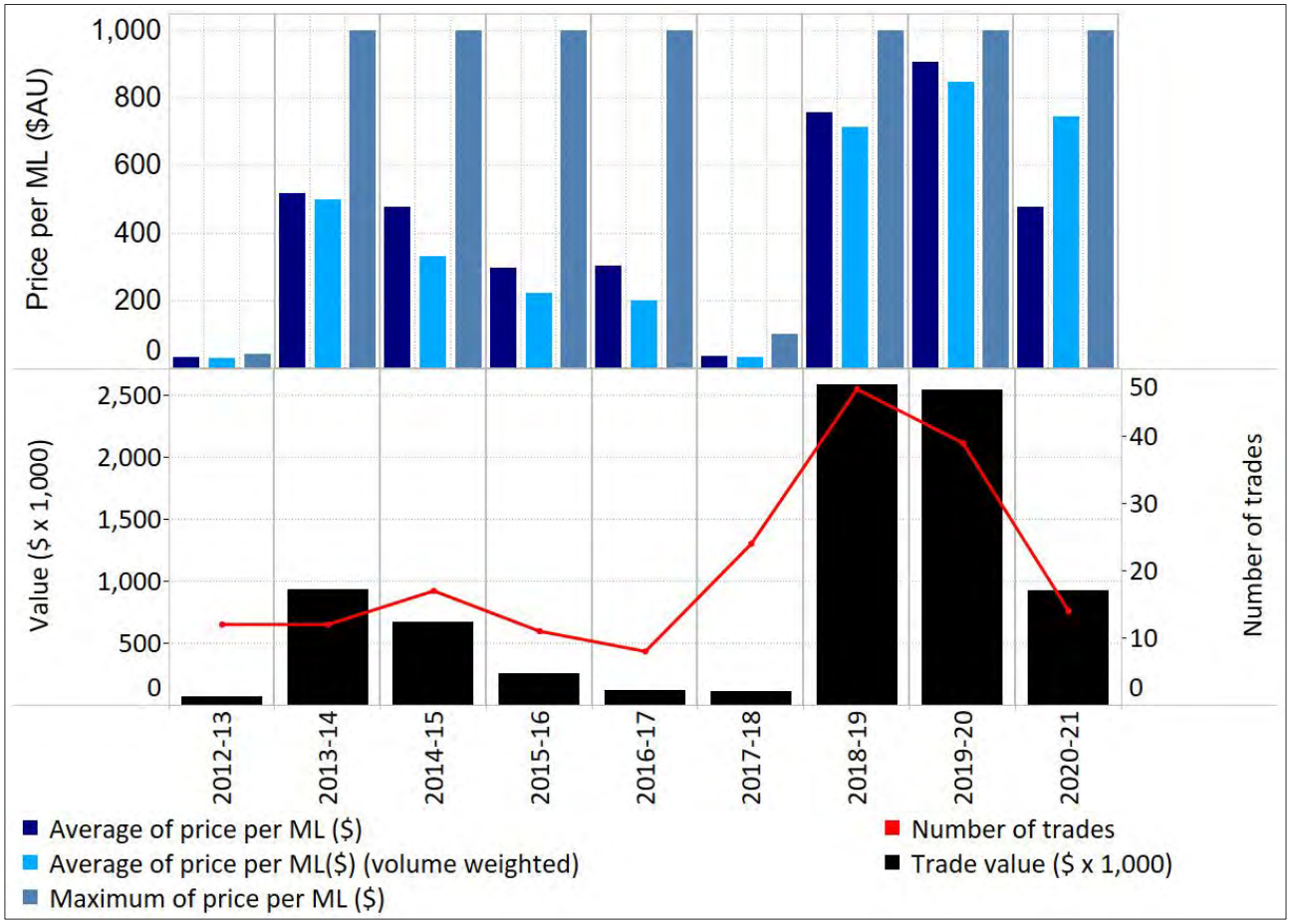


Temporary commercial statistics

For the reporting period, considering commercial trades only (>$1 per megalitres), 14 transactions were processed (Figure 42). Temporary trading for the reporting period indicates that the:

- average price for water was $477 per megalitre (weighted average $746), a 47% increase on the prior reporting period
- maximum price for water was $1,000 per megalitre
- total trade value was $927,000, the fourth highest under water sharing plan management conditions and a 63% decrease on the prior reporting period.

Figure 42: Allocation assignment commercial statistics—Belubula



Permanent water trading

Permanent commercial statistics

- No general security share assignments have been processed in this reporting period (Figure 43).
- No high security share assignments have been processed since the commencement of the water sharing plan.
- Four licences were subject to change of holder for commercial purposes moving a total of 50 shares to new ownership (Figure 44)[15].

[15] Pricing information for change of holder dealings are unavailable as sale is often coupled with land.

Figure 43: Share assignments commercial statistics—Belubula, General Security

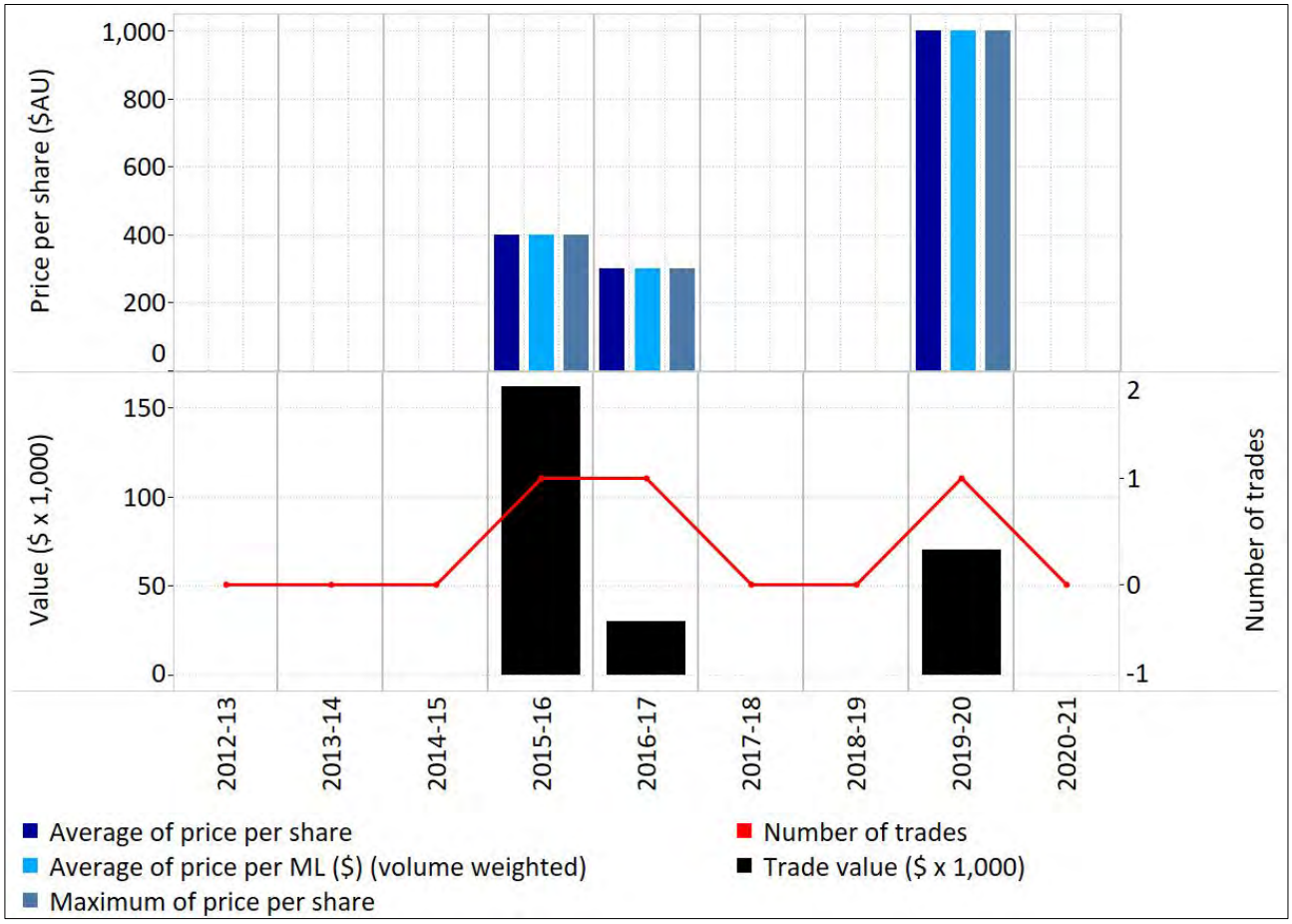
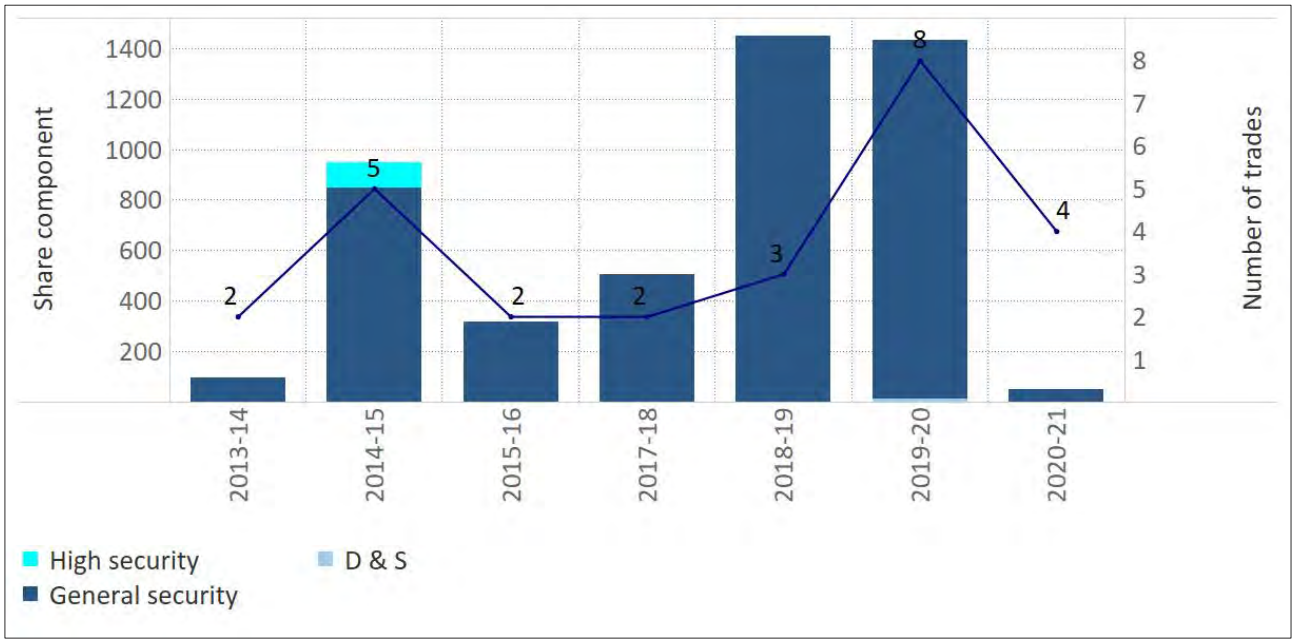


Figure 44: Change of holder commercial statistics, Belubula



Environmental Water

Planned environmental water

Translucent flow conditions were triggered in August 2020 and a total of 172,954 megalitres was delivered in 2 events as translucent environmental water and measured at Willandra weir.

The environmental water allowance (EWA) was credited with 20,000 megalitres in April 2020. Both Wyangala and Lake Brewster were made available during the year and were used. A total of 4,925 megalitres of Wyangala EWA and 9,670 megalitres of Lake Brewster EWA was used.

The water quality allowance (WQA) was credited with 20,000 megalitres on 1 July 2020. A total of 6,319 megalitres was used in the reporting period.

There is currently no held environmental water in the Belubula.

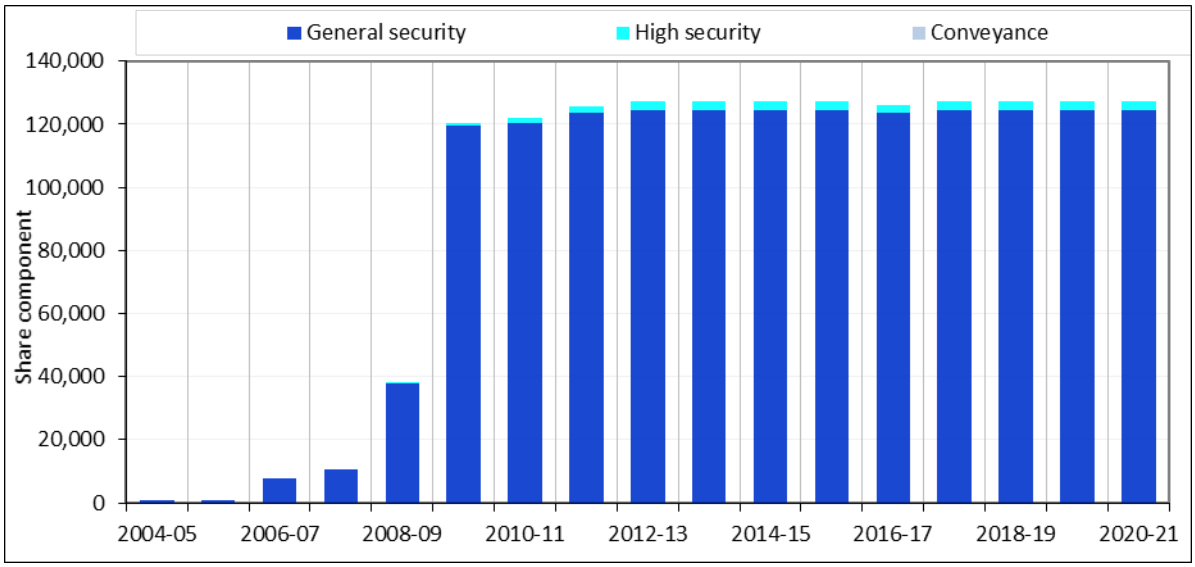
The water sharing plan minimum end of-system flow requirement in the Belubula was met except 13 days in January 2021 and 1 day December 2020.

Further details on planned environmental water and historical accounting are available in Note 7 of this document.

Held environmental water

- Held environmental water share component remained constant throughout the period.
- Total held environmental water consists of 124,518 shares general security and 2,728 shares high security as of 30 June 2021 (Figure 45).
- Total usage of held environmental water was 68,245 megalitres (Figure 46).
- Details on held environmental are available in Note 6 of this GPWAR.
- Utilisation of available Held environmental water from regulated supplies decreased (by 24%) to 53%, but still the equal second highest since the commencement of the water sharing plan (Figure 47).

Figure 45: Held environmental water share in the Lachlan since commencement of the plan[16]



[16] These represent the number of shares at the conclusion of the water year.

