Department of Climate Change, Energy, the Environment and Water

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General Purpose Water Accounting Report NSW Murray Catchment 2022-23

Acknowledgement of Country

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

We acknowledge the people of the Barkindji, Barapa Barapa, Maljangapa, Maraura, Mutthi Mutthi, Ngiyampaa, Nyeri Nyeri, Tati Tati, Wadi Wadi, Wemba Wemba, Weki Weki, Wiradjuri and Yorta Yorta Nations and that the land and waters of the NSW Murray 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 catchment landscape and natural resources.

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Acknowledgements

Produced by the water resource insights team, NSW Department of Climate Change, Energy, the Environment and Water — Water group

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Contents

Abbreviations

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
CARM	Computer aided river management
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 three-dimensional, finite-difference groundwater flow model
SILO	climatic data provision system run by Queensland government for the provision of both measured and modelled 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 river management (CARM)	a spreadsheet-based water balance model used for optimising river operations (orders and releases). Replacement for the CAIRO system.
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

Term	Definition
effluent	flow leaving a place or process Sewage effluent refers to the flow leaving a sewage treatment plant. An effluent stream is one which leaves the main river and does not return.
entity	a defined geographical area or zone within the accounting region Transactions and reports are produced for each entity.
end of system	the last defined point in a catchment where water information can be measured and/or reported
environmental water	water allocated to support environmental outcomes and other public benefits Environmental water provisions recognise the environmental water requirements and are based on environmental, social and economic considerations, including existing user rights.
evaporation	the process by which water or another liquid becomes a gas Water from land areas, bodies of water, and all other moist surfaces is absorbed into the atmosphere as a vapour.
evapotranspiration	the process by which water is transmitted as a vapour to the atmosphere as the result of evaporation from any surface and transpiration from plants
extraction	the pumping or diverting of water from a river or aquifer by licensed users for a specific purpose (irrigation, stock, domestic, towns, etc.) The volume is measured at the point of extraction or diversion (river pump, diversion works, etc.).
general purpose water accounting report (GPWAR)	a report prepared according to the Australian Water Accounting Standard It comprises a number of components including a contextual statement, a statement of water assets and water liabilities, a statement of change in water assets and water liabilities, a statement of physical water flows, notes and disclosures, and an assurance and accountability statement.
General Security licence	a category of water access licence implemented under the *Water Management Act 2000* This forms the bulk of the water access licence entitlement volume in NSW and is a low-priority entitlement (i.e. it only receives water once essential and High Security entitlements are met in the available water determination process).
groundwater	Water location beneath the ground in soil pore spaces and in the fractures of rock formations
High Security licence	a category of water access licence implemented under the *Water Management Act 2000* It receives a higher priority than General Security licences but less priority than essential requirements in the available water determination process.
HYDSTRA database	a database used by NSW Department of Climate Change, Energy, the Environment and Water to store continuous, time-series data such as river flow, river height, and water quality

Term	Definition
inflows	surface water runoff and deep drainage to groundwater (groundwater recharge) and transfers into the water system (both surface and groundwater) for a defined area
inter-valley trade	trade of licence holder allocation account water via allocation assignment from one catchment to another catchment (or state)
intra-valley trade	trade of licence holder allocation account water via allocation assignment within the same catchment
median	the middle point of a distribution, separating the highest half of a sample from the lowest half
non-physical transaction	an accounting transaction representing a process that is not a component of the water cycle (e.g. an available water determination)
physical transaction	an accounting transaction representing a process of the water cycle (e.g. an extraction)
regulated river	a river system where flow is controlled via one or more major man-made structures such as dams and weirs For the purposes of the *Water Management Act 2000*, a regulated river is one that is declared by the minister to be a regulated river. Within a regulated river system, licence holders can order water against a held entitlement.
share component	an entitlement to water specified on the access licence, expressed as a unit share or, in the case of specific purpose licences (e.g. Local Water Utility, Major Water Utility and Domestic and Stock), a volume in megalitres The amount of water a licence holder is allocated as a result of an available water determination and the amount they can take in any year is based on their share component.
storage	a state-owned dam, weir or other structure that is used to regulate and manage river flows in the catchment and the water bodies impounded by these structures
storage reserve	proportion of water in a storage reserved in the resource assessment process for future essential or High Security requirements (e.g. town water)
storage volume	the total volume of water held in storage at a specified time
supplementary water	unregulated river flow available for extraction under a Supplementary 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.

Term	Definition
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*

Director's foreword

This is the 10th annual release of the general-purpose water accounting report (GPWAR) for the regulated component of the NSW Murray Regulated River Water Source. It has been prepared for the accounting period 1 July 2022 to 30 June 2023 under the Australian Water Accounting Standard 1 (WASB, 2012).

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

Included in the GPWAR are:

- a contextual statement summarising the climatic conditions, water resources, environmental holdings, water trading market and water resource management in the water source for 2022–23
- a physical flow diagram illustrating changes in storage volumes and the associated inflows and outflows
- water accounting statements presenting the opening and closing balances, and itemised changes to these balances for available water resources (water assets) and licenced allocation accounts (water liabilities)
- disclosure notes (linked to the figures within the water accounting statements) providing detailed information of accounting components including:
  - access licence account balances
  - planned and held environmental water account balances
  - a detailed available water determination report
  - temporary trading by licence category
  - supplementary announcements and usage by river reach
  - physical inflows and outflows to the system for the water year.

Detailed information on groundwater sources is excluded from the GPWAR. Detailed information on the Lower Darling Regulated River Water Source is provided in a separate GPWAR. Reporting datasets used in the GPWAR are available by sending an email request of your required information to water.wams@dpi.nsw.gov.au

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

- the information presented in these accounts is a faithful representation of the management and operation of the NSW Murray Regulated River Water Source for the reporting period
- all data presented in this report is based on the best available information at the time of publication
- NSW Department of Climate Change, Energy, the Environment and Water has prepared this GPWAR in accordance with the Australian Water Accounting Standard 1.

Danielle Baker

Director Water Analytics

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

Contextual statement

The NSW Murray catchment stretches over southern New South Wales, northern Victoria and south-eastern South Australia. The main drainage feature is the Murray River, which begins in the mountains of the Southern Alps of NSW and Victoria and flows in a westerly direction for over 2,500 kilometres to its outlet on the South Australian coast near Goolwa. It forms the boundary between NSW and Victoria for 1,880 kilometres (Figure 1). At Wentworth in south-west NSW, the Murray is joined by its major tributary the Darling River, which drains an area of 116,000 square kilometres of NSW and Queensland. The NSW Murray catchment represents one-fifth of the total area of the Murray–Darling Basin, one of the most significant agricultural areas in Australia.

In NSW the Murray River moves through three distinct landscapes. The following three sub-sections combine to form the NSW Murray catchment:

- Upper Murray
- Central Murray
- Lower Murray.

Upper Murray

The Upper Murray comprises the headwaters and unregulated reaches of the Murray River upstream of Hume Dam to Lake Mulwala, near Yarrawonga. The river begins its course amongst the high mountain peaks of Mount Kosciusko and Mount Jagungal in the Snowy Mountains, marking the border between NSW and Victoria through to Hume Dam.

The upper catchment is generally rugged and mountainous, which has restricted agricultural and urban development. Vast areas of the catchment remain forested with native vegetation and over one-third of the catchment is protected within national parks. Elevations across the catchment range from approximately 2,200 metres around the alpine peaks in the east to approximately 150 metres at Hume Dam.

Hume Dam is the main operational storage for the Murray River. It has been supplying regulated deliveries of water to the Murray River system since its completion in 1936 (the wall was raised in 1961). The Mitta Mitta River is the major Victorian tributary to Hume Dam. It flows northwards from the high country near Omeo and enters Hume Dam near Tallangatta. Dartmouth Dam was constructed on the Mitta Mitta River in 1979, and with a capacity of nearly 4,000,000 megalitres is the largest storage in the Murray system. Dartmouth Dam is primarily used as a drought reserve for the system, with bulk transfers of water released to Hume Dam as required.

The most extensive land use in the Upper Murray is for conservation, with nearly one-third of the catchment designated as national parkland. Forestry and grazing are also dominant land uses.

Central Murray

Central Murray broadly covers the central Murray River from Yarrawonga in the east to the Darling River–Murray River confluence at Wentworth, in the west. Major tributaries include the Goulburn, Campaspe and Loddon rivers in Victoria, and the Murrumbidgee and Wakool rivers in NSW.

As the Murray River enters Lake Mulwala (the major storage in central Murray), it continues west through Yarrawonga Weir. Flows are diverted from the Murray through various creeks and channels to the Edward (Kolety)–Wakool River system, which aligns with the Murray River floodplain, west of Deniliquin. The Wakool River joins the Murray River west of Moulamein. In the central Murray, the Murray River system receives inflow from the Murrumbidgee catchment via Billabong Creek and the Murrumbidgee River. The Murray River then flows into Mildura Weir, surrounded by Mallee River Basin and Benanee Basin.

The majority of the Central Murray is used for agricultural purposes, with grazing being the dominant land use. The flat riverine plains make the region suitable for a variety of dryland- and irrigated-cropping enterprises. The Murray Irrigation Area also resides within Central Murray (Murray Riverina catchment) and is the largest irrigation scheme in NSW.

Lower Murray

The Lower Murray covers the area between the confluence of the Darling and Murray Rivers at Wentworth through to the Murray River outlet on the South Australian coast near Goolwa. The Lower Murray covers around 100,000 square kilometres. Its major tributaries include the Darling River, the Great Darling Anabranch and the Marne River.

The Darling River delivers inflow to the Murray River. A component of the resources held in the Menindee Lakes Scheme is dedicated to meeting the Murray River system requirements. Lake Victoria, located in the western Riverina region of south-western NSW, is a naturally occurring shallow freshwater lake of the Murray catchment that is used as a re-regulating storage to transfer water to South Australia.

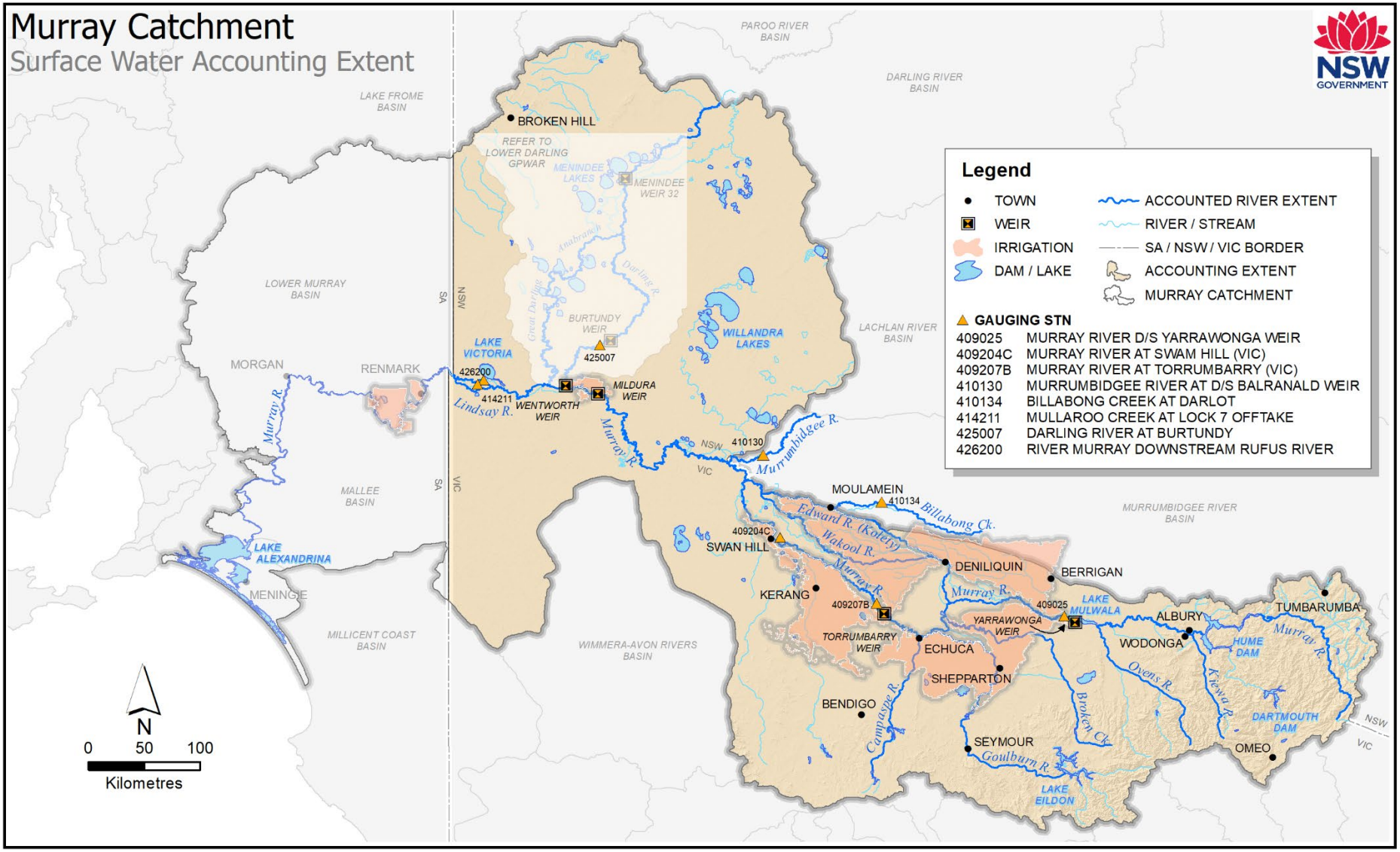
Downstream of Lake Victoria, the Murray River flows into South Australia and turns south for its final 500 kilometres before it reaches Lake Alexandrina, and finally, the Murray Mouth. The main tributary in South Australia that feeds the Murray River is the Marne River.

Accounting extent

This report covers the extent illustrated in Figure 1, and includes the water features, licences, entitlements and management covered by the NSW Murray Regulated River Water Source managed under the rules stipulated in the *Water Sharing Plan for the NSW Murray and Lower Darling Regulated Rivers Water Sources*.

Physical groundwater volumes that interact with the regulated river are not explicitly represented in the GPWAR statements (interactions form part of the unaccounted difference). Supporting information on groundwater in the NSW Murray region is available separately on the NSW Department of Climate Change, Energy, the Environment and Water website (www.dcceew.nsw.gov.au/water/home).

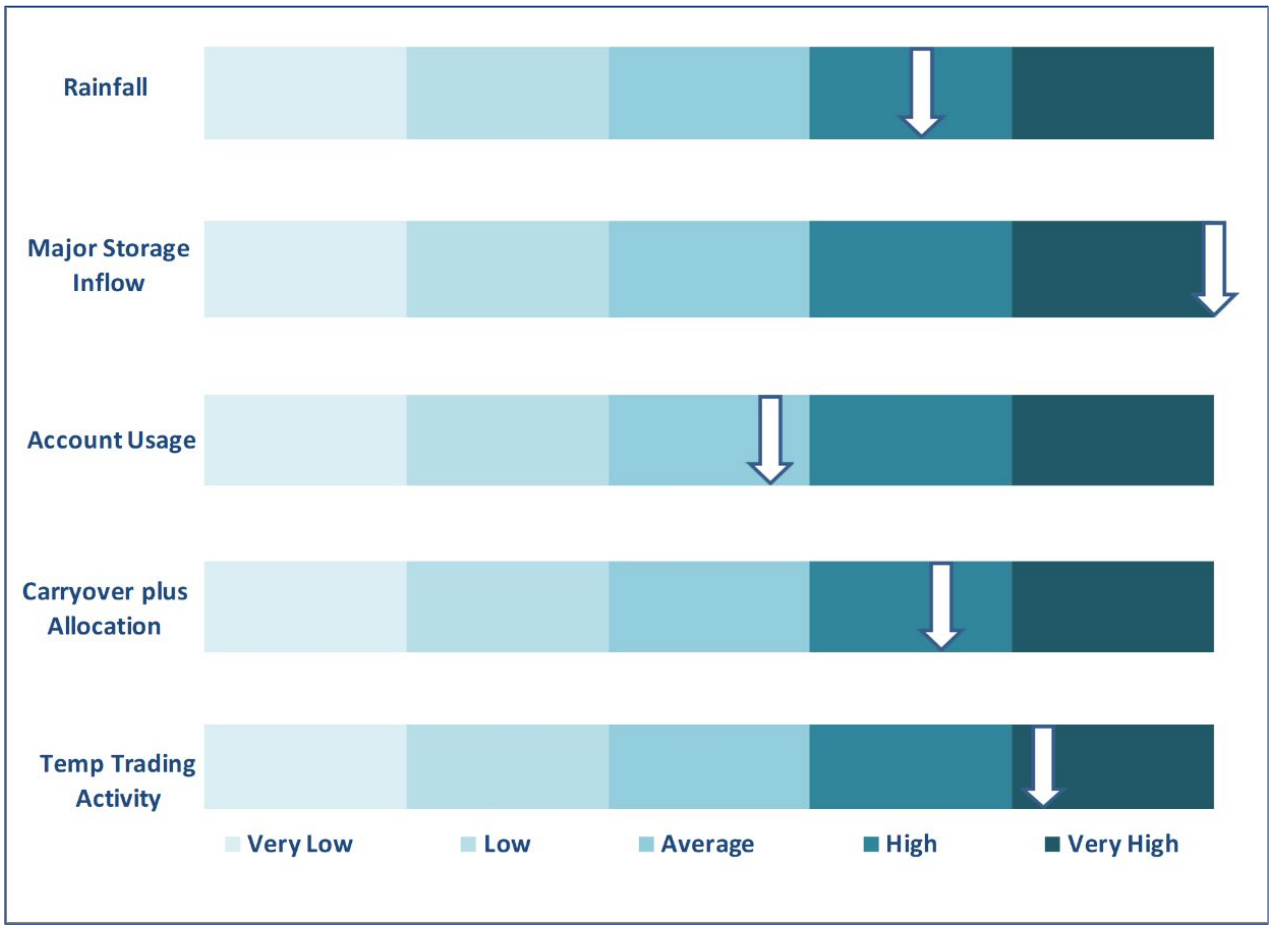
Figure 1: Surface water geographical extent of the accounts



Snapshot

The key climatic and water resource indicators for 2022–23 relative to historical water years managed under water sharing plan conditions are presented in Figure 2. and Effective allocation (carryover plus allocation) and temporary trading activity were in the very high range. Rainfall and Storage inflow were both high and Account usage from water access licences was in the average range.

Figure 2: 2022–23 summary indicators



Climate

At Tumbarumba (upper catchment), 1345 mm of rainfall was recorded in the reporting period (Table 1). Comparatively, this volume of rainfall is:

- 138% of the long-term historical median rainfall for this location
- 81% of the highest volume on record at the location.

Most rainfall was in Aug 2022 (198 mm) and Nov 2022 (193 mm) (Figure 3 and Figure 4).

At Berrigan (central catchment), 646 mm of rainfall was recorded in the reporting period (Table 2). Comparatively, this volume of rainfall is:

- 151% of the long-term historical median rainfall for this location
- 69% of the highest volume on record at the location.

Most rainfall was in Oct 2022 (179 mm) and Nov 2022 (104 mm) (Figure 3 and Figure 4).

At Moulamein (lower catchment), 463 mm of rainfall was recorded in the reporting period (Table 3). Comparatively, this volume of rainfall is:

- 182% of the long-term historical median rainfall for this location
- 71% of the highest volume on record at the location.

Most rainfall fell in Oct 2022 (186 mm) and Nov 2022 (101 mm) (Figure 3 and Figure 4).

A spatial representation of rainfall in the reporting period compared to average rainfall conditions is provided in Figure 5 and Figure 6 indicating above average rainfall for the majority of the catchment with the exception the far western extent being below average.