Figure 46: Held environmental account water used in the Lachlan since commencement of plan

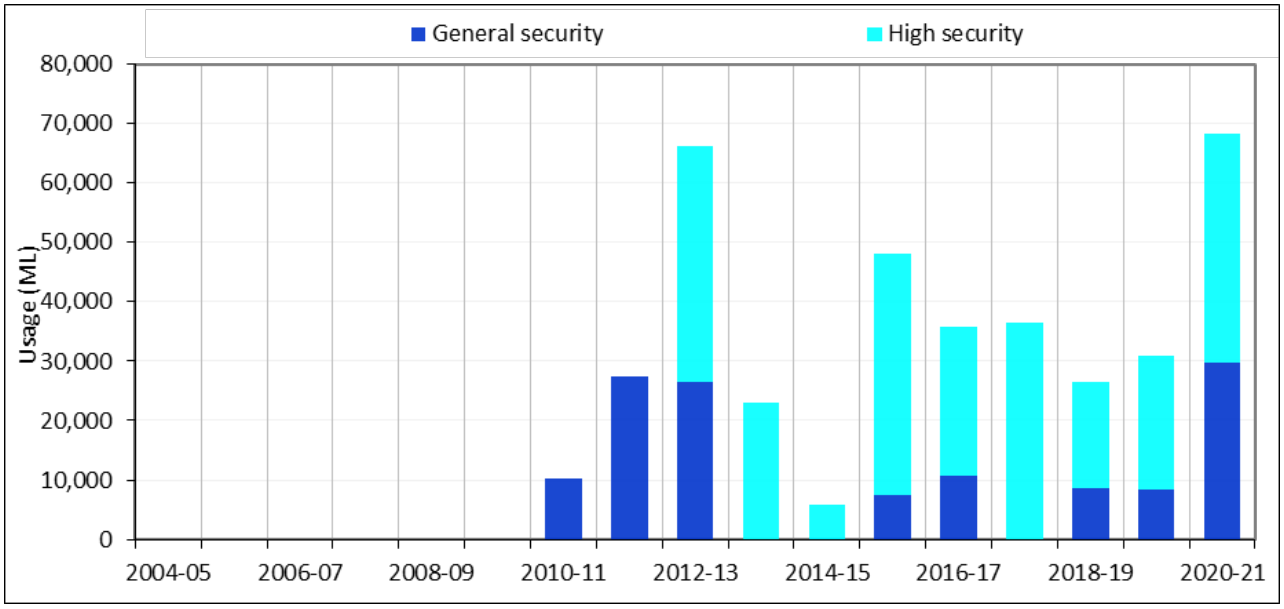
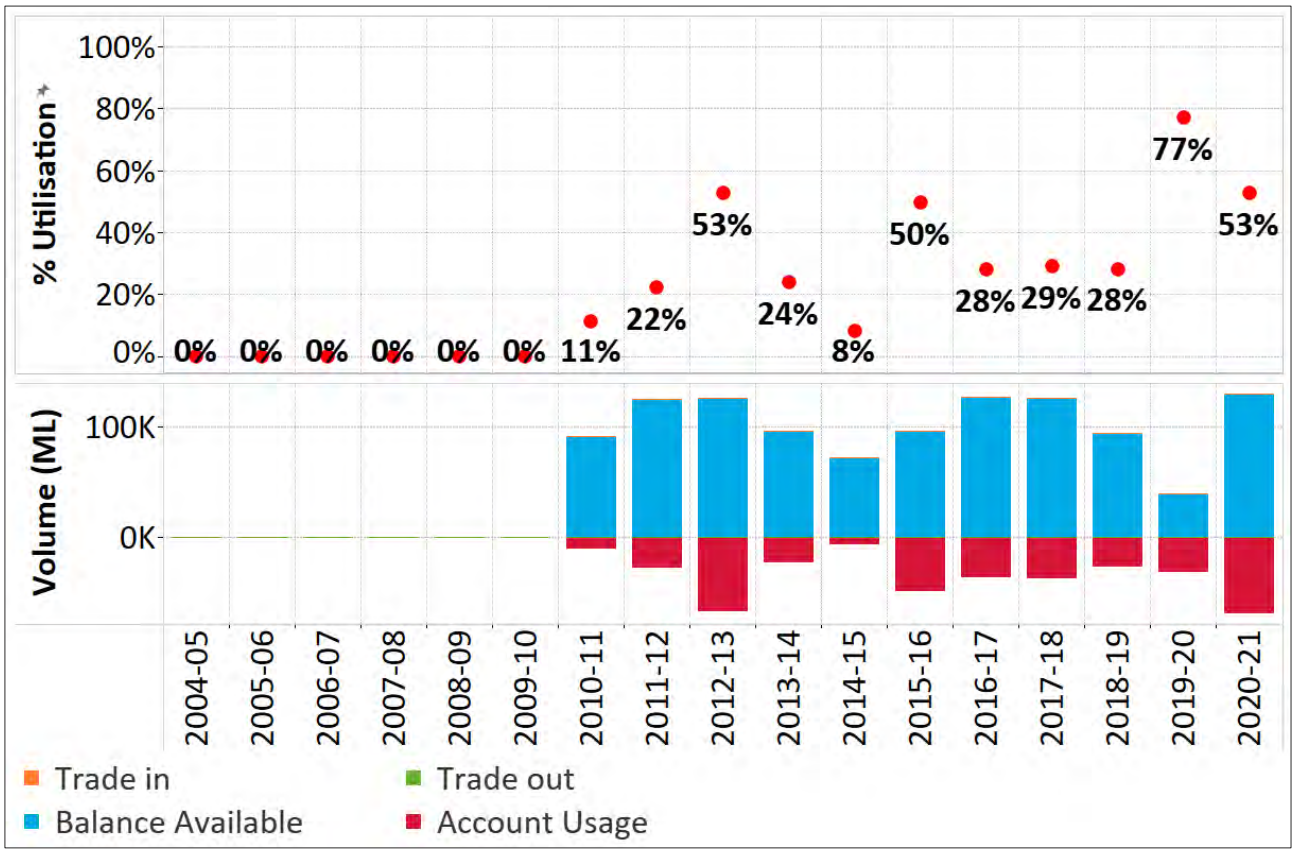


Figure 47: Held Environmental Water percentage utilisation (water availability against account usage)



Water accounting statements

Significant water accounting policies

We have used an accrual basis of accounting to prepare the water accounting statements in this GPWAR. All figures are in megalitres (ML).

We have excluded the 'Statement of Physical Flows' from this GPWAR as all transactions have been presented in the statements 'Water Assets and Liabilities' and 'Changes in Water Assets and Water Liabilities'. We have included a physical flow diagram that represents the physical movements of water to more clearly depict 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 on from the department's website (industry.nsw.gov.au/water).

Quantification of data

Data accuracy

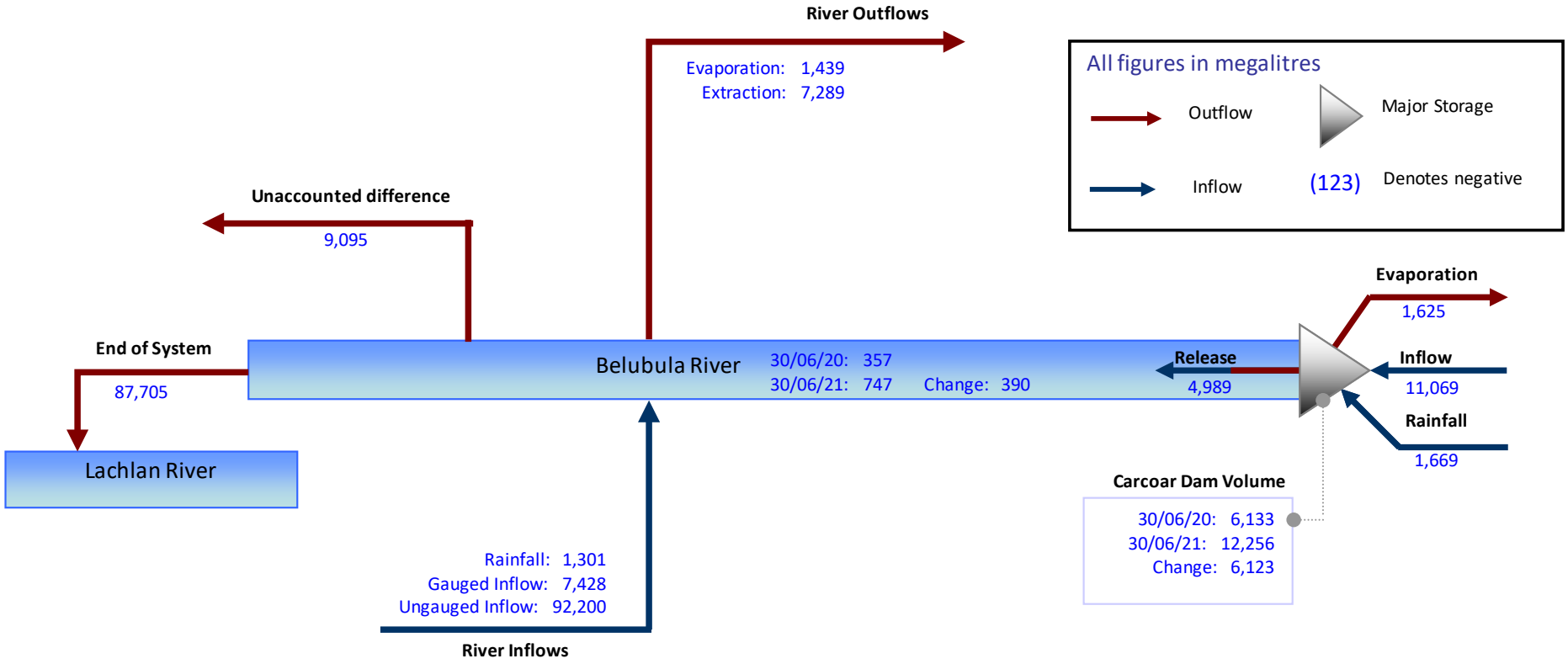
It is important to recognise that the data used to account for water movement and management in the reporting entity has been obtained from a variety of sources and systems. The data ranges from observed values where a high accuracy would be anticipated through to modelled results and estimates where 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 8).

Table 8: Water account data accuracy estimates key

Accuracy	Description
A1[17]	+/- 0% Data is determined rather than estimated or measured. Therefore, the number contains no inaccuracies.
A	+/- 10%
B	+/- 25%
C	+/- 50%
D	+/- 100%

[17] 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 Department of Planning and Environment corporate database.

Belubula 2020–21 physical flows mass balance diagram



Belubula catchment—Statement of water assets and 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 21	30 June 20
Carcoar Dam	A	8	12,256	6,133
River	B	9	747	357
Total Surface water storage (Asws)	-	-	**13,003**	6,490
Change in Surface Water Storage			**6,513**	**(1,284)**

Surface water liabilities

2. Allocation account balance	Accuracy	Notes	30 June 21	30 June 20
Domestic and Stock (Stock)	A1	1	0	0
General Security	A1	1	6,103	6,545
High Security	A1	1	0	0
Total allocation account balance (Lsws)			6,103	6,545
Change in Allocation Account Balance			**(442)**	**(1,674)**

Surface water net changes

3. Net changes	30 June 21	30 June 20
Net surface water assets (Asws – Lsws)	**6,900**	**(55)**
Change in Net Surface Water Assets	**6,955**	390

Belubula catchment—Changes in water assets and liabilities

For the year ended 30 June 2021 (1 of 2)

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

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

Surface water storage increases	Accuracy	Notes	2020–21	2019–20
Carcoar Dam	-	-	-	-
Inflow	A	10	11,069	3,045
Rainfall	B	12	1,669	731
River	-	-	-	-
Rainfall	C	13	1,301	484
Gauged Inflow	A	14	7,428	1,795
Ungauged Inflow	C	15	92,200	28,900
River inflow from Carcoar Dam release	A	16	4,989	4,086
Total surface water storage increases (Isws)			**118,655**	**39,041**

Surface water storage decreases	Accuracy	Notes	2020–21	2019–20
Carcoar Dam	-	-	-	-
Evaporation	B	12	1,625	1,266
Storage Releases	A	16	4,989	4,086
River	-	-	-	-
Evaporation	C	13	1,439	955
Flow Leaving	A	18	87,705	22,831
Basic Rights Extractions	C	20	70	70
Extractions from River	A	19	7,219	2,732
Total surface water storage decreases (Dsws)			**103,047**	31,940
Unaccounted volume—balancing item (Usws)	D	24	**9,095**	**8,385**

Net surface water storage changes	2020–21	2019–20
Net surface water storage inflow (Isws – Dsws – Usws)	**6,513**	**(1,284)**

Belubula catchment—Changes in water assets and liabilities

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

2. Changes in allocation accounts

Allocation account increases	Accuracy	Notes	2020–21	2019–20
Available Water Determinations	-	-	-	-
Domestic and Stock	A1	2	170	170
Domestic and Stock (Domestic)	A1	2	6	8
Domestic and Stock (Stock)	A1	2	44	44
General Security	A1	2	0	0
High Security	A1	2	1,095	1,095
Supplementary Demand	A	21	3,125	3,125
Internal Trade - Buyers	A1	4	1,318	3,161
Uncontrolled Flow	-	-	2,541	338
Total Allocation Account Increases (Iaa)	-	-	**8,298**	7,941

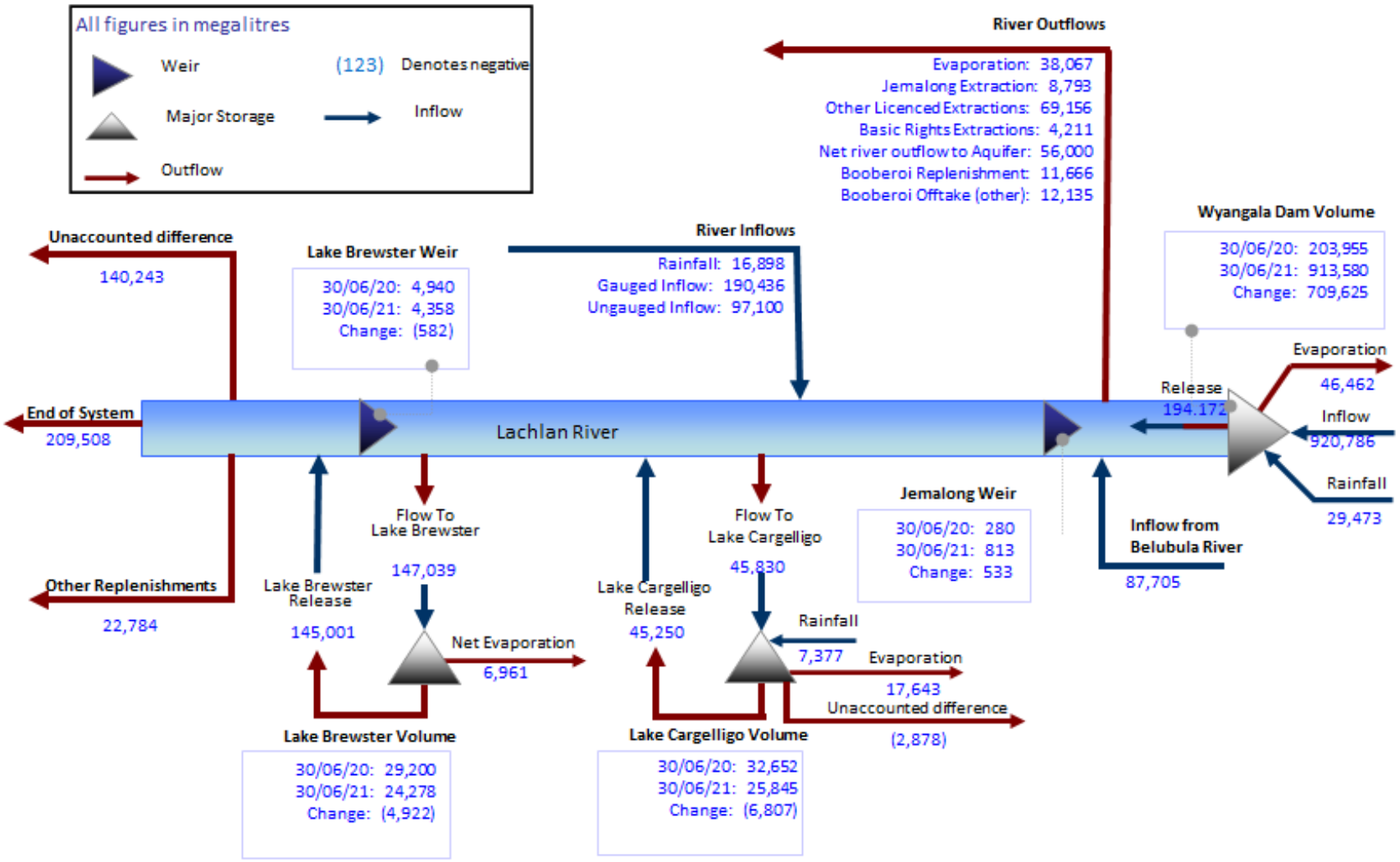
Allocation account decreases	Accuracy	Notes	2020–21	2019–20
Account forfeiture	-	-	-	-
Domestic and Stock	A1	1	154	158
Domestic and Stock (Domestic)	A1	1	6	6
Domestic and Stock (Stock)	A1	1	44	41
General Security	A1	1	0	53
High Security	A1	1	0	0
Account usage	-	-	-	-
Domestic and Stock	A	3	17	12
Domestic and Stock (Domestic)	A	3	0	0
Domestic and Stock (Stock)	A	3	0	1
General Security	A	3	1,405	2,482
High Security	A	3	132	237
Supplementary	A	3	3,125	3,125
Uncontrolled Flow Take	-	-	2,541	338
Adjusting account entry—decrease	-	-	0	0
Internal trade—sellers	A1	4	1,318	3,161
Total allocation account decreases (Daa)	-	-	**8,740**	9,614

Net change in allocation accounts	Accuracy	Notes	2020–21	2019–20
Net allocation account balance increase (Iaa – Daa)	-	-	**(442)**	**(1,673)**

3. Overall changes

Surface water assets	2020–21	2019–20
Change in net surface water assets (Isws – Dsws – Usws – Iaa + Daa)	**6,955**	389