Figure 3: Monthly rainfall data and historical median at Tumbarumba, Moulamein and Berrigan

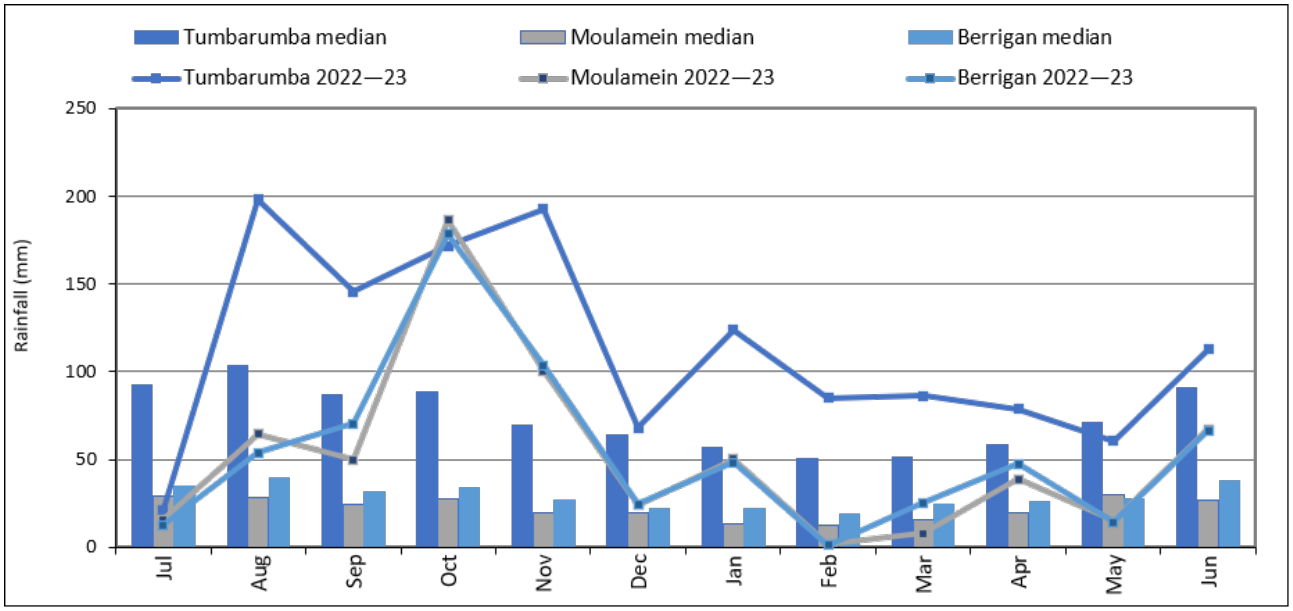


Figure 4: Monthly rainfall deviations from median at Tumbarumba, Moulamein and Berrigan

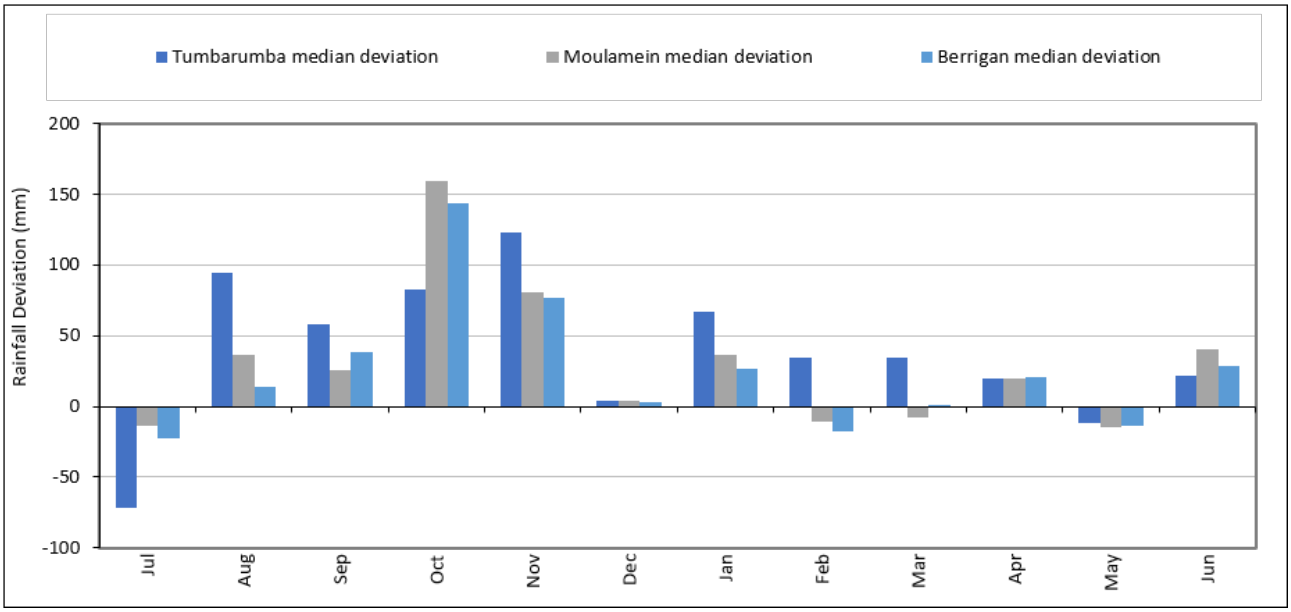


Table 1: 2022–23 monthly rainfall and historic monthly rainfall statistics at Tumbarumba[1] — measurements in millimetres

Tumbarumba	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Annual
2022–23 rainfall	21.4	198.4	145.6	171.6	192.6	68.0	124.0	85.0	86.2	78.8	60.4	112.8	1344.8
Historical mean	104.0	106.6	90.3	95.4	77.2	70.9	64.2	54.8	66.6	66.4	82.5	102.5	981.5
Historical median	93.1	104.1	87.0	88.7	69.8	64.0	57.1	50.6	51.8	59.1	71.8	90.9	975.0
Historical low	14.2	8.6	9.6	0.5	0.0	0.0	0.0	0.0	0.0	0.0	0.5	6.0	523.6
Historical high	254.6	246.6	225.3	259.7	240.2	212.4	203.2	252.2	260.4	224.6	295.4	322.1	1663.2
Water year highest	1985-86	1938-39	1959-60	1975-76	2010-11	1918-19	1896-97	2010-11	1905-06	1973-74	1941-42	1922-23	1955-56

Table 2: 2022–23 monthly rainfall and historic monthly rainfall statistics at Berrigan1 — measurements in millimetres

Berrigan	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Annual
2022–23 rainfall	12.5	53.8	70.3	178.6	103.8	24.5	48.2	1.0	25.2	47.5	14.1	66.5	646.0
Historical mean	39.2	42.4	39.1	42.4	32.9	32.6	31.6	29.8	34.6	34.9	40.4	42.3	441.9
Historical median	34.7	39.7	32.2	34.6	26.9	22.0	22.0	19.1	24.7	26.4	28.2	38.3	426.5
Historical low	0.0	0.3	1.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	168.4
Historical high	108.4	124.2	133.6	178.6	154.7	247.9	264.0	159.0	181.3	159.3	162.1	115.3	932.4
Water year highest	1985-86	1888-89	2015-16	2021-22	1911-12	1929-30	1973-74	1968-69	1955-56	1938-39	1888-89	1930-31	1973-74

[1] Long-term statistics are from the Bureau of Meteorology — climate data online, using the climatic stations '72043 — Tumbarumba post Office', '74009 — Berrigan Post Office' and '75046 — Moulamein Post Office'. Historic record statistics are 1886 to 2023 for Tumbarumba, 1875 to 2023 for Berrigan and 1888 to 2023 for Moulamein.

Table 3: 2022–23 monthly rainfall and historic monthly rainfall statistics at Moulamein[1] — measurements in millimetres

Moulamein	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Annual
2022–23 rainfall	35.2	14.6	27.6	31.2	65.2	16.5	65.0	1.8	88.6	54.2	40.8	22.2	462.9
Historical mean	31.0	33.6	31.2	33.3	28.5	30.7	23.6	23.8	26.3	25.9	34.2	33.3	355.1
Historical median	29.3	27.8	24.6	26.7	19.5	19.2	13.1	12.5	16.1	18.9	30.4	26.9	340.4
Historical low	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	151.6
Historical high	103.3	123.7	111.7	114.9	145.9	190.2	180.8	151.1	154.2	122.4	110.4	160.3	872.6
Water year highest	1935-36	1957-58	1905-06	1972-73	1888-89	1929-30	1973-74	1945-46	1905-06	1973-74	1905-06	1922-23	1973-74

Figure 5: Murray catchment annual rainfall for 2022–23

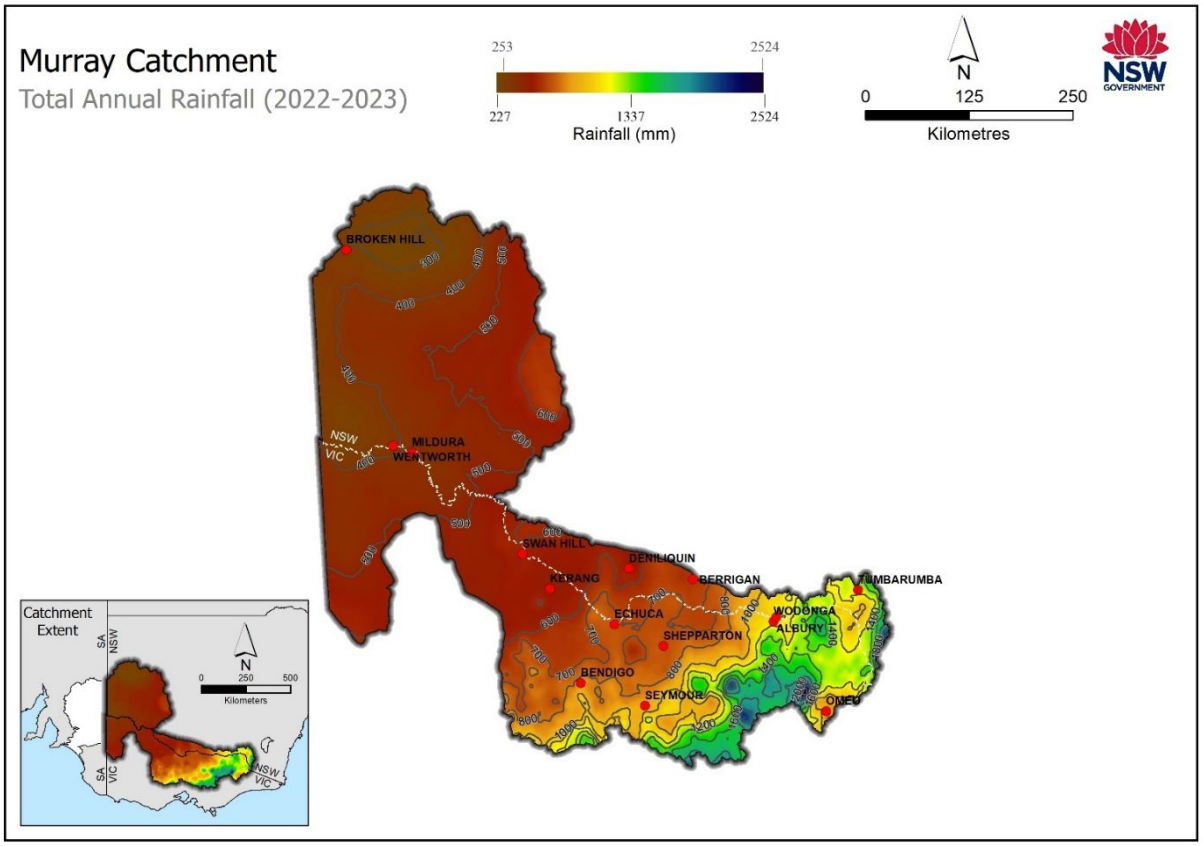
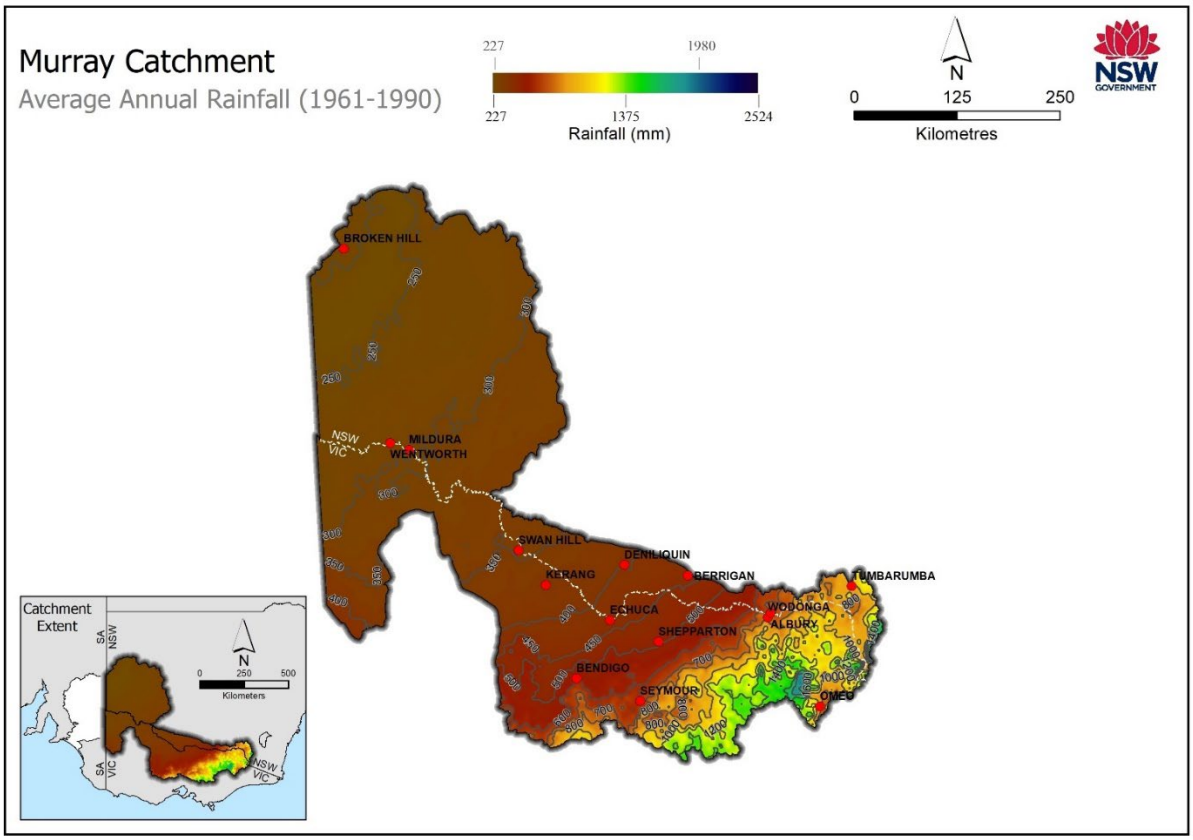


Figure 6: Average annual rainfall in the Murray catchment (1961–90)



Dam inflows and volume

Inflows

Historically, the long-term average annual inflow[2] at the Hume storage site has varied significantly, cycling through prolonged periods of wet and dry flow regimes. Broadly, the data (Figure 7) illustrates predominately:

- dry conditions from the late 1890s to around 1950, with a period of average conditions from 1920 to 1940
- wet conditions from around 1950 to the late 1990s, with a period of dry conditions through the 1960s and average conditions through the 1980s
- trend of continuing drier conditions from the late 1990s to present.

Dartmouth followed similar patterns with two notable exceptions: a wet period in the late 1910s and drying from mid-1970s to late 1980s (Figure 11).

Hume Dam inflow

For the reporting period natural inflows into Hume dam (excluding regulated contributions from the Snowy Hydro Scheme, and transfers from Dartmouth storage) were 5,351,416 megalitres (Figure 9), which is:

- 245% of the long–term median natural inflow (2,186,000 megalitres per year)
- very high relative to the historical record, exceeding 96% of years on record
- the 2nd consecutive year of above average inflow

The highest inflow (considering all sources of inflow) in the reporting period occurred 30 December 2022, with an inflow rate of 124,988 megalitres per day (Figure 10). Due to the regulating impact of Snowy Hydro transfers, there is not a strong relationship between storage inflow to Hume Dam and catchment rainfall, particularly in dry seasons.

Total storage inflow to Hume Dam including regulated transfers from upstream infrastructure was 7,986,180 megalitres for the reporting period.

Dartmouth inflow

Dartmouth inflows were 1,684,446 megalitres (Figure 13), which is:

- 201% of the long-term median inflow (839,450 megalitres per year)

[2] While the long-term annual historical unregulated storage inflows for Hume Dam were obtained from the Murray–Darling Basin Authority the 2011–12 to current unregulated inflows were derived by NSW Department of Primary Industries undertaking a back-calculated storage balance. See Note 11 in this GPWAR.

- very high relative to the historical record, exceeding 97% of years on record
- the 2nd consecutive year of above average inflow

The highest daily inflow occurred on 15 November 2022, with a volume of 33,124 megalitres entering the storage (Figure 14).

Menindee Lakes inflow

Flows at Wilcannia serve as an estimate of potential inflow available for the Menindee Lakes storage system. For the reporting period, the flow at Wilcannia totalled 9,545,304 megalitres (Figure 15), which is:

- 1115% of the long-term median flow at this location (856,142 megalitres per year)
- very high relative to the historical record, exceeding 98% of years on record
- the 2nd consecutive year of above average inflow.

The highest daily flow volume occurred on 27 December 2022, where 100,966 megalitres per day was recorded (Figure 16).

Lake Victoria inflow

Lake Victoria is primarily utilised as a re-regulating storage for water supply. Inflow totalled 1,022,250 megalitres for the reporting period. Daily inflows and rainfall are illustrated in Figure 17. As the storage is primarily re-regulating flows there is not a strong relationship between inflow and local rainfall.

Figure 7: Long-term annual flow upstream of Hume Dam and cumulative deviation from mean.