Lachlan 2020-21 physical flows mass balance diagram



Lachlan catchment—Statement of water assets and 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
Wyangala Dam	A	8	916,045	203,955
Lake Cargelligo	A	8	25,845	32,652
Lake Brewster	A	8	24,278	29,200
Lake Brewster Weir	A	8	4,358	4,940
Jemalong Weir	A	8	813	280
River	B	9	25,992	14,814
Total surface water storage (Asws)	-	-	**994,866**	**285,841**
Change in surface water storage	-	-	***709,025***	***(83,830)***

Surface water liabilities

2. Allocation account balance	Accuracy	Notes	30 June 2021	30 June 2020
Domestic and Stock	A1	1	0	(8)
High Security (HS)	A1	1	0	(26)
General Security	A1	1	422,471	99,323
Regulated River (Conveyance)	A1	1	0	107
Total allocation account balance (Lsws)	**-**	**-**	**422,471**	**99,396**
Change in allocation account balance	-	-	***323,075***	***(55,628)***

Surface water net changes

3. Net change	30 June 2021	30 June 2020
Net surface water assets (Asws – Lsws)	**572,395**	**186,445**
Change in net surface water assets	***385,950***	***(28,202)***

Lachlan catchment—Changes in water assets and liabilities

For the year ended 30 June 2021 (1 of 2)

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

Surface water storage increases	Accuracy	Notes	2020-2021	2019-2020
Wyangala Dam	-	-	-	-
Inflow	A	10	920,786	141,862
Rainfall	B	12	29,473	7,100
Lake Cargelligo	-	-	-	-
Inflow	A	11	45,830	63,856
Rainfall	B	12	7,377	3,983
Lake Brewster	-	-	-	-
Inflow	A	11	147,039	56,586
River	-	-	-	-
Rainfall	C	13	16,898	11,396
Inflow from storage releases	A	16	384,422	289,564
Tributary inflow	-	-	-	-
Belubula inflow	A	14	87,705	22,831
Gauged tributaries	A	14	190,436	37,072
Ungauged runoff estimate	C	15	97,100	35,600
Total surface water storage increases (Isws)	-	-	**1,927,067**	**669,850**

Surface water storage decreases	Accuracy	Notes	2020-2021	2019-2020
Wyangala Dam	-	-	-	-
Storage releases	A	16	194,275	246,179
Evaporation	B	12	46,462	20,692
Lake Cargelligo	-	-	-	-
Storage releases	A	16	45,250	35,273
Evaporation	B	12	17,643	16,983
Lake Brewster	-	-	-	-
Storage releases	A	16	145,001	8,112
Net evaporation	B	12	6,961	20,760
River	-	-	-	-
Evaporation	C	13	38,067	45,058
Flows leaving	-	-	-	-
End of system	A	18,22	209,508	12,413
Booberoi offtake (other)	A	18	12,135	5,903
Booberoi replenishment	A	18,22	11,666	5,533
Other flow leaving	A	18	22,784	34,024
Regulated effluent	-	-	-	-
To Brewster	A	11	147,039	56,586
To Cargelligo	A	11	45,830	63,856
Net river outflow to aquifer	D	23	56,158	41,541
Extractions	-	-	-	-
Basic rights extractions	A	20	4,211	4,211
Licensed extractions from river	A	19	77,949	67,290
Account balance adjustment	-	-	-	-
Account balance adjustment Lake Brewster	-	-	0	0
Total surface water storage decreases (Dsws)	-	-	**1,080,677**	**684,414**
Unaccounted volume (balancing item) (Usws)	D	24	**137,365**	**69,268**

Net surface water storage changes	2020-2021	2019-2020
Net surface water storage inflow (Isws – Dsws – Usws)	**709,025**	**(83,832)**

Lachlan catchment—Changes in water assets and liabilities

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

2. Changes in allocation accounts

Allocation account increases	Accuracy	Notes	2020-2021	2019-2020
Available water determinations	-	-	-	-
Domestic and Stock	A1	2	12,729	12,755
General Security	A1	2	414,790	0
High Security	A1	2	27,680	24,083
Local Water Utility	A1	2	15,545	15,545
Conveyance	A1	2	17,911	6,960
Internal Trade - Buyers	A1	4	178,146	80,380
Environmental Contingency Allowance Increase	A1	7	20,000	0
Water Quality Allowance Increase	A1	7	20,000	20,000
Total allocation account increases (Iaa)	-	-	**706,801**	**159,723**

Allocation account decreases	Accuracy	Notes	2020-2021	2019-2020
Allocation account usage	-	-	-	-
Domestic and Stock	A	3	4,541	4,699
General Security	A	3	69,362	32,536
High Security	A	3	59,164	46,515
Local Water Utility	A	3	4,304	7,572
Conveyance	A	3	7,037	6,853
Environmental contingency allowance usage	A1	7	13,243	0
Water quality allowance usage	A1	7	6,319	1,329
Account forfeiture	-	-	-	-
Domestic and Stock	A1	1	8,180	8,024
General Security	A1	1	287	75
High Security	A1	1	1,627	700
Local Water Utility	A1	1	10,971	7,973
Conveyance	A1	1	0	0
Environmental contingency allowance	A1	7	6,757	0
Water quality allowance	A1	7	13,681	18,671
Storage spill forfeit	A1	5	0	0
Licences cancelled	-	-	0	
Domestic and Stock	A1	1	0	20
Domestic and Stock (Domestic)	A1	1	0	6
General Security	A1	1	0	0
Internal trade—sellers	A1	4	178,146	80,380
Account balance adjustment	A1	25	107	0
Total allocation account decreases (Daa)	-	-	**383,727**	**215,351**

Net change in allocation accounts	2020-2021	2019-2020
Net allocation account balance increase (Iaa-Daa)	**323,075**	**(55,628)**

3. Overall changes

Surface water assets	2020-2021	2019-2020
Change in net surface water assets (Isws – Dsws – Usws – Iaa + Daa)	***385,950***	***(28,203)***

Note disclosures

Reconciliation and future prospect descriptions

This section contains reconciliation and future prospect descriptions for the Belubula and Lachlan regulated water sources. In all tables **(..)** denotes a negative value.

Belubula catchment: Reconciliation of change in net water asset to net change in physical water storage	**2020–21 (ML)**	2019–20 (ML)
Change in net surface water assets	**6,955**	390
Non-physical adjustments		
Net change in allocation accounts	**(442)**	(1,674)
Net change in physical surface water storage	**6,513**	(1,284)

Belubula catchment: Reconciliation of closing water storage to total surface water assets	**2020–21 (ML)**	2019–20 (ML)
Closing water storage		
Surface water storage	**13,003**	6,490
Adjustments for non-physical assets	**0**	0
Total surface water assets	**13,003**	6,490

Lachlan catchment: Reconciliation of change in net water asset to net change in physical water storage	**2020—21 (ML)**	2019–20 (ML)
Change in net surface water assets	**385,950**	(28,202)
Non-physical adjustments		
Net change in allocation accounts	**323,075**	(55,628)
Net change in claims to water: EWA		0
Net change in physical surface water storage	**709,025**	(83,830)

Lachlan catchment: Reconciliation of closing water storage to total surface water assets	**2020–21 (ML)**	2019–20 (ML)
Closing water storage		
Surface water storage	**994,866**	285,841
Adjustments for non-physical assets	**0**	0
Total surface water assets	**994,866**	285,841

Note: All figures can be derived from or found directly in the Water Accounting Statements of the General Purpose Water Accounting Report.

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

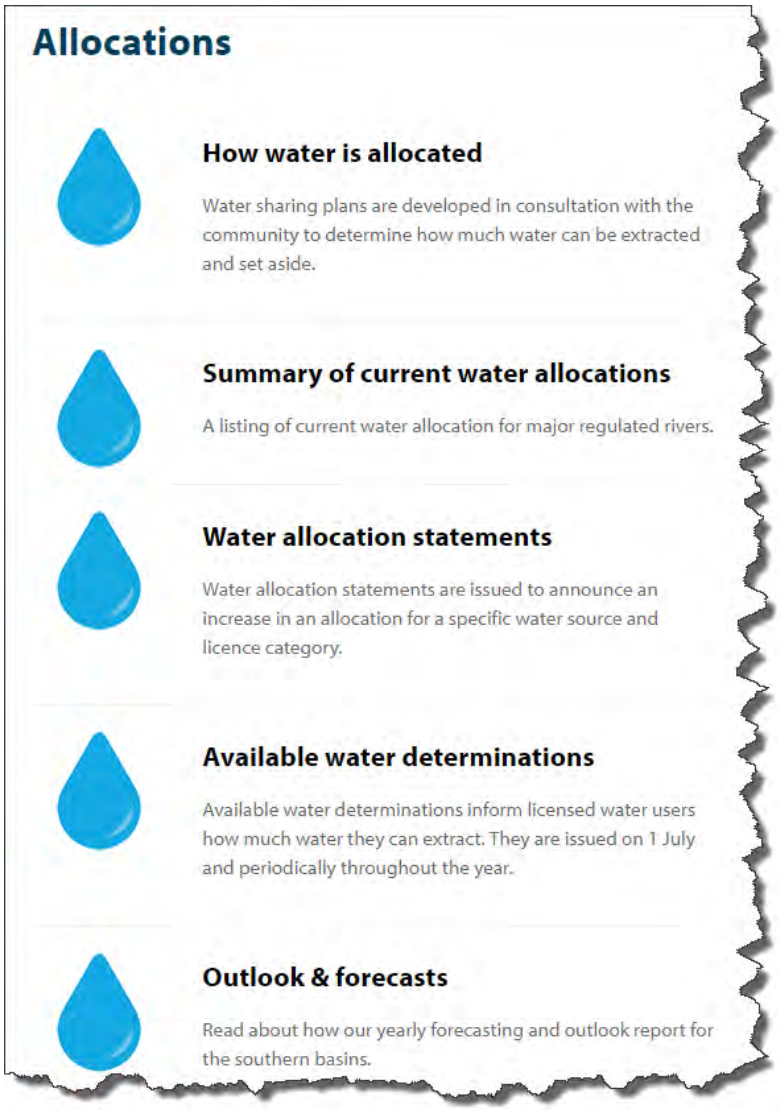
Final datasets for reporting in the GPWAR, including meter readings by field staff were not available in time to produce an informative 12-month forecast for report users.

In lieu of this, the links below give the latest water availability information for the Lachlan and Belubula water sources. This includes carryovers and available water determinations at the time of reporting, along with probability information about the Lachlan and Belubula systems' reliability.

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.



Latest storage volumes

See real-time information on storage volumes at realtimedata.waternsw.com.au

Significant events since the reporting period

The Lachlan and Belubula catchments have experienced storage increases since the close of the reporting period. At the time of writing (April 2022), Wyangala was at 93% of full supply capacity (rising trend) and Carcoar was at 98% of full supply capacity (rising trend).

No temporary water restrictions were enforced within the Lachlan and Belubula Regulated River water sources since the reporting period.

System reliability/long-term water availability

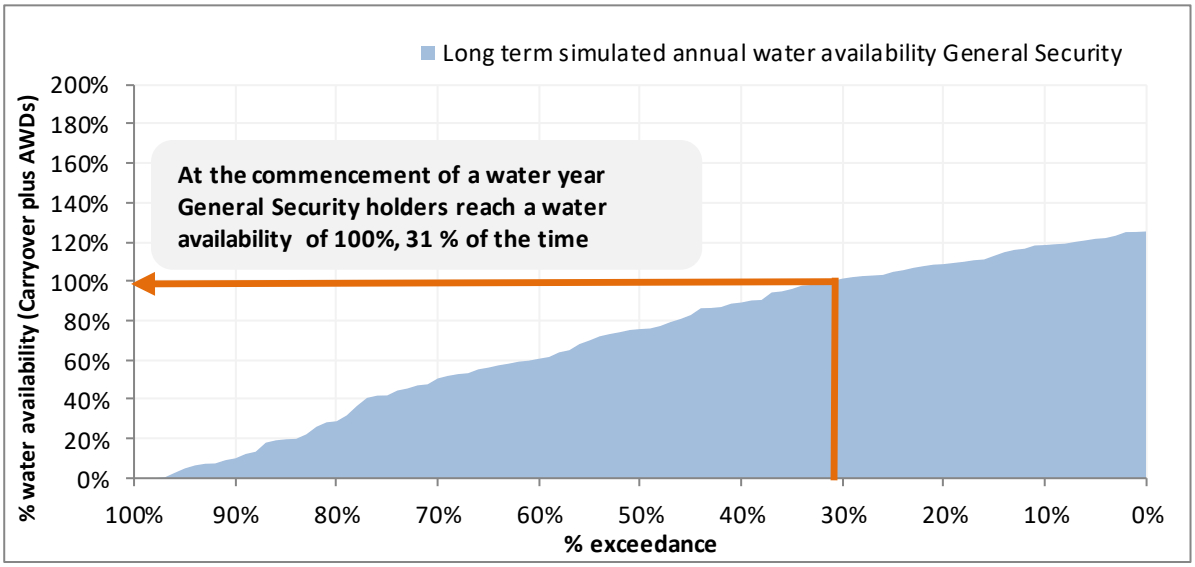
Long term planning models simulated rules and management under the water sharing plans and can provide indicative system reliability information for the commencement and closure of a watering season[18]. Using this information as an outlook assumes rules, infrastructure and user behaviour remain constant and that the future climate will be representative of the historic climate.

In any given year, the latest simulation indicates high security entitlements are likely to a have full allocation at 100% of the time for both Lachlan and Belubula water sources.

At the commencement of a water year, over the long-term, the Lachlan General Security licence holders equal or exceed 100% of their entitlement 31% of the time (Figure 48). For the Belubula water source, the simulation indicates that the General Security licence holders will fail to reach 100% availability at the beginning of the year, but equal or exceed 66% of entitlement 50% of the time (Figure 49).

Availabilities increase throughout the water year as storages are supplemented from new inflow. By the end of the water year, simulation results indicate a water availability of 100% of entitlement or greater, 61% of the time in the Lachlan (Figure 50) and 83% of entitlement or greater, 50% of the time in the Belubula (Figure 51).

Figure 48: Lachlan start of water year simulated availability for General Security access licences



[18] 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. Modelled data simulated as July to June water year. Simulation period 1 June 1892 to 30 June 2017

Figure 49: Belubula start of water year simulated availability for General Security access licences

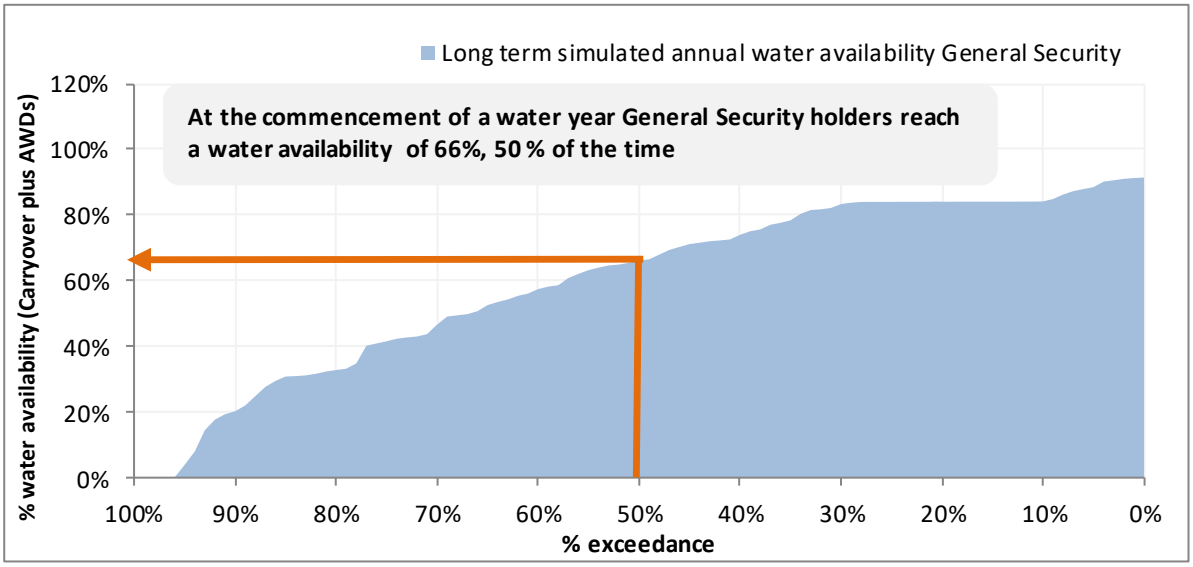


Figure 50: Lachlan end of water year simulated availability for General Security access licences