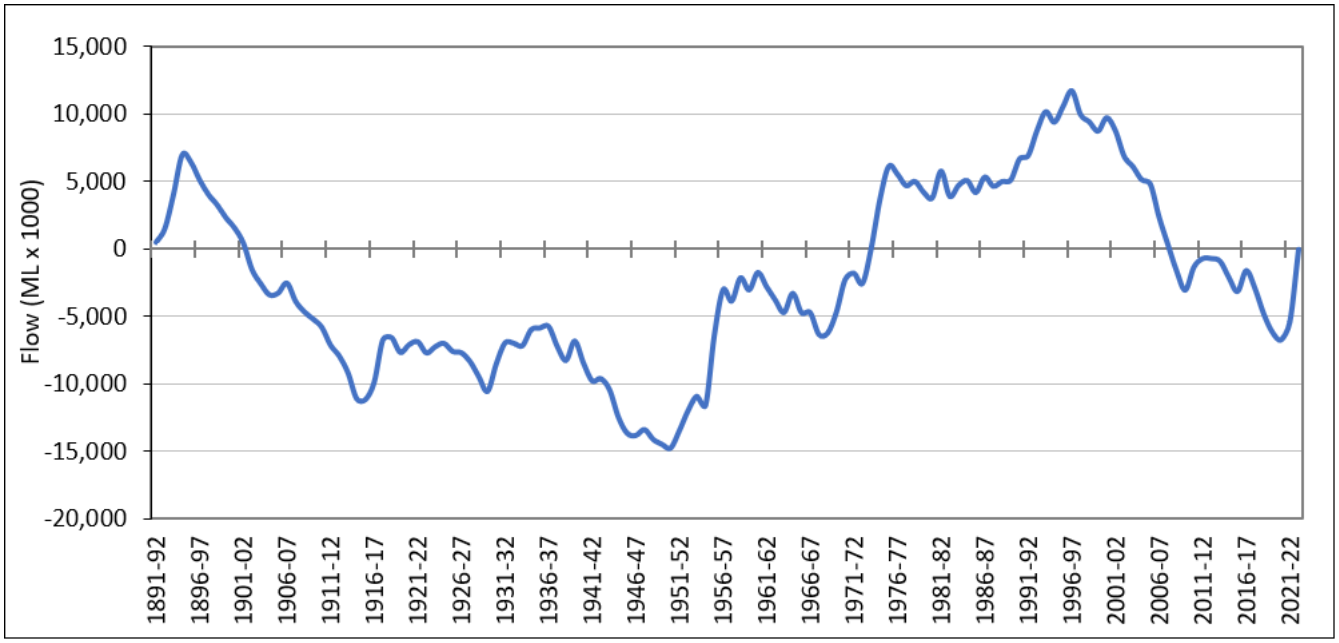


Figure 8: Hume Dam long-term sequence of years below mean inflow

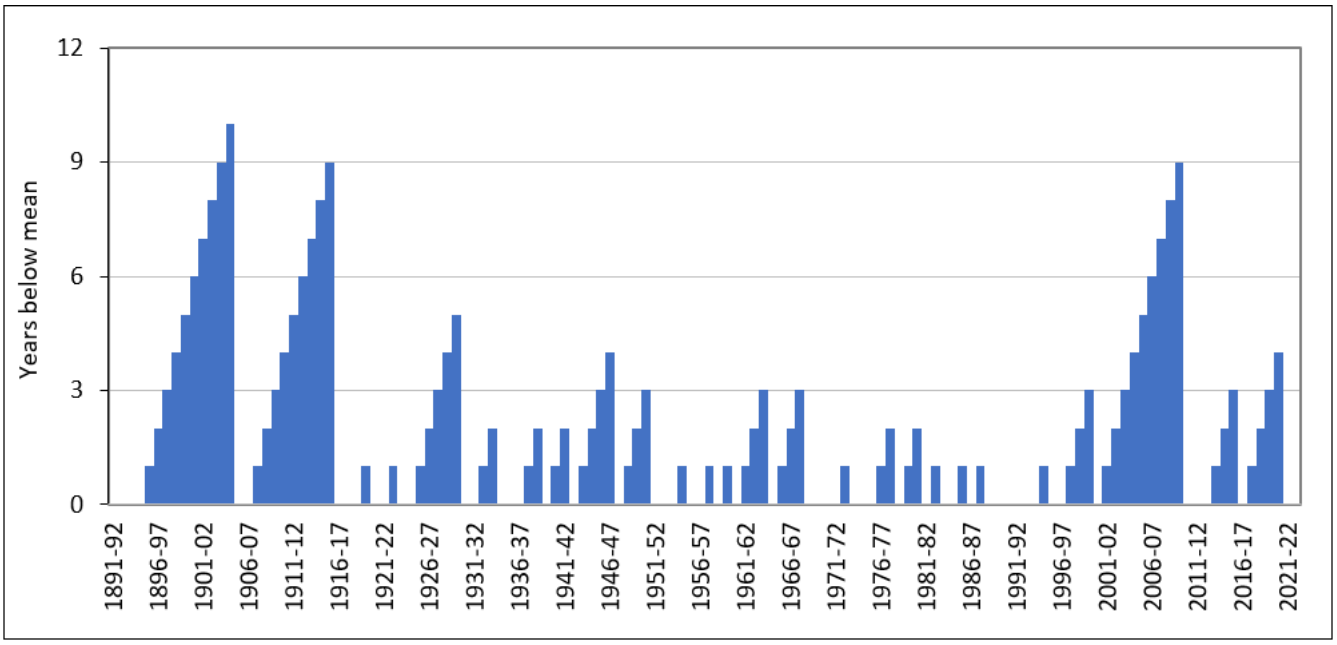


Figure 9: Long-term natural inflows to Hume Dam against mean and reporting year inflow

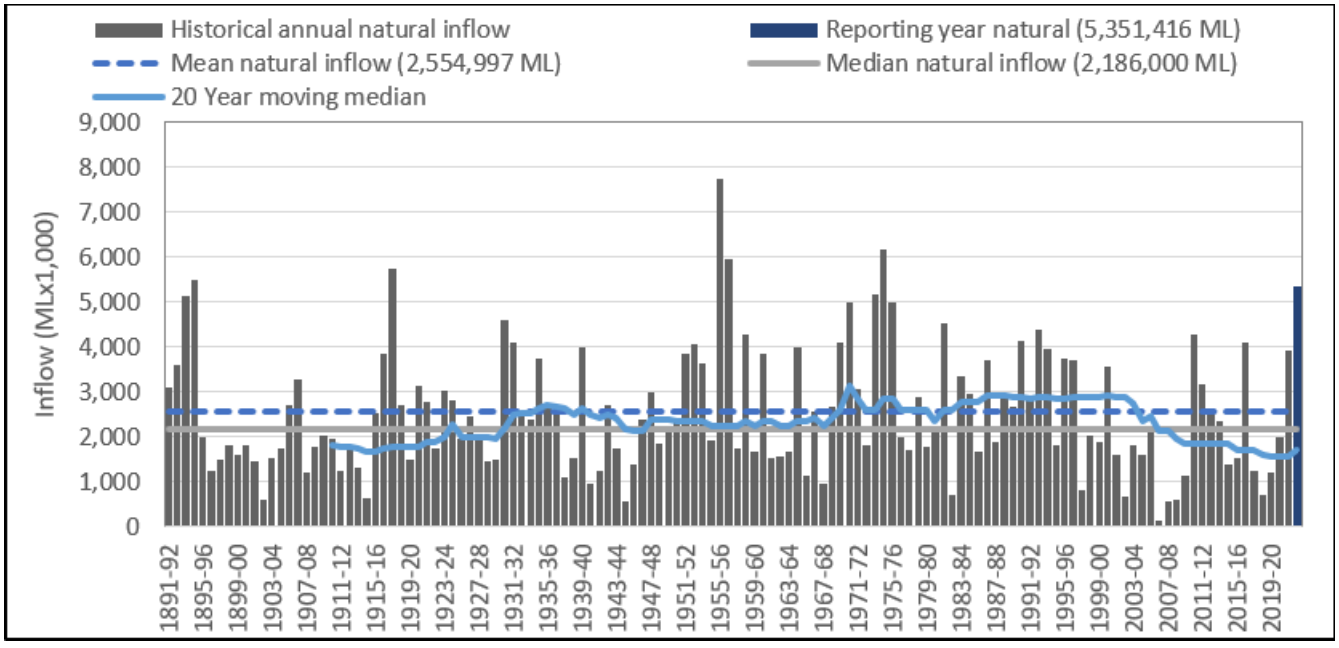


Figure 10: Daily inflows and rainfall at Hume Dam for the reporting period (natural and regulated)

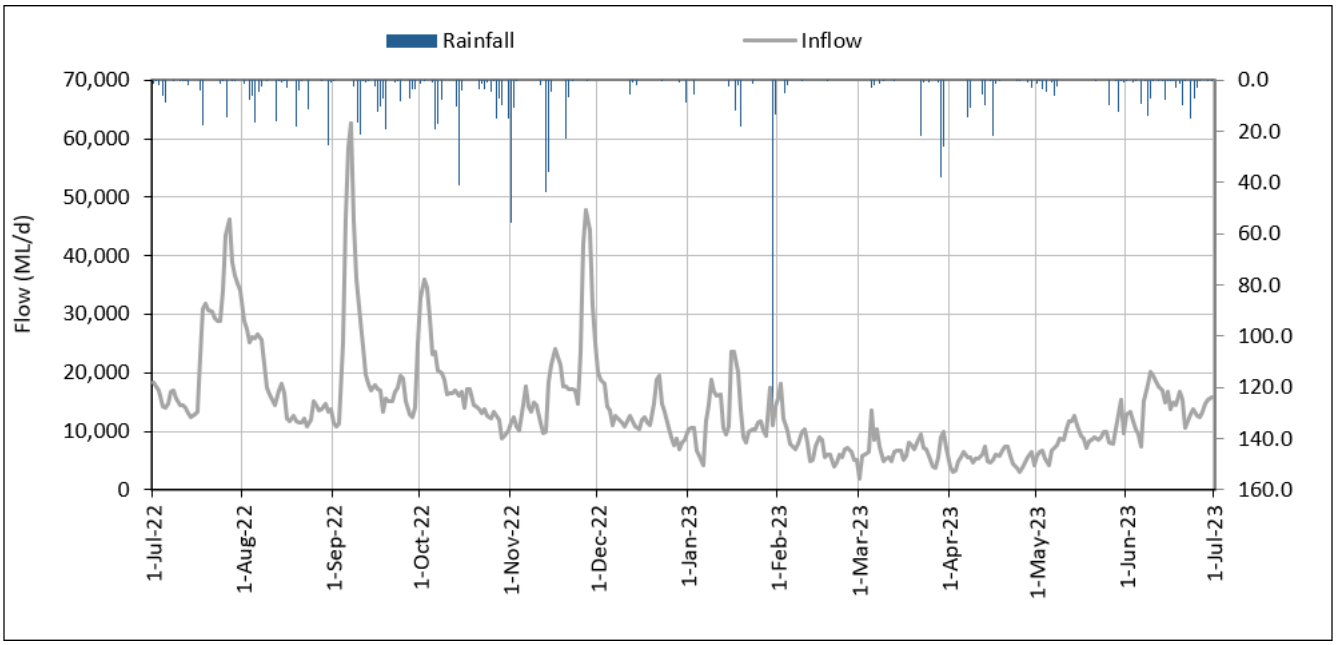


Figure 11: Long-term annual flow upstream of Dartmouth storage and cumulative deviation from mean

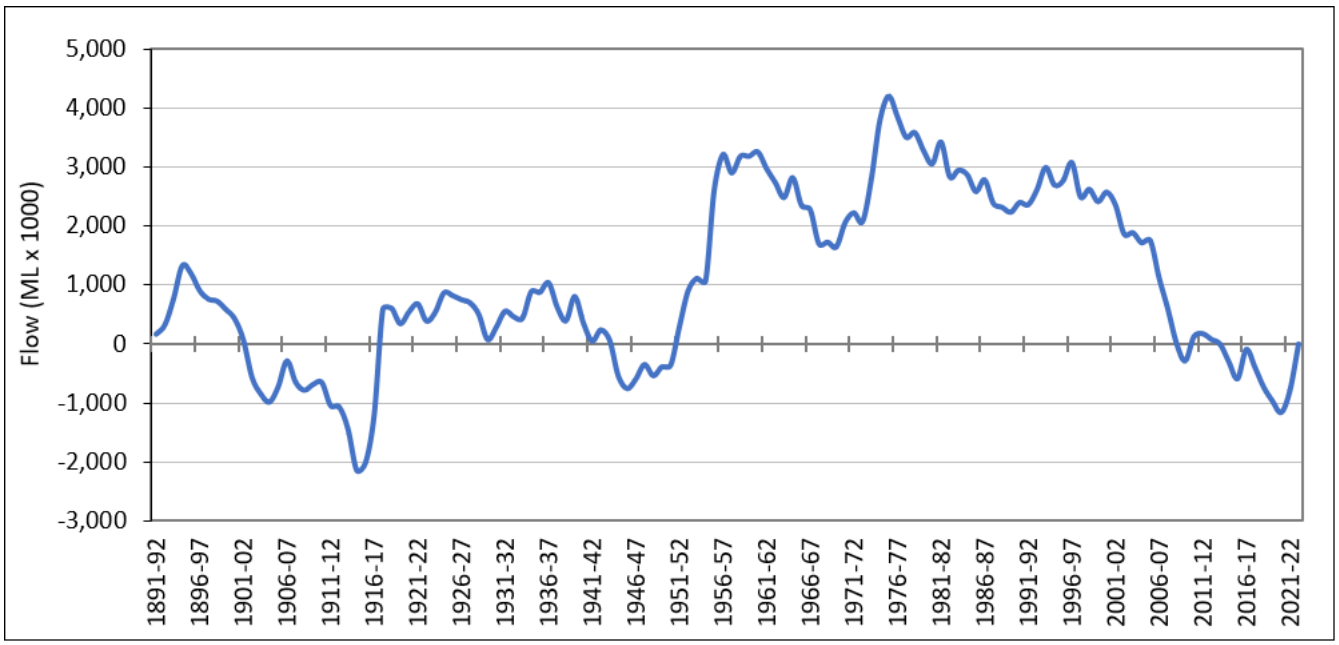


Figure 12: Dartmouth Dam long-term sequence of years below mean inflow

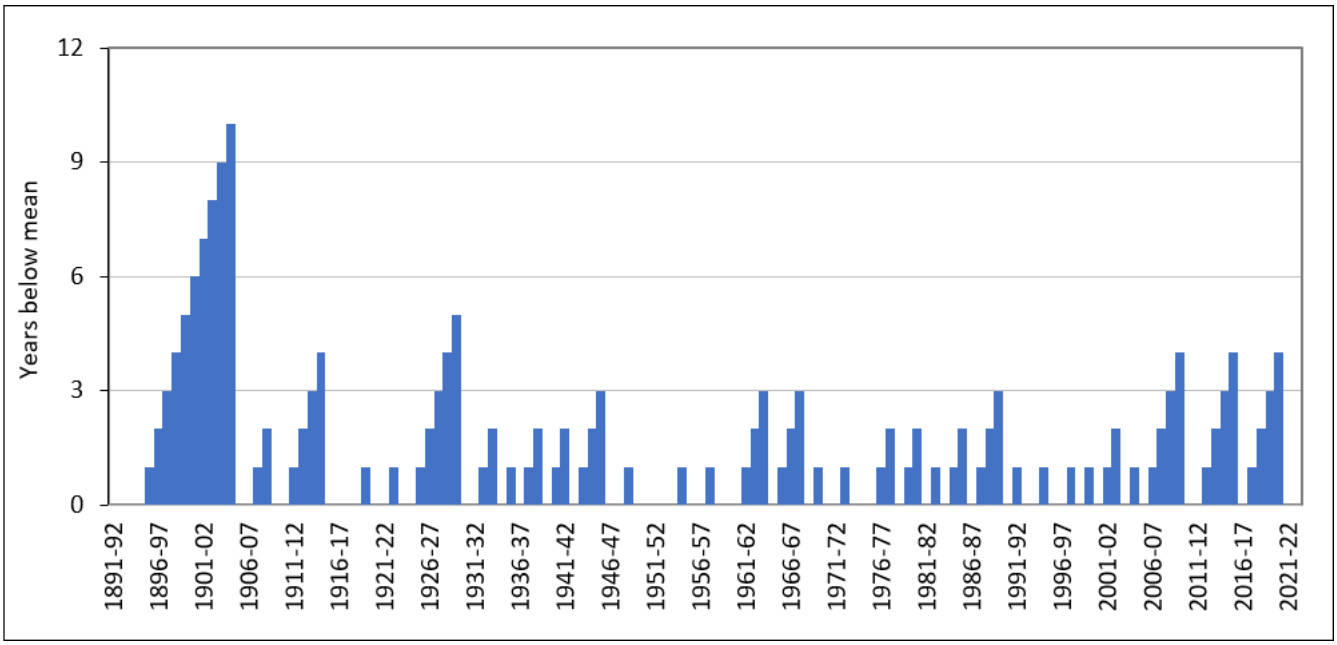


Figure 13: Long-term inflows to Dartmouth Dam against mean and reporting year inflow

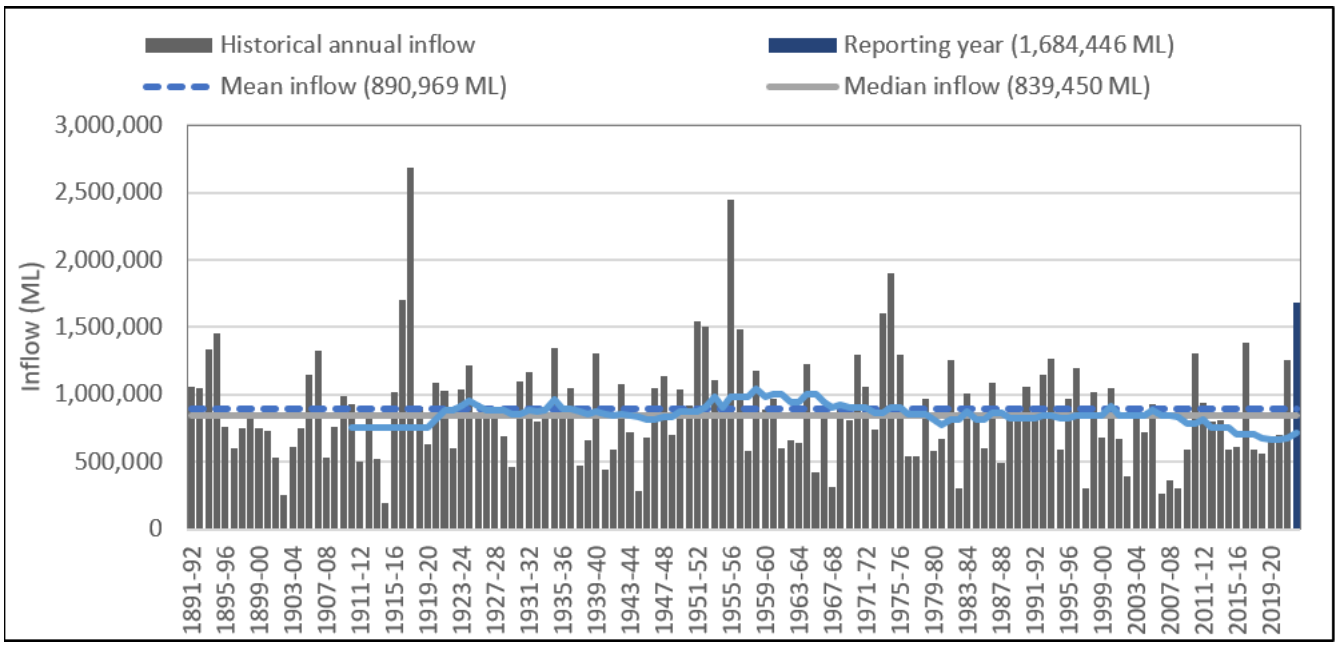


Figure 14: Daily inflows and rainfall at Dartmouth Dam for reporting period

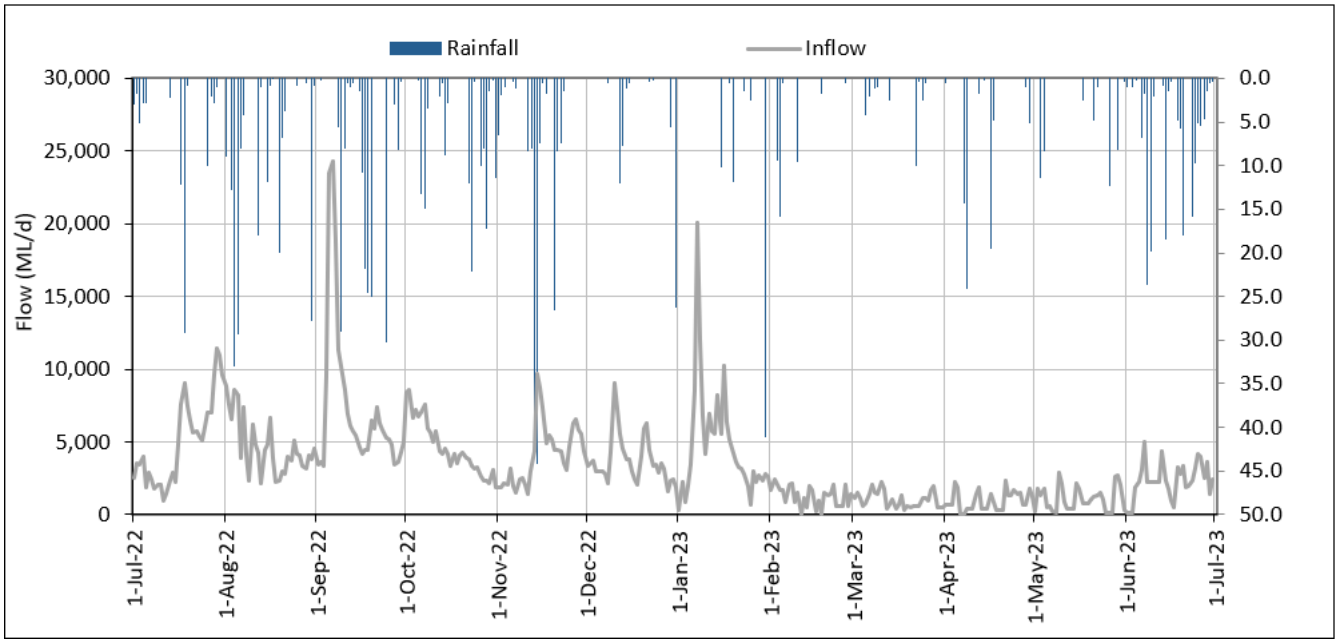


Figure 15: Long-term potential inflow to Menindee Lakes (flow at Wilcannia) against mean and reporting year inflow