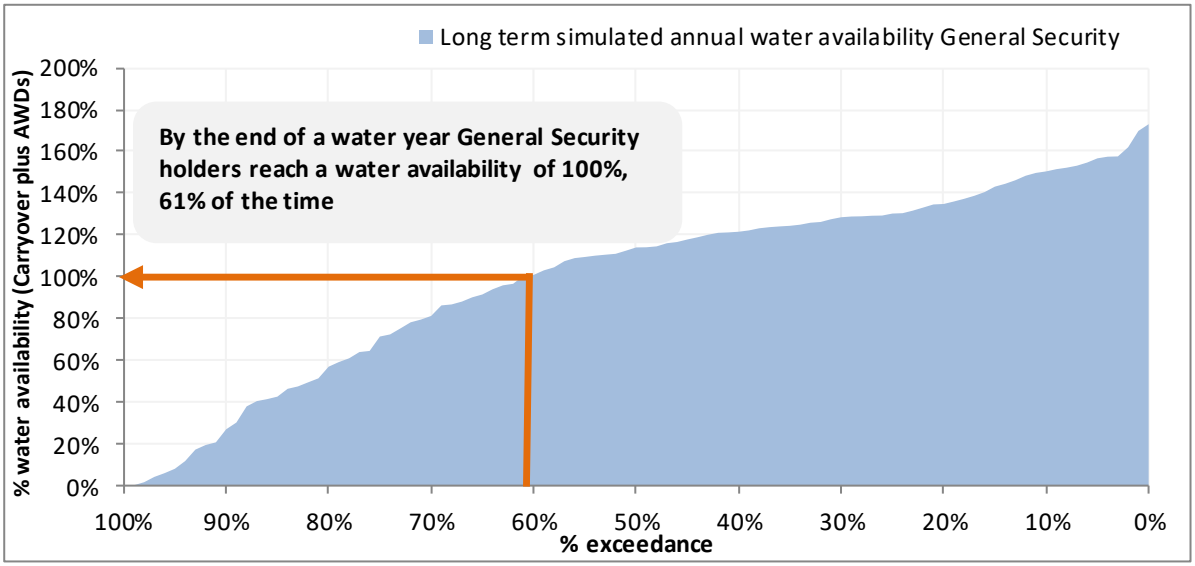


Figure 51: Belubula end of water year simulated availability for General Security access licences

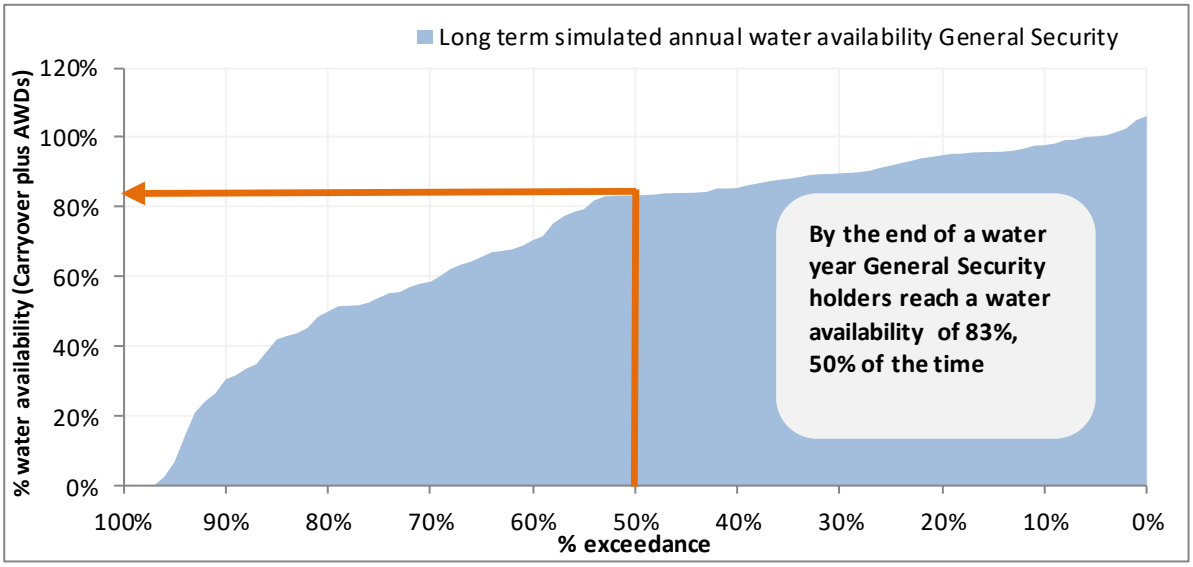


Table 9: Lachlan carryovers and available water determinations since reporting period close (as of April 2022)[19]

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-21	Opening	10,954	-	-	0.0%	0.0%	0	0	0	0.0%	0.0%
1-Jul-21	AWD 100.0%	10,954	10,954	10,954	100.0%	100.0%	10,954	0	10,954	100.0%	100.0%
Domestic and stock (domestic)											
1-Jul-21	Opening	176	-	-	0.0%	0.0%	0	0	0	0.0%	0.0%
1-Jul-20	AWD 100.0%	176	176	176	100.0%	100.0%	176	0	176	100.0%	100.0%
Domestic and stock (stock)											
1-Jul-21	Opening	1,599	-	-	0.00%	0.00%	0	0	0	0.00%	0.00%
1-Jul-21	AWD 100.0%	1,599	1,599	1,599	100.00%	100.00%	1,599	0	1,599	100.00%	100.00%
Local water utility											
1-Jul-21	Opening	15,545	-	-	0.00%	0.00%	0	0	0	0.00%	0.00%
1-Jul-21	AWD 100.0%	15,545	15,545	15,545	100.00%	100.00%	15,545	0	15,545	100.00%	100.00%
Regulated river (conveyance)											
1-Jul-21	Opening	17,911	-	-	0.00%	0.00%	0	0	0	0.00%	0.00%
1-Jul-21	AWD 1.0 ML per Share	17,911	17,911	17,911	100.00%	100.00%	17,911	0	17,911	100.00%	100.00%
27-Sep-21	Storage Spill	17,911	(17,116)	0	0.00%	0.00%	0	0	0	0.00%	0.00%
28-Sep-21	AWD 1.0 ML per Share	17,911	17,911	17,911	100.00%	100.00%	17,911	0	17,911	100.00%	100.00%
23-Mar-22	Storage Spill	17,911	(6,894)	0	0.00%	0.00%	0	0	0	0.00%	0.00%
24-Mar-22	AWD 1.0 ML per Share	17,911	17,911	17,911	100.00%	100.00%	17,911	0	17,911	100.00%	100.00%

[19] Available water determinations for the reporting period are provided in note 2 of the GPWAR

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 (%)
General Security											
1-Jul-21	Opening	592,801	-	-	0.00%	0.00%	402,774	19,759	422,530	67.90%	71.30%
1-Jul-21	AWD 0.0 ML per Share	592,801	0	0	0.00%	0.00%	402,774	19,759	422,530	67.90%	71.30%
8-Jul-21	AWD 0.11 ML per Share	592,801	64,853	64,853	10.90%	10.90%	450,005	37,381	487,383	75.90%	82.20%
9-Aug-21	AWD 0.36 ML per Share	592,801	210,833	275,686	35.60%	46.50%	556,238	141,980	698,217	93.80%	117.80%
8-Sep-21	AWD 0.01 ML per Share	592,801	5,878	281,564	1.00%	47.50%	558,134	145,962	704,094	94.20%	118.80%
22-Sep-21	Storage Spill	592,801	(622,037)	0	(104.90)%	0.00%	64	18	82	0.00%	0.00%
23-Sep-21	AWD 1.15 ML per Share	592,801	681,725	681,725	115.00%	115.00%	510,802	171,005	681,807	86.20%	115.00%
8-Nov-21	AWD 0.01 ML per Share	592,801	5,922	687,647	1.00%	116.00%	510,837	176,892	687,729	86.20%	116.00%
18-Jan-22	AWD 0.03 ML per Share	592,801	17,784	705,431	3.00%	119.00%	511,058	194,455	705,513	86.20%	119.00%
8-Feb-22	AWD 0.06 ML per Share	592,801	35,570	741,001	6.00%	125.00%	511,179	229,904	741,083	86.20%	125.00%
8-Mar-22	AWD 0.03 ML per Share	592,801	17,777	758,778	3.00%	128.00%	511,241	247,619	758,860	86.20%	128.00%
23-Mar-22	Storage Spill	592,801	(669,344)	0	(112.90)%	0.00%	64	18	82	0.00%	0.00%
24-Mar-22	AWD 1.21 ML per Share	592,801	717,290	717,290	121.00%	121.00%	421,822	295,550	717,372	71.20%	121.00%
High Security											
1-Jul-21	Opening	27,680	-	-	0.00%	0.00%	0	0	0	0.00%	0.00%
1-Jul-21	AWD 1.0 ML per Share	27,680	27,680	27,680	100.00%	100.00%	27,680	0	27,680	100.00%	100.00%

Table 10: Belubula carryovers and available water determinations since reporting period close (as of November 2020)

Date	Individual Announcement	Share Component	Allocation Volume (ML)	Cumulative Volume (ML)	Allocation Volume (%)	Cumulative Volume (%)	Balance Available (ML)	Balance Not Available (ML)	Balance Total (ML)	Balance Available (%)	Balance Total (%)
Domestic and stock											
1-Jul-21	Opening	170	-	-	0.00%	0.00%	0	0	0	0.00%	0.00%
1-Jul-21	AWD 100.0 %	170	170	170	100.00%	100.00%	170	0	170	100.00%	100.00%
Domestic and stock (domestic)											
1-Jul-21	Opening	6	-	-	0.00%	0.00%	0	0	0	0.00%	0.00%
1-Jul-21	AWD 100.0 %	6	6	6	100.00%	100.00%	6	0	6	100.00%	100.00%
Domestic and stock (stock)											
1-Jul-21	Opening	44	-	-	0.00%	0.00%	0	0	0	0.00%	0.00%
1-Jul-21	AWD 100.0 %	44	44	44	100.00%	100.00%	44	0	44	100.00%	100.00%
General security											
1-Jul-21	Opening	22,454	-	-	0.00%	0.00%	6,001	102	6,103	26.70%	27.20%
1-Jul-21	AWD 0.0 ML per Share	22,454	0	0	0.00%	0.00%	6,001	102	6,103	26.70%	27.20%
27-Aug-21	AWD 0.12 ML per Share	22,454	2,672	2,672	11.90%	11.90%	8,633	142	8,774	38.40%	39.10%
10-Dec-21	AWD 0.64 ML per Share	22,454	13,390	16,062	59.60%	71.50%	20,544	1,621	22,165	91.50%	98.70%
29-Mar-22	AWD 0.07 ML per Share	22,454	1,260	17,322	5.60%	77.10%	21,453	1,972	23,425	95.50%	104.30%
High security											
1-Jul-21	Opening	1,095	-	-	0.00%	0.00%	0	0	0	0.00%	0.00%
1-Jul-21	AWD 1.0 ML per Share	1,095	1,095	1,095	100.00%	100.00%	1,095	0	1,095	100.00%	100.00%
Supplementary water											
1-Jul-21	Opening	3,125	-	-	0.00%	0.00%	0	0	0	0.00%	0.00%
1-Jul-21	AWD 1.0 ML per Share	3,125	3,125	3,125	100.00%	100.00%	3,125	0	3,125	100.00%	100.00%

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 Act 1912

Water Sharing Plan for the Lachlan Regulated River Water Source 2016

Water Sharing Plan for the Belubula Regulated River Water Source 2012

Available on the department's website at https://www.industry.nsw.gov.au/water

Data accuracy

A1—Nil inaccuracy +/- 0%

Providing agency

NSW Department of Planning and Environment

Data source

Water Accounting System (WaterNSW)

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:

- AWD (detailed in Note 2)
- licensed account usage (see Note 3)
- forfeiture due to:
    - carryover rules
    - account spillage as a result of AWD

    - licence conversions
- licence conversion
- trade of allocation water between accounts (detailed in Note 4).

Additional information

Table 12 and Table 13 provide a balanced summary of the water allocation accounts for each category of access licence for the Lachlan and Belubula respectively. Table 11 provides a description of each of the table components.

Table 11: 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		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 either issuing new access licences or increasing the volume of licensed account water.
	Cancel	Decrease in account water as a result of licence cancellation or decrease in the volume of licensed account water.
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
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 under controlled river conditions and is accountable against the licence.
Uncontrolled Flow Usage		Volume of water that is taken under high flow conditions that is not accountable against a licence. This differs from supplementary water in that it becomes accountable once specific allocation levels are exceeded.
Forfeits	**Storage spill**	When Wyangala Dam spills general security accounts forfeit all remaining water in the general security accounts. The accounts are then reset via an AWD to a level as defined in the water sharing plan. Under operational rule for Carcoar Dam under the *Water Act 1912* a spill of the storage will result in the spill volume reducing the volume of carryover until it is all forfeited.
	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.
End of year balance	**Available**	Account balance that is available to be taken at the conclusion of the water year.
	Non available	That part of the remaining account balance that is not available to be taken at the conclusion of the water year. This is water in accounts that is in excess of the annual take limit.
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.
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.

Table 12: Allocation account balance summary for the reporting period—Lachlan regulated river

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	Cancel	New	Cancel	In	Out			Available	Not Available		
Domestic and Stock	10,954	(8)	10,954	0	0	0	0	0	0	4,396	0	6,550	0	6,550	0
Domestic and Stock [Domestic]	176	0	176	0	0	0	0	0	0	2	0	174	0	174	0
Domestic and Stock [Stock]	1,599	(0)	1,599	0	0	0	0	0	0	142	0	1,457	0	1,457	0
Local Water Utility	15,545	0	15,545	0	0	0	0	0	270	4,304	0	10,971	0	10,971	0
Regulated River (Conveyance)	17,911	0	17,911	0	0	0	0	0	10,874	7,037	0	0	0	0	0
General Security	592,801	99,323	414,790	0	0	0	0	107,265	129,258	69,362	287	415,393	7,077	0	422,471
High Security	27,680	(26)	27,680	0	0	0	0	70,882	37,744	59,164	0	1,627	0	1,627	0

Table 13: Allocation account balance summary for the reporting period—Belubula regulated river

Category	Share 30 June 2021	Opening balance	AWD	Licences		Drought suspension		Assignments		Account usage	UCF[20]	During year forfeit	End of year balance		End of year forfeit	Carry forward
				New	Cancel	In	Out	In	Out				Available	Not Available		
Domestic and Stock	170	0	170	0	0	0	0	0	0	17	0	0	154	0	154	0
Domestic and Stock [Domestic]	6	0	6	0	0	0	0	0	0	0	0	0	6	0	6	0
Domestic and Stock [Stock]	44	0	44	0	0	0	0	0	0	0	0	0	44	0	44	0
General Security	22,454	6,545	0	0	0	0	0	1,318	355	1,405	2,541	0	6,001	102	0	6,103
High Security	1,095	0	1,095	0	0	0	0	0	963	132	0	0	0	0	0	0
Supplementary Water	3,125	0	3,125	0	0	0	0	0	0	0	3,125	0	0	0	0	0

[20] Uncontrolled flow usage

Note 2—Available water determination (allocation announcement)

This is the process by which the regulated surface water asset available for use within the regulated system is determined and shared. It determines 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 (AWD).

Additional AWD for the Lachlan River are also permitted in the event of a storage spill when general security accounts are reset. For addition details see Note 5.

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 Lachlan Regulated River Water Source 2016.

- Part 7—Limits to the availability of water
    - Division 2—Available Water Determinations.

Water Sharing Plan for the Belubula Regulated River Water Source 2012.

- Part 7—Limits to the availability of water
    - Division 2—Available Water Determinations.

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

Data accuracy

A1—Nil inaccuracy +/- 0%

Providing agency

NSW Department of Planning and Environment.

Data source

Water Accounting System (WaterNSW)

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

Methodology

The AWD procedure itself is generally divided into 2 sections: the available water asset, and system commitments. Once system commitments have been met the available water asset is then available for distribution to the access licence categories in order of priority (Table 14). The volume of the announced allocation is expressed as either a volume per share or as a percentage of the share component of the licence.

Table 14: Priority of access licence categories

Licence category	AWD priority
General Security	Low
High Security	High
Conveyance	Low
Domestic and Stock[21]	Very High
Local Water Utility	Very High

Available water asset 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 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 such as town water supplies, stock and domestic requirements, industrial use and permanent plantings (e.g. orchards, vineyards) and environmental allowances
- undelivered account water–water that is already in accounts that is yet to be provided
- end of system flow requirement, which is an estimate of the flow 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.

Additional information

Table 16 and Table 17 provide allocation summary reports for the reporting period, for the Lachlan and Belubula respectively. Table 15 provides notes to help interpret these reports.