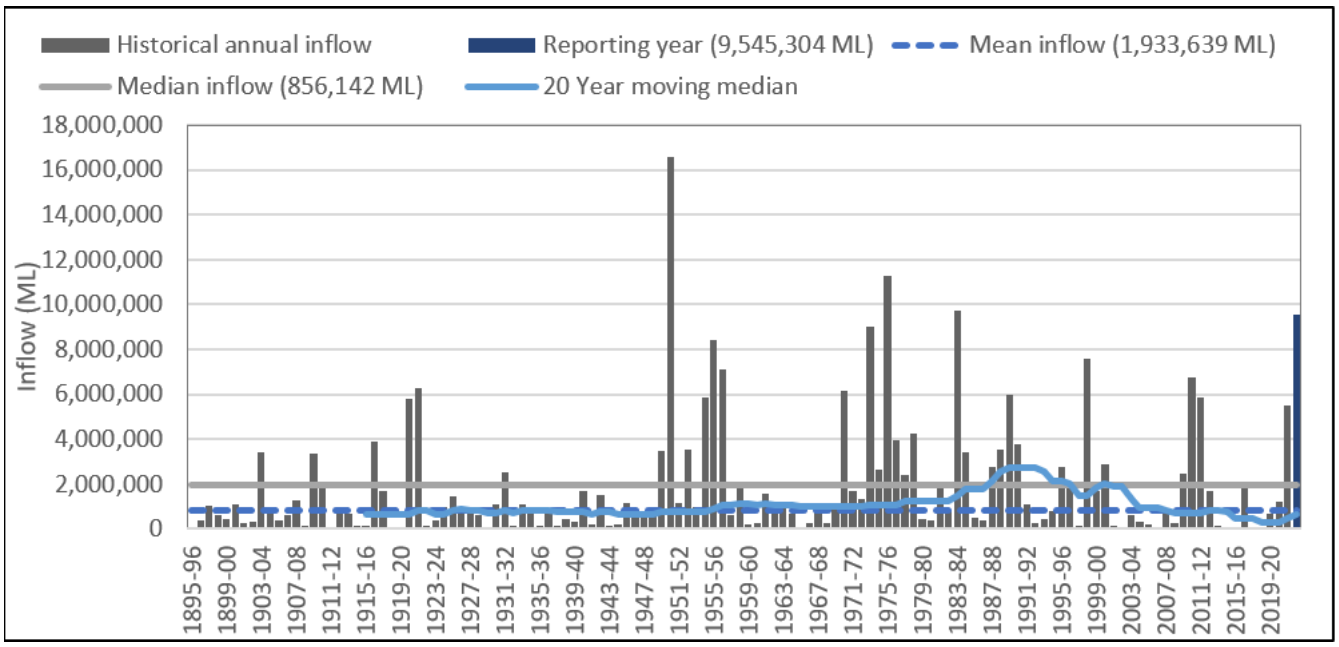


Figure 16: Daily flow at Wilcannia for reporting period

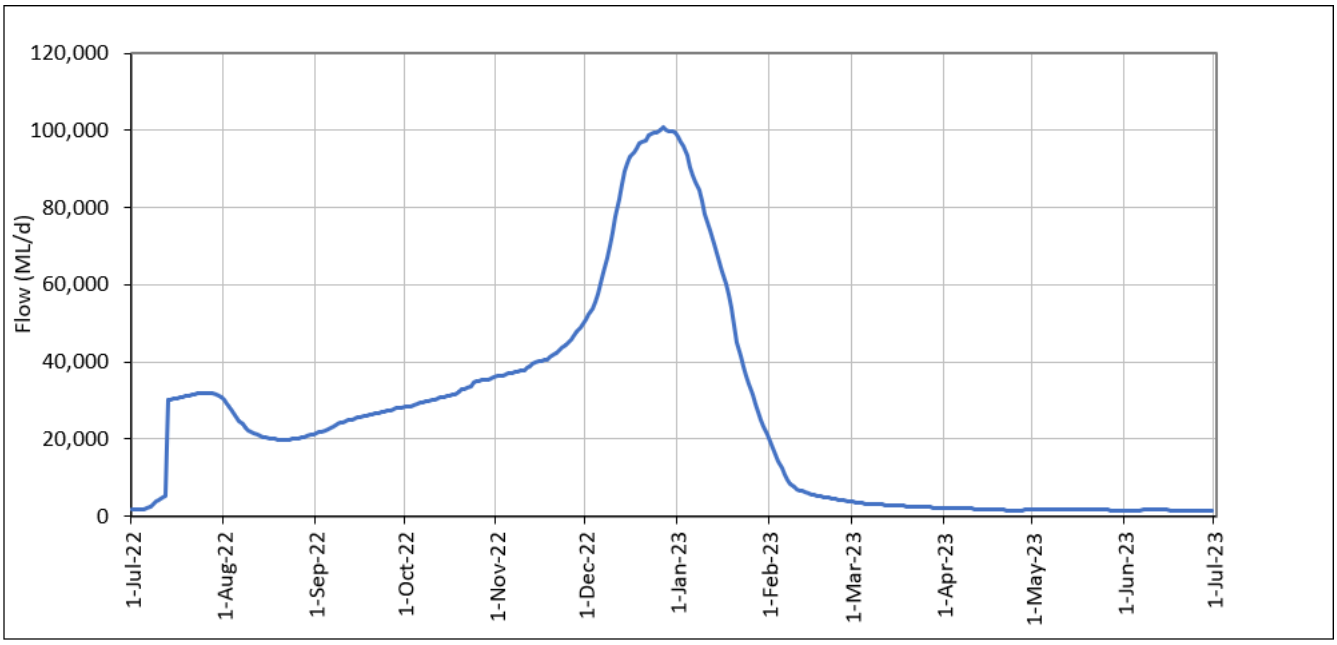
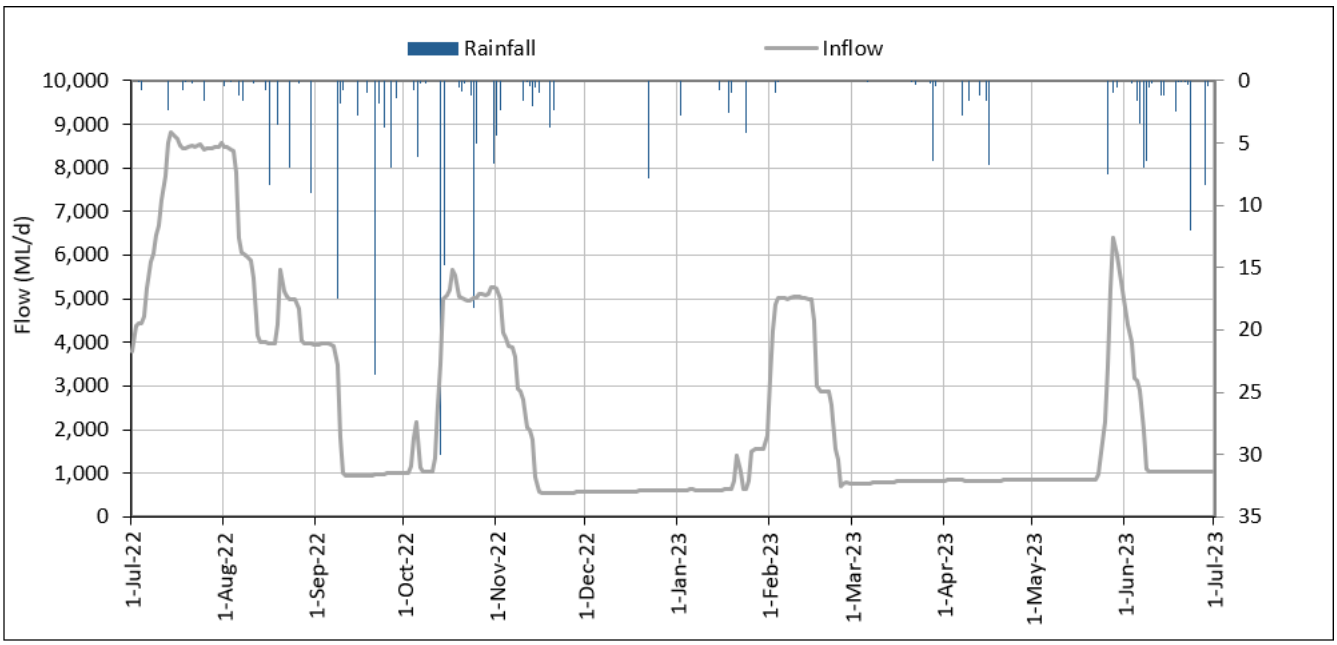


Figure 17: Daily inflows and rainfall at Lake Victoria for reporting period



Storage volume

Hume

- At the commencement of the reporting period, the volume held in Hume dam was 2,822,047 megalitres or 94% of full supply capacity (Figure 18).
- At the end of the reporting period, the volume held in Hume dam was 2,911,128 megalitres or 97% of full supply capacity, an increase of 3% for the water year.

- The maximum volume held during the reporting period was 2,992,629 megalitres on 5 November 2022.

Dartmouth

- At the commencement of the reporting period, the volume held in Dartmouth dam was 3,663,752 megalitres or 95% of full supply capacity (Figure 20).
- At the end of the reporting period, the volume held in Dartmouth dam was 3,742,091 megalitres or 97% of full supply capacity, an increase of 2% for the water year.
- The maximum volume held during the reporting period was 3,934,941 megalitres on 16 November 2022.

Menindee Lakes

- At the commencement of the reporting period, the volume held in Menindee Lakes was 1,903,357 megalitres or 110% of full supply capacity (Figure 22).
- At the end of the reporting period, the volume held in Menindee Lakes was 1,423,096 megalitres or 82% of full supply capacity a decrease of 28% for the year.
- The maximum volume held in storage during the reporting period was 2,042,168 megalitres or 118% on 30 December 2022.
- The total combined storage volume in the Menindee Lakes System remained above 640,000 megalitres during the reporting period so the volume of water above 480,000 ML becomes part of the River Murray shared water resource.