[21] Domestic and Stock is further broken down into 3 sub-categories: 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 15: Allocation summary report notes

Heading	Description
Opening	Remaining allocation account balances at the conclusion of the previous season that is allowed to be carried forward to this season.
AWD announced	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 volume	Volume of water credited to accounts within a licence category as a result of the announcement made.
Cumulative volume	Cumulative total of the announced volumes for the water year and licence category.
Allocation % entitlement	This is the announced volume expressed as a percentage of the entitlement applicable on the particular date.
Allocation cumulative %	This is the cumulative volume expressed as a percentage of the entitlement applicable on the particular date.
Balance available	Sum of water available in allocation accounts that has been made available to be taken during the season.
Balance not available	Water allocated that is not accessible at this point in time.
Balance total	Sum of the total volume of account water in accounts.
Balance available %	Balance available expressed as a percentage of the entitlement.
Balance total %	Balance total expressed as a percentage of the entitlement

Table 16: Allocation announcements for the reporting period—Lachlan regulated river water source

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	10,954	-	-	0.0%	0.0%	(8)	0	(8)	(0.1%)	(0.1%)
1-Jul-20	AWD 100.0 %	10,954	10,954	10,954	100.0%	100.0%	10,946	0	10,946	99.9%	99.9%
Domestic and stock (domestic)											
1-Jul-20	Opening	176	-	-	0.0%	0.0%	0	0	0	0.0%	0.0%
1-Jul-20	AWD 100.0 %	176	176	176	100.0%	100.0%	176	0	176	100.0%	100.0%
Domestic and stock (stock)											
1-Jul-20	Opening	1,599	-	-	0.0%	0.0%	0	0	0	0.0%	0.0%
1-Jul-20	AWD 100.0 %	1,599	1,599	1,599	100.0%	100.0%	1,599	0	1,599	100.0%	100.0%
Local water utility											
1-Jul-20	Opening	15,545	-	-	0.0%	0.0%	0	0	0	0.0%	0.0%
1-Jul-20	AWD 100.0 %	15,545	15,545	15,545	100.0%	100.0%	15,545	0	15,545	100.0%	100.0%
Regulated river (conveyance)											
1-Jul-20	Opening	17,911	-	-	0.0%	0.00%	0	0	0	0.0%	0.0%
1-Jul-20	AWD 0.1658 ML per Share	17,911	2,970	2,970	16.6%	16.60%	2,970	0	2,970	16.6%	16.6%
10-Aug-20	AWD 0.191 ML per Share	17,911	3,421	6,391	19.1%	35.70%	6,391	0	6,391	35.7%	35.7%
4-Sep-20	AWD 0.4763 ML per Share	17,911	8,531	14,922	47.6%	83.30%	14,922	0	14,922	83.3%	83.3%
7-Oct-20	AWD 0.0167 ML per Share	17,911	299	15,221	1.7%	85.00%	15,221	0	15,221	85.0%	85.0%
9-Nov-20	AWD 0.025 ML per Share	17,911	448	15,669	2.5%	87.50%	15,669	0	15,669	87.5%	87.5%
8-Mar-21	AWD 0.025 ML per Share	17,911	448	16,116	2.5%	90.00%	16,116	0	16,116	90.0%	90.0%
12-Apr-21	AWD 0.0835 ML per Share	17,911	1,496	17,612	8.4%	98.30%	17,612	0	17,612	98.3%	98.3%
10-Jun-21	AWD 0.0167 ML per Share	17,911	299	17,911	1.7%	100.00%	17,911	0	17,911	100.0%	100.0%
General security											
1-Jul-20	Opening	592,801	-	-	0.0%	0.0%	27,887	71,436	99,323	4.7%	16.8%
1-Jul-20	AWD 0.0 ML per Share	592,801	0	0	0.0%	0.0%	27,887	71,436	99,323	4.7%	16.8%

Date	Individual Announcement	Share Component	Allocation Volume (ML)	Cumulative Volume (ML)	Allocation Volume (%)	Cumulative Volume (%)	Balance Available (ML)	Balance Not Available (ML)	Balance Total (ML)	Balance Available (%)	Balance Total (%)
1-Jul-20	Drought Suspension 100.0% of balance available	592,801	0	0	0.0%	0.0%	0	99,323	99,323	0.0%	16.8%
2-Jul-20	Drought Suspension Re-credit Misc	592,801	0	0	0.0%	0.0%	13,685	85,638	99,323	2.3%	16.8%
10-Aug-20	Drought Suspension Re-credit 100.0%	592,801	0	0	0.0%	0.0%	99,058	265	99,323	16.7%	16.8%
4-Sep-20	AWD 0.28 ML per Share	592,801	165,962	165,962	28.0%	28.0%	264,128	1,157	265,285	44.6%	44.8%
7-Oct-20	AWD 0.04 ML per Share	592,801	23,707	189,669	4.0%	32.0%	287,638	1,354	288,992	48.5%	48.8%
9-Nov-20	AWD 0.06 ML per Share	592,801	35,572	225,241	6.0%	38.0%	322,904	1,660	324,564	54.5%	54.8%
8-Mar-21	AWD 0.06 ML per Share	592,801	35,564	260,805	6.0%	44.0%	358,104	2,023	360,127	60.4%	60.8%
12-Apr-21	AWD 0.2 ML per Share	592,801	118,502	379,307	20.0%	64.0%	473,597	5,032	478,629	79.9%	80.7%
10-May-21	AWD 0.04 ML per Share	592,801	23,687	402,994	4.0%	68.0%	495,917	6,399	502,316	83.7%	84.7%
High security											
1-Jul-20	Opening	27,680	-	-	0.0%	0.0%	(26)	0	(26)	(0.1%)	(0.1%)
1-Jul-20	AWD 0.7 ML per Share	27,680	19,376	19,376	70.0%	70.0%	19,350	0	19,350	69.9%	69.9%
10-Aug-20	AWD 0.3 ML per Share	27,680	8,304	27,680	30.0%	100.0%	27,654	0	27,654	99.9%	99.9%

Table 17: Allocation announcements for the reporting period—Belubula regulated river

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	170	-	-	0.0%	0.0%	0	0	0	0.0%	0.0%
1-Jul-20	AWD 100.0 %	170	170	170	100.0%	100.0%	170	0	170	100.0%	100.0%
Domestic and stock (domestic)											
1-Jul-20	Opening	6	-	-	0.0%	0.0%	0	0	0	0.0%	0.00%
1-Jul-20	AWD 100.0 %	6	6	6	100.0%	100.0%	6	0	6	100.0%	100.0%
Domestic and stock (stock)											
1-Jul-20	Opening	44	-	-	0.0%	0.0%	0	0	0	0.0%	0.0%
1-Jul-20	AWD 100.0 %	44	44	44	100.0%	100.0%	44	0	44	100.0%	100.0%
General security											
1-Jul-20	Opening	22,454	-	-	0.0%	0.0%	6,443	102	6,545	28.7%	29.1%
1-Jul-20	AWD 0.0 ML per Share	22,454	0	0	0.0%	0.0%	6,443	102	6,545	28.7%	29.1%
High security											
1-Jul-20	Opening	1,095	-	-	0.0%	0.0%	0	0	0	0.0%	0.0%
1-Jul-20	AWD 1.0 ML per Share	1,095	1,095	1,095	100.0%	100.0%	1,095	0	1,095	100.0%	100.0%
Supplementary water											
1-Jul-19	Opening	3,125	-	-	0.0%	0.0%	0	0	0	0.0%	0.0%
1-Jul-19	AWD 1.0 ML per Share	3,125	3,125	3,125	100.0%	100.0%	3,125	0	3,125	100.0%	100.0%

Note 3—Allocation account usage

This is the volume of water that is extracted, diverted or measured as usage under controlled river conditions and is accountable against an access licence.

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

Water Accounting System (WaterNSW)

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. However, with 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. The methods are based on:

- periods of announcement—during periods of supplementary water announcements extractions can be debited against the supplementary water licences (note there are no supplementary licences in the Lachlan)
- usage is 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. The prioritising is based on the nature of and rules around each of the licence categories. Table 18 provides the order in which extractions are apportioned to access licence categories. In the table following licensed extractions are apportioned in order of priority starting at priority 1. This is a generic list where not all categories will necessarily appear in this GPWAR. There are also various sub-categories of licence associated with some of the categories.

Table 18: 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

Additional Information

Table 19 provides a summary of usage for both the Lachlan and Belubula catchments broken up into licence categories for the reporting period

Table 19: Allocation account usage

Account usage	Lachlan	Belubula
Domestic and Stock	4,396	17
Domestic and Stock [Domestic]	2	0
Domestic and Stock [Stock]	142	0
Local Water Utility	4,304	N/A
Regulated River (Conveyance)	7,037	N/A
Regulated River (General Security)	69,362	1,405
Regulated River (High Security)	59,164	132
Supplementary Water	N/A	3,125
Total account usage	**144,408**	**4,678**

Note 4—Internal trading (allocation assignments)

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

Data type

Administration

Policy

Water Sharing Plan for the Lachlan Regulated River Water Source 2016

- Part 10 Access licence dealing rules
    - Clause 61 assignments of water allocations dealings

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

Water Sharing Plan for the Belubula Regulated River Water Source 2012

- Part 10 Access licence dealing rules
    - Clause 53 assignment of water allocations dealings

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

Data accuracy

A1—Nil inaccuracy +/- 0%

Providing agency

NSW Department of Planning and Environment

Data source

Water Accounting System (WaterNSW)

Methodology

Trading data is extracted from the Water Accounting System.

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. There are also limits in place on the amount of water that can be interchanged upstream and downstream of Cargelligo Weir. Trading is not permitted between the Lachlan and Belubula water sources.

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 20 and Table 21 provide the internal trading figures between licence categories for the Lachlan and Belubula respectively. All figures represent a volume in megalitres.

Table 20: Lachlan regulated river internal trade summary

From	To General security	To High security	Total
General security	68,820.8	60,437.3	**129,258.1**
High security	27,299.7	10,444.3	**37,744.0**
Local Water Utility	270.0		**270.0**
RR conveyance	10,874.0		**10,874.0**
Total	**107,264.5**	**70,881.6**	**178,146.1**

Table 21: Belubula regulated river internal trade summary

From	To General security	Total
General security	355.0	355.0
High security	962.7	962.7
Total	**1,317.7**	**1,317.7**

Note 5—Spill reset and forfeiture

Wyangala Dam

As set out in the water sharing plan this refers to the resetting of the general security allocation accounts to level as defined in the water sharing plan when Wyangala Dam either spills or releases water to maintain airspace and both Lake Brewster and Lake Cargelligo are full. When this occurs all remaining water in the general security accounts is withdrawn and an AWD up to 1.36 megalitres per share (value deemed to be the maximum that general security accounts can hold) is made to reset the accounts.

Carcoar Dam

With the *Water Act 1912*, when Carcoar Dam spills the volume of spill progressively reduces any carryover water until such time as all carryover water is withdrawn from accounts. In 2012–13 the spill and reset volumes applied occurred while operating under the rules of the *Water Act 1912*. There is no spill reset process however set out in the *Water Sharing Plan for the Regulated Belubula River 2012*.

Data type

Administration

Policy

Water Act 1912

Water Sharing Plan for the Lachlan Regulated River Water Source 2016.

- Part 9 Rules for Managing Access Licences
    - Clause 56 Withdrawals from water allocation accounts for regulated river (high security) access licences, regulated river (general security) access licences and regulated river (conveyance) access licences

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

Water Accounting System

Methodology

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

For Carcoar Dam the carryover account is reduced by the volume of spill recorded (only applicable under the Water Act 1912).

Additional information

Total forfeitures and available water determination volumes resulting from spill transactions in the reporting period are provided in Table 22.

Table 22: Storage spill forfeitures and resets

Storage	Spill Forfeiture	Spill AWD Reset
Wyangala Dam	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. Therefore, they are subject to the following key rules:

- available water determinations (AWD) for their share of the entitlement to be added to accounts
- carryover rules—the forfeiting of unused water that cannot be carried over
- provide water orders prior to use.

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

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 Lachlan Regulated River Water Source 2016

Water Sharing Plan for the Belubula Regulated River Water Source 2012

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

Data accuracy

A—Estimated in the range +/- 10%

Providing agency

NSW Department of Planning and Environment

Data source

NSW Department of Planning and Environment Environmental Water Portal (internal system)

Available Water Determination Register—NSW Department of Planning and Environment website at 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 a list of typical transactions that can apply to an environmental allocation account:

- AWD (including pro rata of AWD for new licences)
- licensed extractions
- forfeiture due to:
    - carryover rules
    - account spillage as a result of AWD
    - licence conversions
    - excess orders (where water order debiting is in place)
- licence conversion
- trade of allocation water between accounts.

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

Information on how environmental agencies manage their entitlements can be obtained from:

- www.environment.nsw.gov.au
- www.mdba.gov.au
- www.environment.gov.au

Table 24 provides a summary of held environmental water for the reporting period. Table 23 provides a description of each component presented. Table 25 presents the changes in environmental holdings relative to the previous reporting period. Table 26 provides a summary of temporary trading associated with the environmental water holdings. The trade is presented from the perspective of purpose of use, whereby a trade to a consumptive holder for the delivery of environmental water is considered to be an environmental-to-environmental movement.

Table 23: Explanatory information for environmental account summary

Heading		Description
No. licences		This is the number of environmental licences held.
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		The total annual volume of water added to the allocation account as a result of allocation assessments.
Licences	**New**	Increase in account water as a result of issuing new access licences
	Cancelled	Decrease in account water as a result of licence cancellation
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
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 under controlled river conditions and is accountable against the licence.
Forfeits	**Storage spill reset**	When Wyangala Dam spills general security accounts firstly forfeit carryover based on the volume of the spill until it is all gone and then forfeits all remaining general security accounts and rests them to a level as defined in the water sharing plan.
	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.
End of year balance	**Available**	Account balance that is available to be taken at the conclusion of the water year.
	Not available	Account balance that is currently not available for use (e.g. restricted due to drought conditions or annual use limit restrictions)
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.
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.

Table 24: Lachlan regulated river environmental account summary

Category	Share 30 June 2021	Opening Balance	AWD	Licences		Drought suspension		Assignments		Account Usage	Forfeit	End of Year Balance		End of Year Forfeit	Carry Forward
				New	Cancel	New	Cancel	In	Out		During Year	Available	Not Available		
General Security	124,518	42,387	87,163	0	0	0	0	31,065	67,552	29,835	0	60,519	2,709	0	63,228
High Security	2,728	0	2,728	0	0	0	0	41,845	6,158	38,411	0	5	0	5	0

Table 25: Lachlan regulated river environmental licence changes for the reporting period

Category	Share 30 June 2020	Share 30 June 2021	Share Difference	No. Licences 30 June 2020	No. Licences 30 June 2021	No. Licence Difference
General Security	124,518	124,518	0	10	10	0
High Security	2,728	2,728	0	7	7	0

Table 26: Lachlan regulated river environmental trade summary[22]

Environmental allocation assignments summary			To				
			Environmental		Non-Environmental		
			General security	High security	General security	High security	Total
From	Environmental	General security	26,309.7	40,642.4	600.0	0	67,552.1
		High security	4,755.1	1,203.0	0	200	6,158.1
		Total	31,064.8	41,845.4	600.0	200	73,710.2

[22] No environmental licences currently exist in the Belubula.

Note 7—Environmental provisions

There are a number of planned environmental provisions for the Lachlan catchment implemented under the water sharing plan, with the aim of enhancing environmental benefits.

Environmental contingency and water quality allowances

The Wyangala Environmental Contingency Allowance (WECA) and the Lake Brewster Environmental Contingency Allowance (LBECA) are credited up to a maximum of 10,000 megalitres (each) based on triggers linked to general security allocation account volumes. These trigger levels are:

1. if on 1 July, the total water held in allocation accounts exceeds 50% of general security share component.
2. if 50% not achieved on 1 July, then if carryover plus AWD volume exceeds 75% at any time during the year.

The water can be called upon for release by the NSW Department of Planning and Environment (Environment, Energy and Science), for ecological purposes, including, but not limited to, completion of waterbird breeding events, promotion of fish breeding, promotion of fish passage, wetland watering and increasing flow variability.

Any water remaining in the WECA or LBECA at the end of the water year must be forfeited. For the purposes of this GPWAR the WECA and LBECA, have been represented as one allowance and termed the Environmental Contingency Allowance (ECA).

The plan also states the requirement for a Water Quality Allowance (WQA) to be used for any water quality management purpose, but in particular for reduction of salinity levels and mitigation of blue-green algae impacts. This account is to be credited 20,000 megalitres on 1 July each year. The balance remaining at the end of a water year must be forfeited.

Translucent flows

The water sharing plan sets out to improve natural variation in the flow regime by passing a proportion of inflows through Wyangala Dam (called ‘translucent’ releases) and prohibiting the extraction of tributary inflows or diversions into Lakes Brewster or Cargelligo. The rules apply from 15 May to 15 November at Wyangala once a total of 250,000 megalitres of inflows have entered the dam after 1 January.

Translucent releases are made when the combination of dam inflows and downstream tributary inflows are sufficient to produce target flows in the range of 3,500 to 8,000 megalitres per day at Brewster Weir. The rules also prohibit the extraction of some tributary inflows or the diversion of flows into Lakes Brewster or Cargelligo from 1 June to 30 November. The plan provides for a total volume of translucent and tributary flows of up to 350,000 megalitres per year measured at Brewster Weir.

Long-term extraction limit

Lachlan River extractions must be limited to a long-term average of 305,000 megalitres while the Belubula River extractions are limited to a long-term average of 7,370 megalitres. All water more than these limits is reserved for environmental benefits.

Environmental Release Rules Carcoar Dam

The water supply system in the Belubula water source must be managed to maintain a flow at the Helensholme gauge (412033) of 10 megalitres per day. Carcoar releases must be made when necessary to meet this requirement.

Data type

Measured/Administration

Policy

Water Sharing Plan for the Lachlan Regulated River Water Source 2016.

- Part 4 Environmental Water Provisions

Water Sharing Plan for the Belubula Regulated River Water Source 2012.

- Part 4 Planned Environmental Water Provisions
- Part 6 System Operation Rules
    - Clause 26 Environmental Release rules for Carcoar Dam

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 Annual Compliance Report (internal document)

Methodology

Credits and debits to the environmental provisions were adopted from the WaterNSW annual compliance report.

Additional Information

Performance against the minimum flow requirement for the reporting period is presented in Figure 52. A summary of the water quality allowance (WQA) and environmental contingency allowance (ECA) account balances are provided in Table 27.

Figure 52: Belubula performance against environmental end of system target

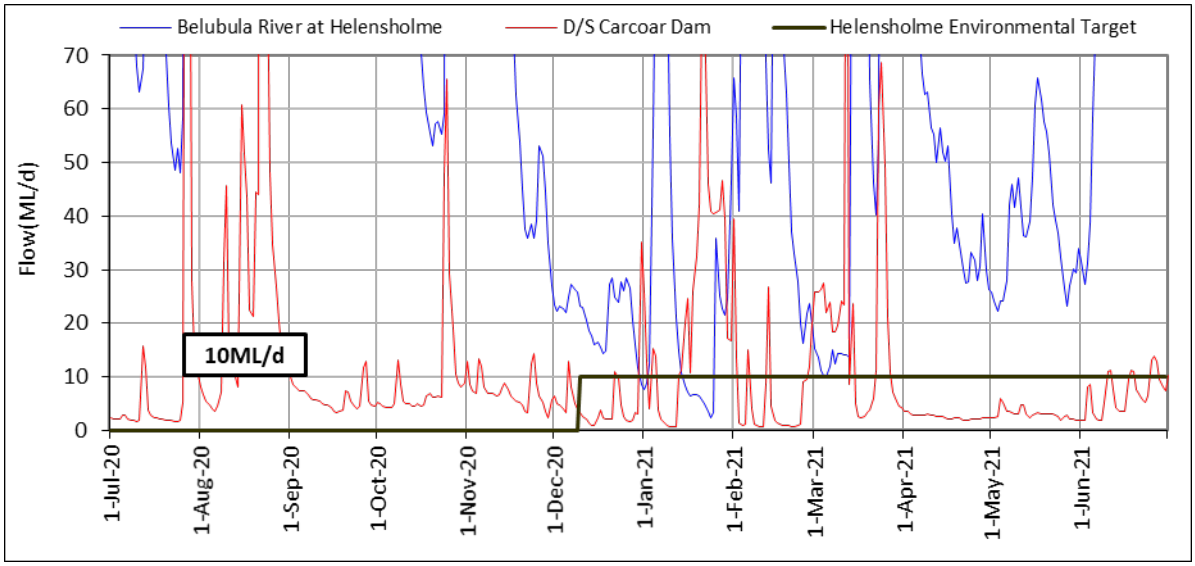


Table 27: Summary of WQA and ECA account balances (figures in ML)

Water year	WQA Water credited	WQA Usage	WQA Forfeit	WQA Balance	ECA Water credited	ECA Usage	ECA Forfeit	ECA Balance
2009–10[23]	0	0	0	0	0	0	0	0
2010–11	20,000	9,600	10,400	0	20,000	20,000	0	0
2011–12	20,000	0	20,000	0	20,000	0	20,000	0
2012–13	20,000	0	20,000	0	20,000	0	20,000	0
2013–14	20,000	0	20,000	0	20,000	0	20,000	0

[23] No credits occurred in 2009-10 due to the plan being switched off for the entire period and the system being operated through critical drought planning.

2014–15	20,000	0	20,000	0	0	0	0	0
2015–16	20,000	0	20,000	0	0	0	0	0
2016–17	20,000	16,027[24]	3,973	0	20,000[25]	5,084[26]	14,916	0
2017–18	20,000	0	20,000	0	20,000	17,295	2,705	0
2018–19	20,000	4,936	15,064	0	10,000	9,271	729	0
2019–20	20,000	1,329	18,671	0	0	0	0	0
2020–21	**20,000**	**6,319**	**13,681**	**0**	**20,000**	**13,243**	**6,757**	**0**

[24] 15,000 delivery and 1,027 evaporation losses applied
[25] No opening credits, 20,000 was credited when the storage spilled in August 2016
[26] Usage of 3,571 and 1,513 evaporation losses applied

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

Storage capacity and dead storage volumes for the main storage in the Lachlan and Belubula are presented in Table 28.

Daily storage volumes and percentages for Lake Brewster are provided in Figure 53. A storage trace has not been provided for Lake Cargelligo due to significant gauging issues in flood events. For plots of Wyangala and Carcoar storages refer to section 'Surface water resources and management' earlier in this report.

Table 28: Capacity and dead storage summary table

Storage	Capacity (ML)	Dead storage (ML)
Carcoar Dam	36,130	214
Wyangala Dam	1,217,670	728
Lake Cargelligo	36,550	6,350
Lake Brewster	153,610	4,550
Jemalong Weir[27]	2,780	-
Lake Brewster Weir[27]	7,190	-

[27] Operated as a re-regulatory weir to improve day to day water delivery.

Figure 53: Lake Brewster storage volume and per cent full

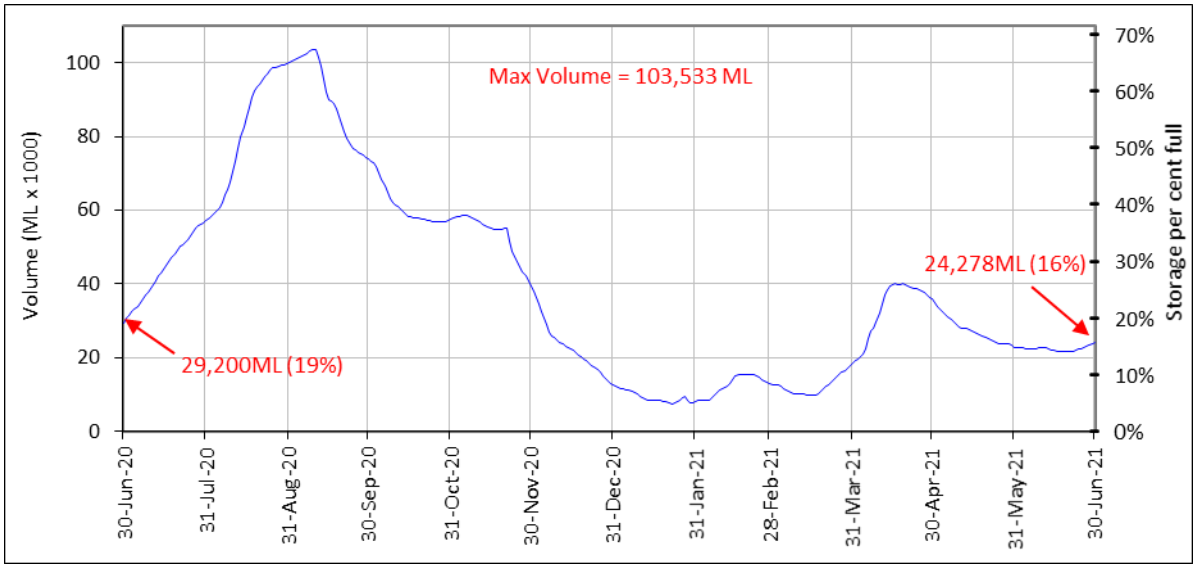
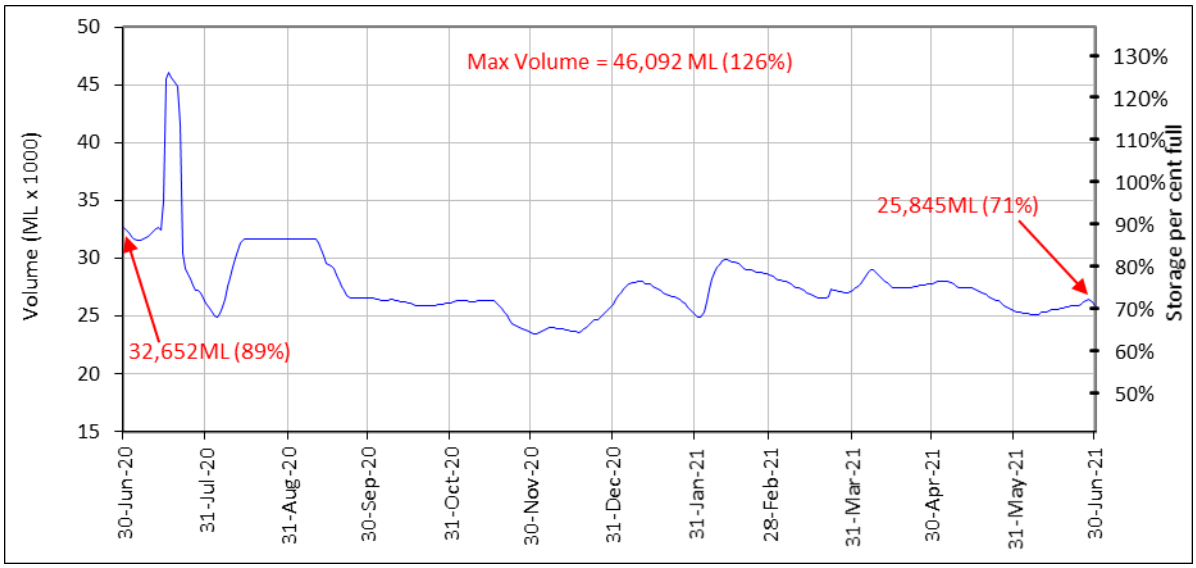


Figure 54: Lake Cargelligo storage volume and per cent full



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 any river section *i*, the volume of water in the section is:

$V_i = Q_i \times T_i$

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

$$Total\ river\ volume\ = \sum_{i=1}^{n} V_i$$

Descriptions of each component in this calculation are presented in Table 29.

Table 29: Summary of river channel storage calculation components

Symbol	Variable	Data Source	Unit
Q_i	Average flow in the river section i. Calculated by averaging the daily flows at the upstream and downstream river gauges.	HYDSTRA	ML/d
V_i	Volume in each river section i.	Calculated	ML
T_i	Average travel time for a parcel of water to travel through the river section i.	CAIRO	days
n	Total number of sections in the river	-	-

Assumptions and approximations:

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

Note 10—Storage inflow—Carcoar and Wyangala

Storage inflow refers to the volume of water flowing into the major headwater storages—Carcoar Dam and Wyangala 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, SILO (Queensland government climatic information)

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 (seepage assumed as zero). This is referred to as a back-calculation of inflows.

The back-calculation figures were derived using a one-day time step with the inflow calculated according to the equation below. Descriptions of each component in this calculation are presented in Table 30.

$$I = \sum_{i=1}^{n} \left(\Delta S_i + \mathrm{O}_i + \mathrm{Se}_i + \frac{(E_i - R_i) * A_i}{100} \right)$$

Table 30: Components for back-calculation of inflow

Symbol	Variable	Unit
I	Inflow	ML/day
ΔS_i	Change in storage volume at time i	ML
O_i	Outflow at time i	ML/day
Se_i	Seepage at time i	ML/day
R_i	Rainfall at time i	mm/day
E_i	Evaporation (Mortons shallow lake estimation, SILO) at time i	mm/day
Ai	Surface area at time i —derived from height to surface areas lookup curve	ha
n	The number of days in the year	-

Note 11—Storage inflow—Lake Cargelligo and Lake Brewster

This is the estimated total annual inflow to Lake Cargelligo or Lake Brewster.

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/WaterNSW: CAIRO

Methodology

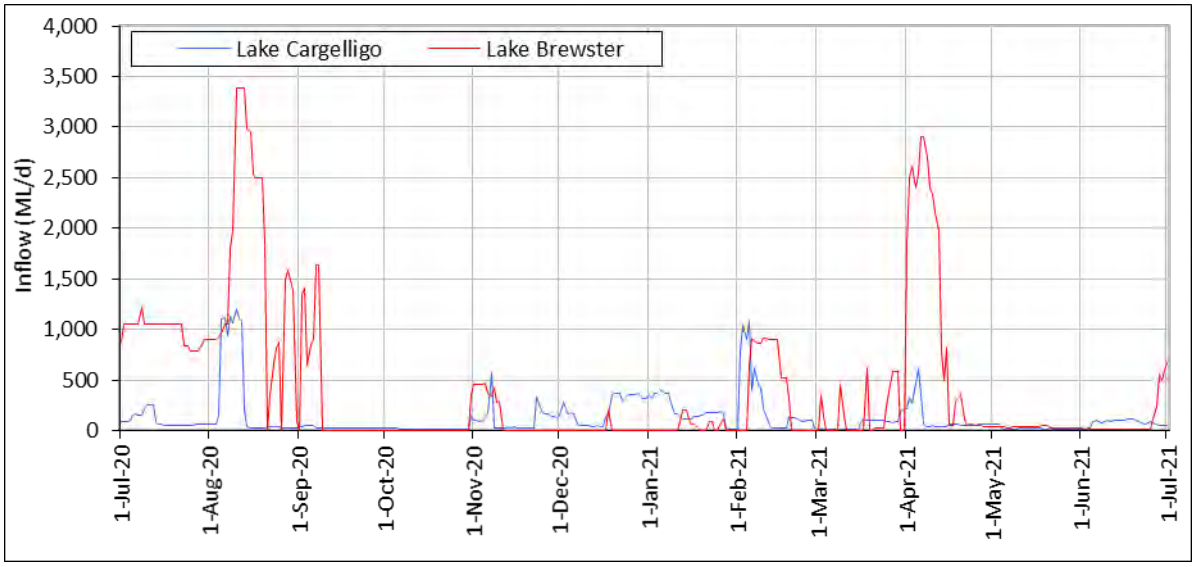
The inflow to Lake Cargelligo used in these accounts is the gauged (measured) flow indicated in the operations database (CAIRO), which is obtained from the gauging site 412101 (Lake Cargelligo Intake upstream Lake Cargelligo Weir)

The inflow to Lake Brewster used in these accounts is the gauged (measured) flow indicated in the operations database (CAIRO), which is obtained from the gauging site 412102 (Lake Brewster Intake downstream Lake Brewster Weir Pool Regulator)

Additional information

Daily storage inflows for Lake Cargelligo and Lake Brewster off river storages are presented in Figure 55.

Figure 55: Lake Cargelligo and Lake Brewster storage inflow



Note 12—Storage evaporation and storage rainfall

This refers to the volume of water effective on Carcoar and Wyangala Dams 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—HYDSTRA, SILO (Queensland government climatic information)

Methodology

Wyangala and Carcoar

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). Descriptions of each component in this calculation are presented in Table 31.

Rainfall:

$$\mathbf{V} = \sum_{i=0}^{n} \left(\frac{R_i \times \mathrm{A}_i}{100} \right)$$

Evaporation:

$$\mathbf{V} = \sum_{i=0}^{n} \left(\frac{E_i \times \mathrm{A}_i}{100} \right)$$

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

Lake Cargelligo

Similarly, the rainfall and evaporation volumes for Lake Cargelligo were estimated by using the storage surface area and observed evaporation and rainfall readings. For rainfall the data collected at the storage was used, whereas for evaporation data at Lake Cargelligo Airport (75039) was used, as the storage data had a large range of erratic data.

Lake Brewster

As Lake Brewster is physically compartmentalised for operation (resulting in saving water to evaporation), calculating an individual rainfall and evaporation volume is a much more difficult task which would include operational information and multiple storage rating curves. For the purpose of this GPWAR a more simplistic approach was adopted whereby only net evaporation is reported, and this net-evaporation is the balancing (unknown) component of the storage mass-balance.

Net Evaporation = Inflow – Change in Storage – Outflow

(all figures are in megalitres)

Note 13—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 (m^2) = 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 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. Descriptions of each component in this calculation are presented in Table 32.

Rainfall: $V = \sum_{i=1}^{n} \left(\frac{R_i \times \mathrm{A}_i}{10^6} \right)$

Evaporation: $V = \sum_{i=1}^{n} \left(\frac{ETO_i \times K_c \times \mathrm{A}_i}{10^6} \right)$

Table 32: Components for storage evaporation and rainfall

Component	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 14—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 Table 33 and Table 34.

Table 33: Belubula—Summary of gauged tributary inflow (annual volume in megalitres)

Station	Station name	Area (km^2)	Volume (ML)
412080	Flyers Creek at Beneree	98	7,428
Total	-	**98**	**7,428**

Table 34. Lachlan—Summary of gauged tributary inflow (annual volume in megalitres)

Station	Station name	Area (km^2)	Volume (ML)
412030	Mandagery Creek U/S Eugowra (Smithfield)	1,630	70,767
412029	Boorowa River at Prossers Crossing	1,530	109,332
412033	Belubula River at Helensholme	2,560	87,705
412192	Booberoi Creek at Return (Cannons Bridge)	N/A	10,336
Total	-	**5,720**	**278,141**

Note 15—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, WaterNSW: CAIRO

Methodology

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 Lake Cargelligo for the Lachlan or below the Helensholme gauging station for the Belubula, however these contributions are likely to be 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 (Helensholme in the Belubula and Lake Cargelligo in the Lachlan)

SR = Storage Release

GI = Gauged Inflows

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

LE = Estimated Losses. These were assumed to be 25% for Lachlan in 2020–21 and 25% in Belubula of the measured flows (gauged flow plus storage releases) entering the system.

Additional information

The estimate of river inflow resulting from ungauged tributary contributions for the reporting period are presented in Table 35.

Table 35: Summary of ungauged inflow estimate for the reporting period

Station name	Volume (ML)
Belubula	92,200
Lachlan	97,100

Note 16—Dam releases, river inflow from dam releases

The volume of water released from Wyangala Dam, Carcoar Dam, Lake Brewster or Lake Cargelligo. In the GPWAR accounting process this release volume decreases the relative storage asset, while increasing the river asset volume.

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 or lake storage, and then passing these heights through a rating table that converts them to a daily flow volume.

Additional information

A summary of the release components for the reporting period is presented in Table 31. Daily releases from Wyangala Dam, Carcoar Dam, Lake Cargelligo and Lake Brewster for the reporting period is presented in Figure 56, Figure 57, Figure 58 and Figure 59 respectively.

Table 36: Summary of releases

River system	Storage	Release (ML)	Increase to river asset (ML)
Belubula regulated river	Carcoar	4,989	4,989
Lachlan regulated river	Wyangala	194,172	384,422
	Lake Brewster	145,001	
	Lake Cargelligo	45,250	

Figure 56: Wyangala Dam storage releases

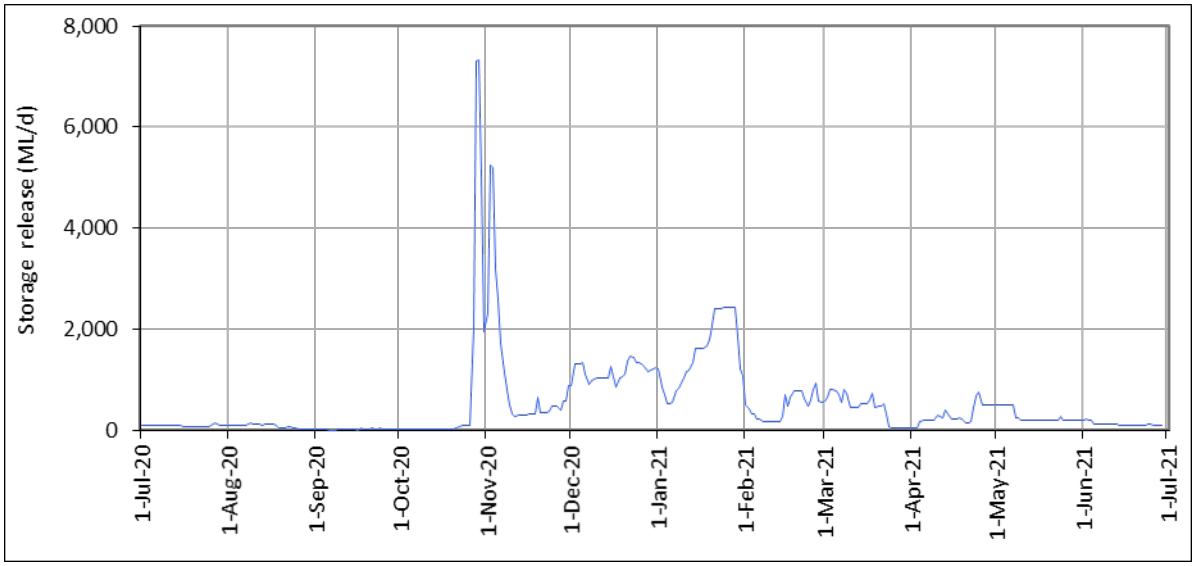


Figure 57: Carcoar Dam storage releases

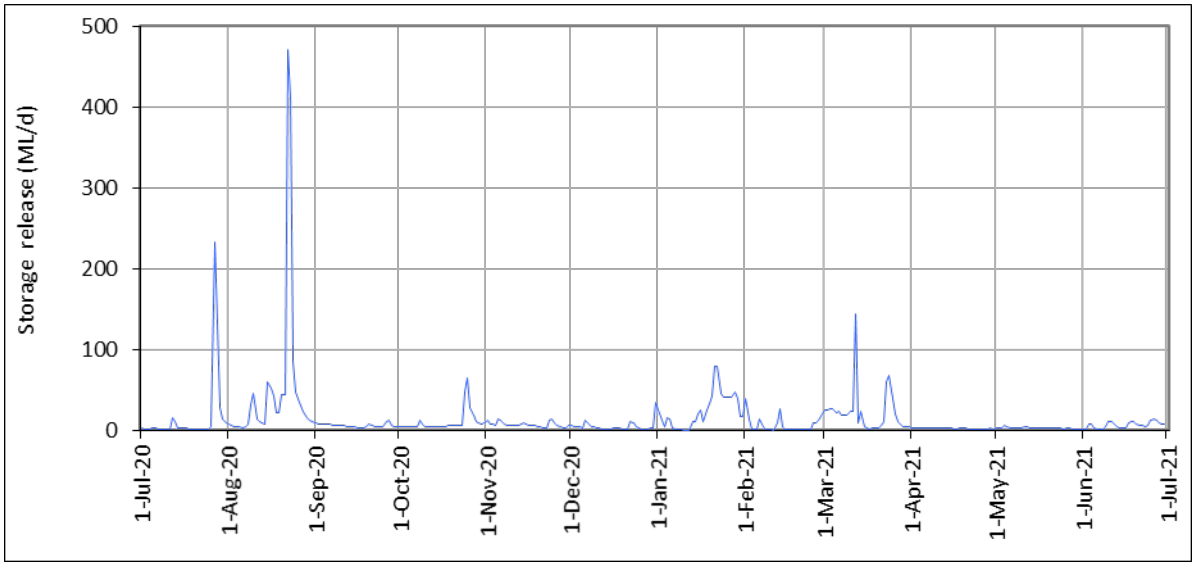


Figure 58: Lake Cargelligo storage releases

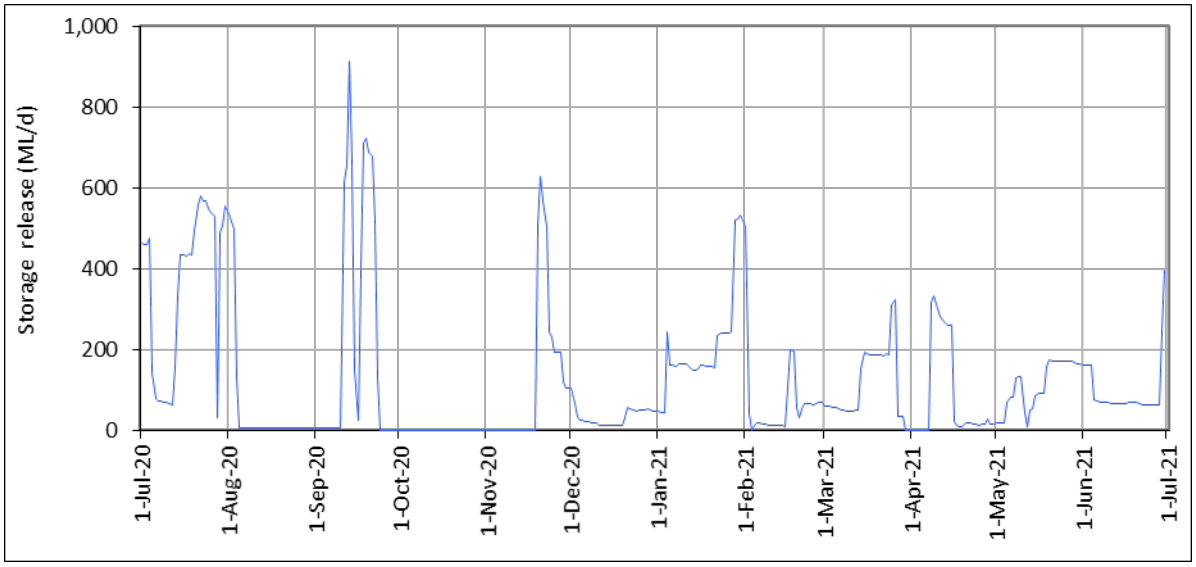
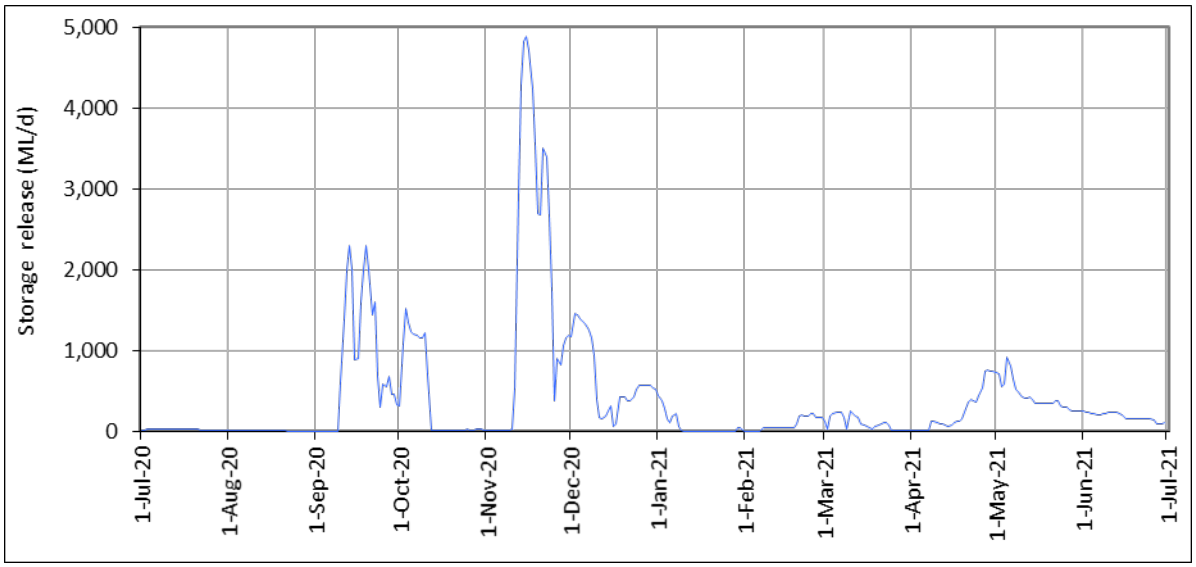


Figure 59: Lake Brewster storage release



Note 17—Regulated effluents

This refers to flow that leaves the river via regulated effluents. Specifically, this is the regulated offtake that divert water to be stored in the off-river storages of Lake Cargelligo or Lake Brewster. The effluents to Lake Cargelligo and Lake Brewster are represented as both a decrease to the river asset volume and an increase to the relative storage asset.

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

Flows were extracted at gauging sites situated within the channel of the effluent flow. The gauges record the time series of heights which are converted to a volume of water based on a derived height to flow conversion relationship (rating table).

Additional information

Regulated effluents from the river during the reporting period are presented in Table 37.

Table 37: Summary of regulated effluents (ML)

Station name	Station code	River outflow (storage inflow) (ML)
Lake Cargelligo Intake Upstream Lake Cargelligo Weir	412101	45,830
Lake Brewster Inlet D/S Lake Brewster Weir Pool Regulator	412102	147,039
Total Decrease to River Asset		**192,869**

Effluent outflows other than those defined in this note have not been included in this GPWAR and as such form part of the unaccounted difference presented in the statements, except for regular water diverted:

- to Jemalong irrigation scheme (10,627 megalitres) which forms part of the allocation account usages and river extraction volume
- out of the system for replenishment purposes which is accounted for as replenishment ‘flows leaving’.

Note 18—Flow leaving

This refers to flow that leaves the entity and does not return to the entity. The line item includes regulated water leaving the defined accounting extent for replenishment purposes and licensed environmental water ordered to flow beyond the accounting extent to achieve environmental benefits. More information on licensed held environmental water is available in Note 6 of this GPWAR.

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

The end of system flow is calculated by adding the flows at the specified end of system gauging stations. Replenishment flows detailed below are as advised by WaterNSW in the operational data, while the held environmental water is separated based on orders. There are no replenishment or environmental flows leaving the Belubula system. A summary of flow leaving the regulated accounting extent for the reporting period are presented in Table 38 and Table 39. Daily time series plots of flow leaving for the Belubula and Lachlan accounting extents are presented in Figure 60 and Figure 61 respectively.

Table 38: Belubula flows leaving summary

Station	Location	Total flow (ML)
412033	Belubula River at Helensholme	87,705
Total	**-**	**87,705**

Table 39: Lachlan flows leaving summary

Station	Location	Total flow (ML)
412163	Merrowie Creek Downstream of Offtake Weir	27,918
412122	Merrimajeel Creek at Cobb Highway	20,692
412124	Mugtabah Creek at Cobb Highway	9,828
412042	Willandra Creek at Willandra Homestead	16,464
412005	Lachlan River at Booligal	157,390
412189	Booberoi Creek at Offtake No.2	23,801
Total	-	**256,092**

Figure 60: Belubula flow leaving chart

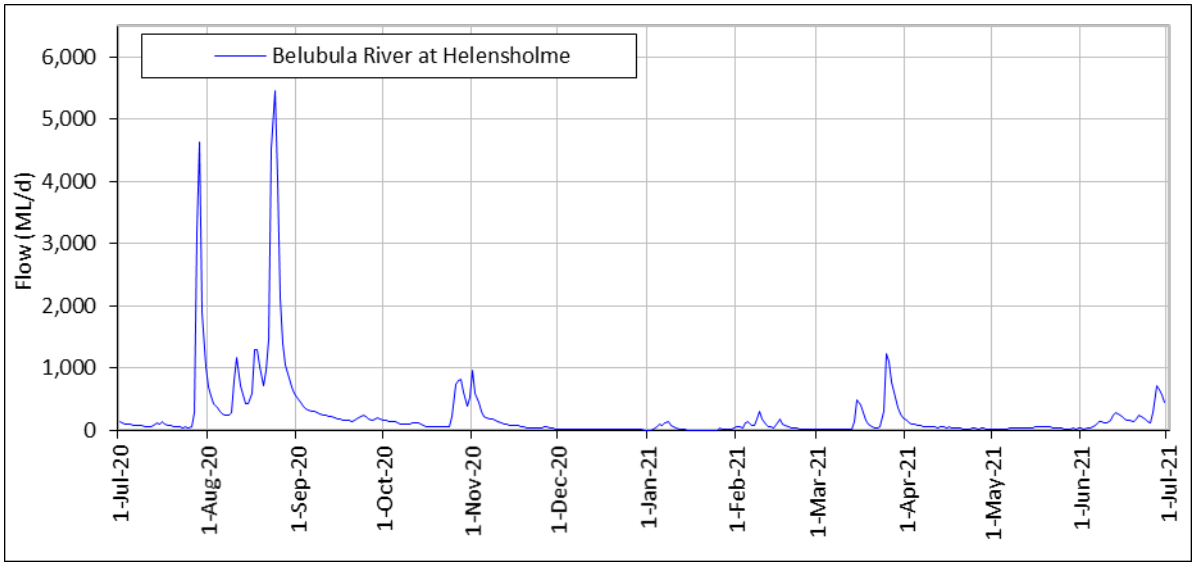
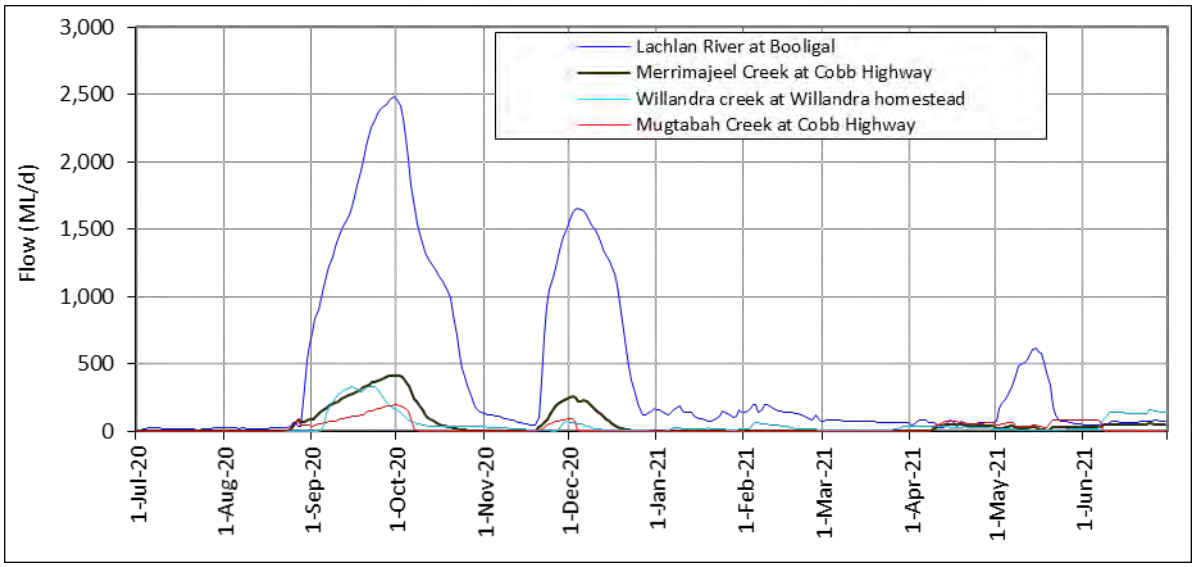


Figure 61: Lachlan flow leaving chart



Note 19—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 targets. As such the volume reported to be physically extracted from the river will not always be equal to the amount of water debited against accounts for usage, which has been described in Note 3. The figure also excludes basic rights extractions, which is reported as a separate line item and detailed in Note 20.

Data type

Measured data

Policy

Not applicable

Data accuracy

A—Estimated in the range +/- 10%

Providing agency

NSW Department of Planning and Environment

Water Accounting System (jointly owned by WaterNSW and NSW Department of Planning and Environment)

NSW Department of Planning and Environment—Water Ordering and Usage database

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 licensed 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.

Extractions from river includes that diverted to an irrigation corporation for distribution (i.e. Jemalong Irrigation diversion).

Additional information

The calculation to estimate the physical extractions from river is presented in Table 40.

Table 40: Reconciliation of physical extraction to account usage

Calculation	Lachlan (ML)	Belubula (ML)
Estimated extractions from river[28]	77,949	7,219
minus		
Uncontrolled Flow Usage	0	2,541
plus		
Licensed flow leaving System[29] plus In-stream licensed usage[30]	66,459	0
equals		
Total account usage[31]	**144,408**	**4,678**

[28] Direct licensed extractions from the river excluding basic rights usage estimate
[29] Licensed water ordered to leave the accounted Lachlan extent for environmental benefits. This number is obtained from the Matter 9.3 report.
[30] Water ordered and used within the accounted system for environmental benefit (not extracted from the river)
[31] The total amount of water accounted for usage against the allocation accounts

Note 20—Basic rights

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 Lachlan Regulated River Water Source 2016

- Part 5 Requirements for water
    - Division 2 Requirements for water for basic landholder rights
        - Clause 18 Domestic and stock rights

Water Sharing Plan for the Belubula Regulated River Water Source 2012

- Part 5 Requirements for water
    - Division 2 Requirements for water for 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 Lachlan Regulated River Water Source 2016
- Water Sharing Plan for the Belubula Regulated River Water Source 2012

Methodology

In this GPWAR the annual extraction for domestic and stock rights for the Lachlan is assumed to be the estimated figure stated in the Water Sharing Plan for the Lachlan Regulated River Water Source 2016 (4,211 megalitres). For the Belubula the annual extraction for domestic and stock rights is assumed to be the estimated figure stated in the Water Sharing Plan for the Belubula Regulated River Water Source 2012 (200 megalitres). These figures are produced from 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.

Note 21—Supplementary/Uncontrolled flows 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.

Uncontrolled flow refers to a specific volume of non-debit water that is pumped or diverted from the river by general and high security licence holders under specific licence and river flow conditions defined in the water sharing plan. The Water Sharing Plan also defines rules by which the non-debit uncontrolled flow that has been taken is to be debited back to the general and high security licence accounts.

Data type

Measured data

Policy

Water Sharing Plan for the Belubula Regulated River Water Source 2012

- Part 7 Limits to the availability of water
    - Division 2—Available water determinations
        - Clause 43—Available water determinations for supplementary water access licences
- Part 9 Rules for managing access licences
    - Division 2—Daily access rules
        - Clause 49—Taking of water under supplementary water access licences

Refer to applicable Water Sharing Plan on the 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

Water Accounting System (WaterNSW)

Methodology

Supplementary and uncontrolled 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 and uncontrolled flow being extracted through the same pumps as those extracting water under other categories of access licences additional information is required to separate out the supplementary and uncontrolled flow extractions.

Licence holders are therefore required to provide notification of their intention to pump prior to pumping or diverting water during the declared supplementary or uncontrolled flow events and provide meter readings both at the commencement and conclusion of pumping. This enables the supplementary and uncontrolled flow extraction to be assessed independent of other extractions.

The Lachlan has no access to supplementary water or uncontrolled flow.

Additional Information

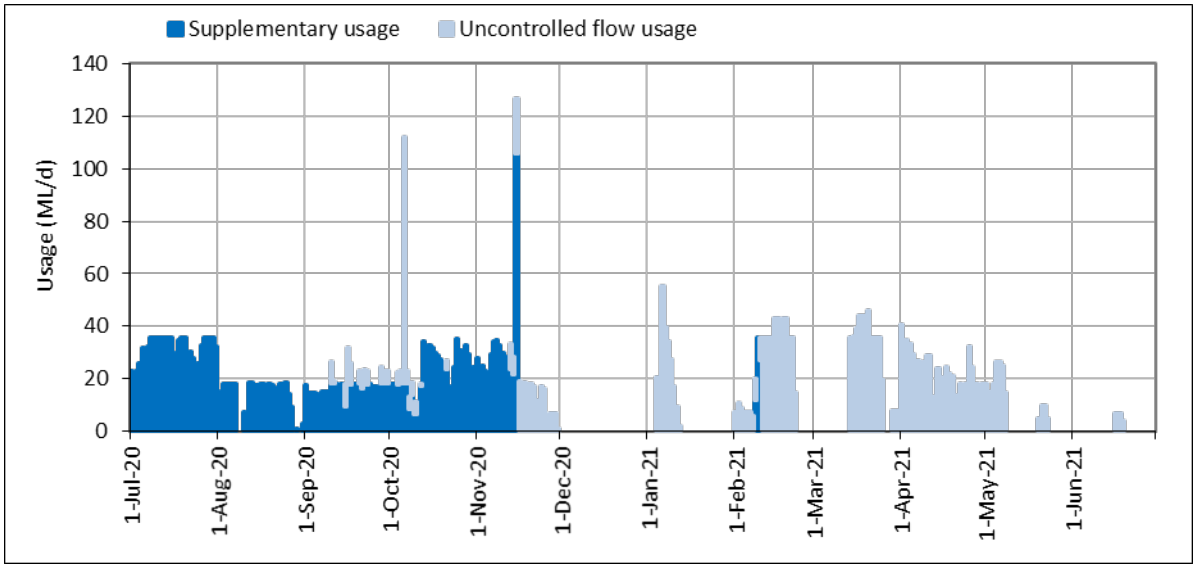
Supplementary access in the Belubula was available in the reporting period during the period indicated in Table 41. Plot showing daily usage for supplementary and uncontrolled flow is provided in Figure 62.

Supplementary or uncontrolled flow access is not available in the Lachlan.

Table 41: Belubula supplementary event announcements, uncontrolled flow and usage for the reporting period

Announce date	% use limit	Section	Section start date	Section end date	Supp. usage	UCF usage
14-Jun-20	100	Carcoar Dam to Needles (Gs412056)	1-Jul-20	21-Nov-20	3,050	190.6
14-Jun-20	100	Carcoar Dam to Needles (Gs412056)	1-Jul-20	30-Nov-20	0	45.4
14-Jun-20	100	Needles (Gs412056) to Bells (Gs412165)	1-Jul-20	30-Nov-20	0	0
14-Jun-20	100	Bells (Gs412165) to Helensholme (Gs412033)	1-Jul-20	30-Nov-20	0	194.1
14-Jun-20	100	Helensholem (Gs412033) to Lachlan Junction	1-Jul-20	30-Nov-20	0	0
4-Jan-21	100	Carcoar Dam to Needles (Gs412056)	4-Jan-21	12-Jan-21	0	142.3
4-Jan-21	100	Needles (Gs412056) to Bells (Gs412165)	4-Jan-21	12-Jan-21	0	0
4-Jan-21	100	Bells (Gs412165) to Helensholme (Gs412033)	4-Jan-21	12-Jan-21	0	84
4-Jan-21	100	Helensholem (Gs412033) to Lachlan Junction	4-Jan-21	12-Jan-21	0	0
4-Jan-21	100	Carcoar Dam to Needles (Gs412056)	4-Jan-21	11-Jan-21	0	0
1-Feb-21	100	Needles (Gs412056) to Bells (Gs412165)	1-Feb-21	22-Feb-21	0	0
1-Feb-21	100	Bells (Gs412165) to Helensholme (Gs412033)	1-Feb-21	22-Feb-21	0	94.2
1-Feb-21	100	Helensholem (Gs412033) to Lachlan Junction	1-Feb-21	22-Feb-21	0	0
2-Feb-21	100	Carcoar Dam to Needles (Gs412056)	2-Feb-21	22-Feb-21	75	420
2-Feb-21	100	Carcoar Dam to Needles (Gs412056)	2-Feb-21	22-Feb-21	0	0
14-Mar-21	100	Carcoar Dam to Needles (Gs412056)	14-Mar-21	30-Jun-21	0	1241.7
14-Mar-21	100	Carcoar Dam to Needles (Gs412056)	14-Mar-21	30-Jun-21	0	0
14-Mar-21	100	Needles (Gs412056) to Bells (Gs412165)	14-Mar-21	30-Jun-21	0	0
14-Mar-21	100	Bells (Gs412165) to Helensholme (Gs412033)	14-Mar-21	30-Jun-21	0	128.3
14-Mar-21	100	Helensholem (Gs412033) to Lachlan Junction	14-Mar-21	30-Jun-21	0	0

Figure 62: Belubula Supplementary and Uncontrolled Flow Usage



Note 22—Replenishments flows

This refers to water that is set aside as part of the essential requirements for the provision of flows to Willandra Creek, Merrowie Creek, Muggabah Creek, Merrimajeel Creek and Booberoi Creek. The water is to supply water for households, town use and stock and for accounting purposes is treated as water leaving the system/entity. 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 Lachlan Regulated River Water Source 2016.

- Part 6 System operation requirements
    - Division 2 General system operations rules
        - Clause 30 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%

Providing agency

NSW Department of Planning and Environment

Data source

NSW Department of Planning and Environment—WaterNSW Compliance Report (Internal 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. For Booberoi creek water may return to the Lachlan River and as such the replenishment is considered to be the outflow minus any return flow.

The following table summarises the assessed replenishment flows for the reporting period.

Additional Information

A summary of replenishment flows for the reporting period is illustrated in Table 42.

Table 42: Replenishment flow summary

Station	Area of replenishment	Annual regulated replenishment limit (ML)	Delivered in reporting period (ML)
412042	Willandra Creek at Willandra Homestead	Up to 12,000	8,072
412163	Merrowie Creek downstream from offtake weir	Up to 9,000	8,883
N/A	Muggabah and Merrimajeel creeks	Up to 9,000	5,829
412189	Booberoi Creek at Offtake No.2	Up to 12,500	11,666
		TOTAL	**34,450**

Note 23—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). The estimate covers the area of the Upper and Lower Lachlan groundwater management areas (GMA). Any interaction outside of these areas is excluded and would therefore form part of the unaccounted difference.

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)

NSW Department of Planning and Environment Method B—Water Table Fluctuation Method (Data inputs from HYDSTRA, GDS)

Methodology

For the Upper and Lower Lachlan groundwater sources, the method used to calculate the net flow from the accounted river extent to the alluvium aquifer can be either of the following:

- If available, use the annual net river – aquifer interaction estimates from the NSW Department of Planning and Environment MODFLOW models for the Lower Lachlan Groundwater Management Area and the Upper Lachlan 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 river stage and historical MODFLOW model results is used. The river gauging site 412005 (Lachlan River at Booligal) was used to develop the relationship for the Lower Lachlan Groundwater Management Area. Similarly, the gauging station 412004(Lachlan River at Forbes) was used to develop the relationship for the Upper Lachlan Groundwater Management Area. The resulting equations used for estimating the accounting inputs are as follows:
    - **Lower Lachlan Groundwater management Area:**

$$Net\ River\ Flow\ to\ Aquifer = 16.234 \times \bar{H} + 11.301$$

    - **Upper Lachlan Groundwater management Area:**

$$Net\ River\ Flow\ to\ Aquifer = 9.44 \times \bar{H} + 27.732$$

Where $\bar{H}$ is the average annual river stage.

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

Additional information

The estimated total net flow to the aquifer for the reporting year is shown in Table 43.

Table 43: Lachlan River Net Flow to Aquifer

Groundwater Management Area	Gauging Station	Average Annual river Stage (m)	Net River Flow to Aquifer (ML)
Lower Lachlan	412005	0.642	21,650
Upper Lachlan	412004	0.710	34,350
		TOTAL	**56,000**

Note 24—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 will 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)

In addition to the unaccounted river asset volume an unaccounted difference was also required to be applied to the Lake Cargelligo storage to achieve mass balance. With the storage balance estimates were made for evaporation and rainfall volumes, while observed readings were used for inflow, release, and storage volume. With all these processes combined there was an unexplained mass balance error. To achieve the correct storage balance an unaccounted difference was therefore applied (Figure 46).

Table 44: Unaccounted Difference Breakdown

Process	Unaccounted difference
River (Lachlan)	**140,243**
Lake Cargelligo (Lachlan)	**(2,878)**
Lachlan total	**137,365**
River (Belubula)	**9,095**

Note 25—Adjusting entry

As opposed to the unaccounted difference which corrects the physical balance of the river (detailed in Note 24), this is a line item that is used to correct non-physical balances of the accounts. The double entry accounting being utilised to produce this GPWAR is a continuous process whereby the opening balance of one year is the closing balance for the preceding year. Occasionally corrections are required for a variety of reasons including:

- when an error has been identified in a prior year of the published GPWAR report
- when a figure in the corporate database has changed since the publication of the GPWAR as a result of an error being identified, or improved information becoming available
- 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.

Data type

Calculated

Accuracy

A1—Nil inaccuracy +/- 0%

Providing agency

NSW Department of Planning and Environment.

Data source

Not applicable

Methodology

A double entry journal transaction in the prior reporting period under the line item adjusting entry (account corrections) that ensures the correct opening balance for the current reporting period is achieved.

Additional information

A journal entry is placed in the comparative year to ensure correct opening balances are achieved in the reporting year. The adjusting entry applied for this account are presented in Table 45.

Table 45: Account adjustments

Adjustment	Value (ML)
Decrease to allocation account balance	
Lachlan – Regulated River Conveyance licence category	107

References

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