Lake Victoria

- At the commencement of the reporting period, the volume held in Lake Victoria was 384,652 megalitres or 57% of full supply capacity (Figure 24).
- At the end of the reporting period, the volume held in Lake Victoria was 536,307 megalitres or 79% of full supply capacity.
- The maximum volume held during the reporting period was 599,403 megalitres on 8 October 2022

Figure 18: Hume Dam volume and percentage of full supply volume

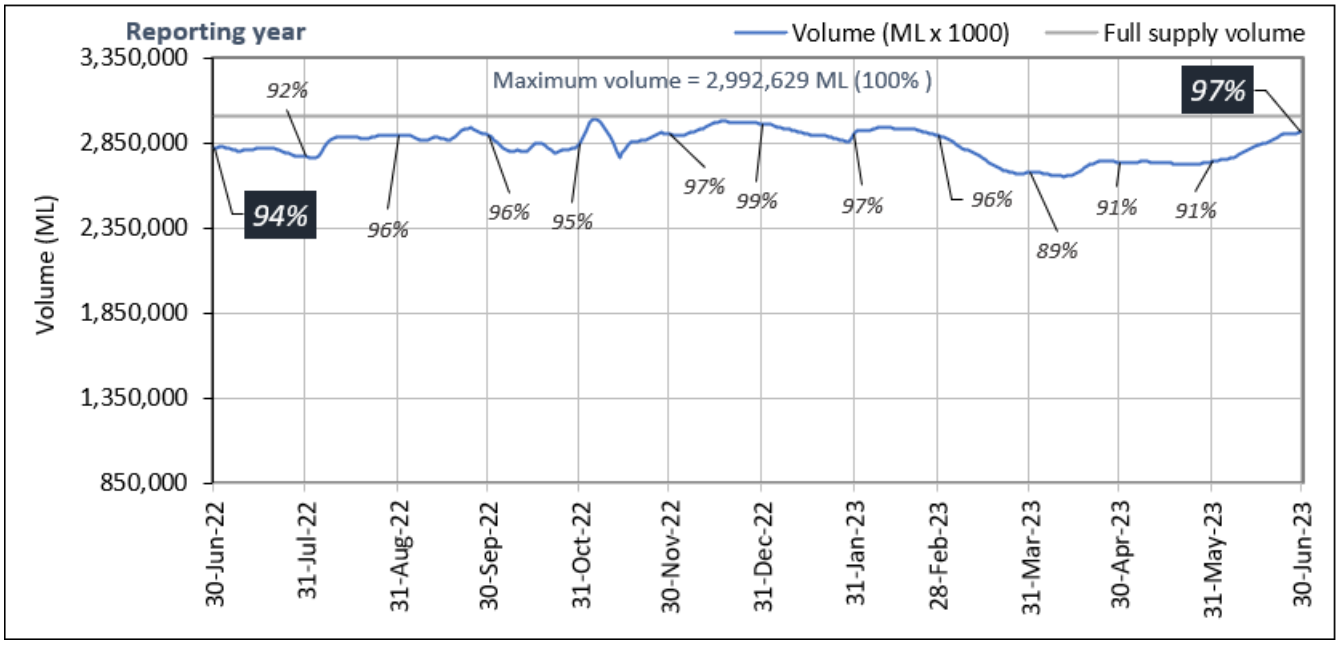


Figure 19: Hume Dam historical storage volumes

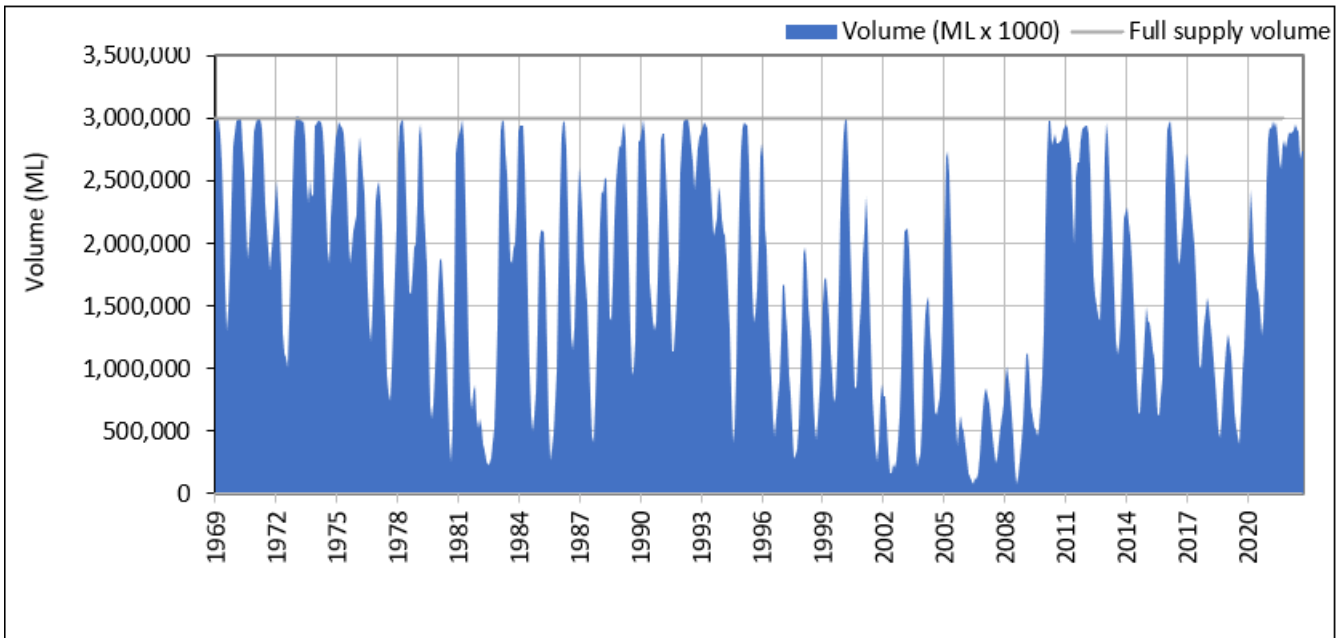


Figure 20: Dartmouth Dam volume and percentage of full supply volume

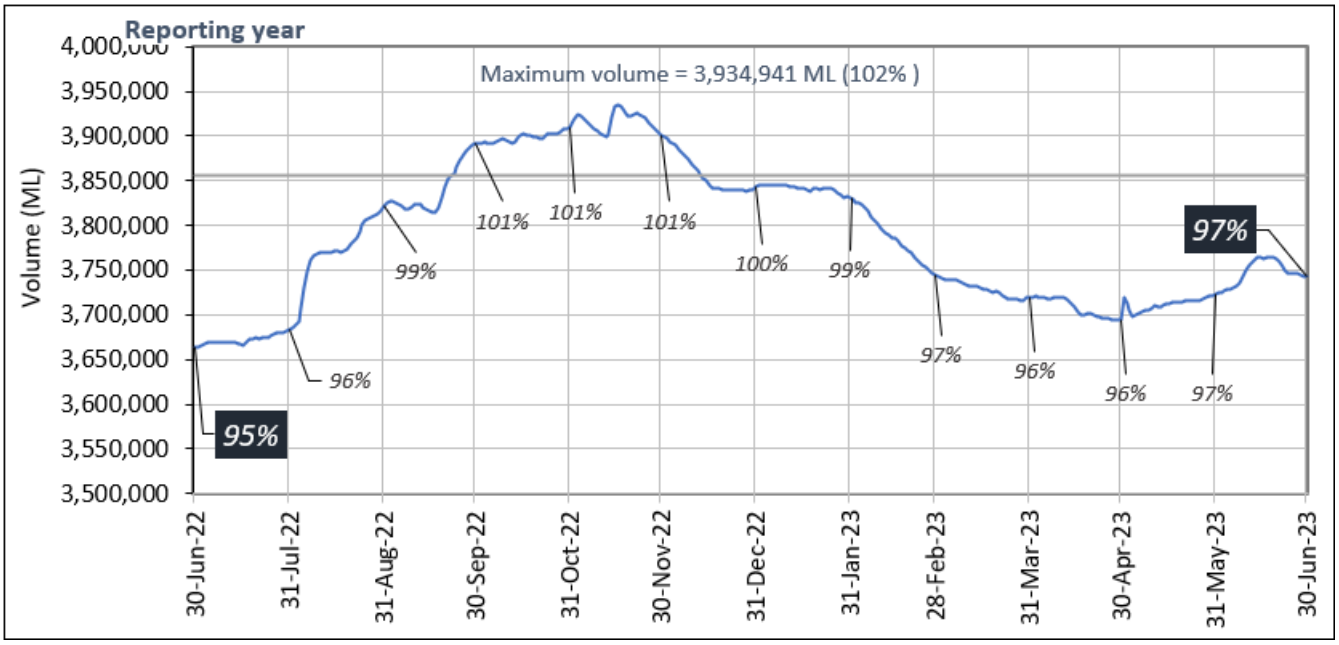


Figure 21: Dartmouth Dam historical storage volumes

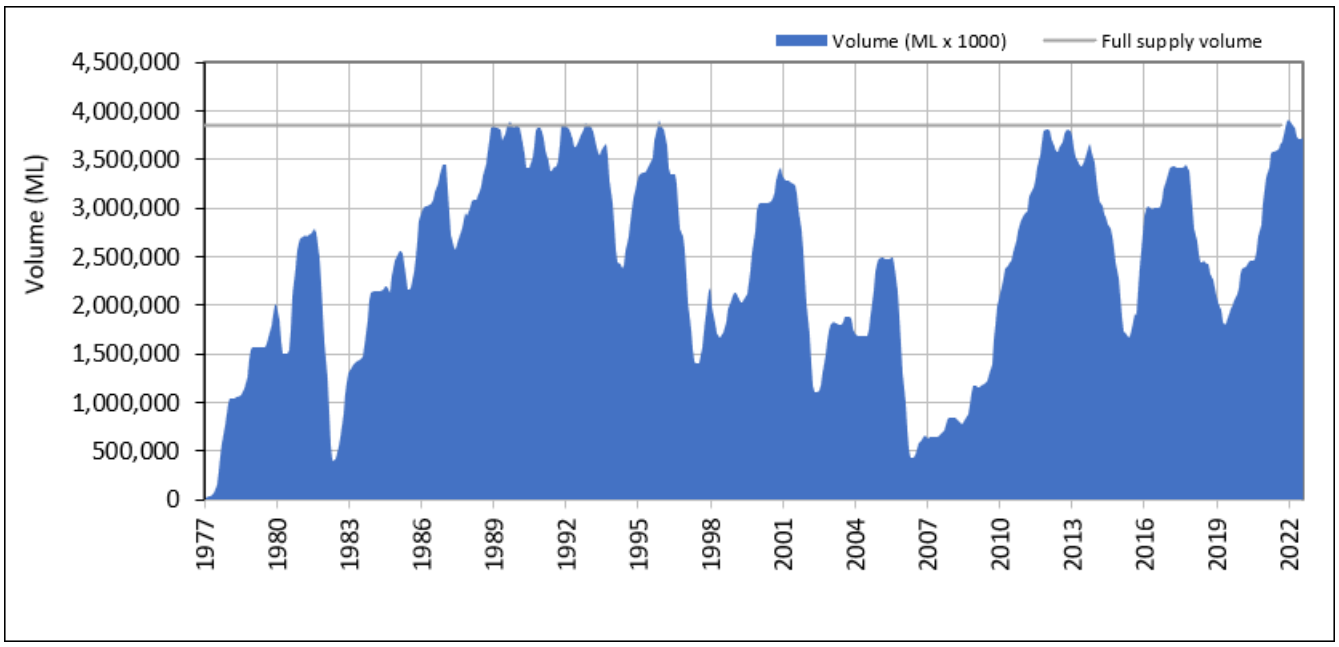


Figure 22: Combined Menindee Lakes volume and percentage of full supply volume

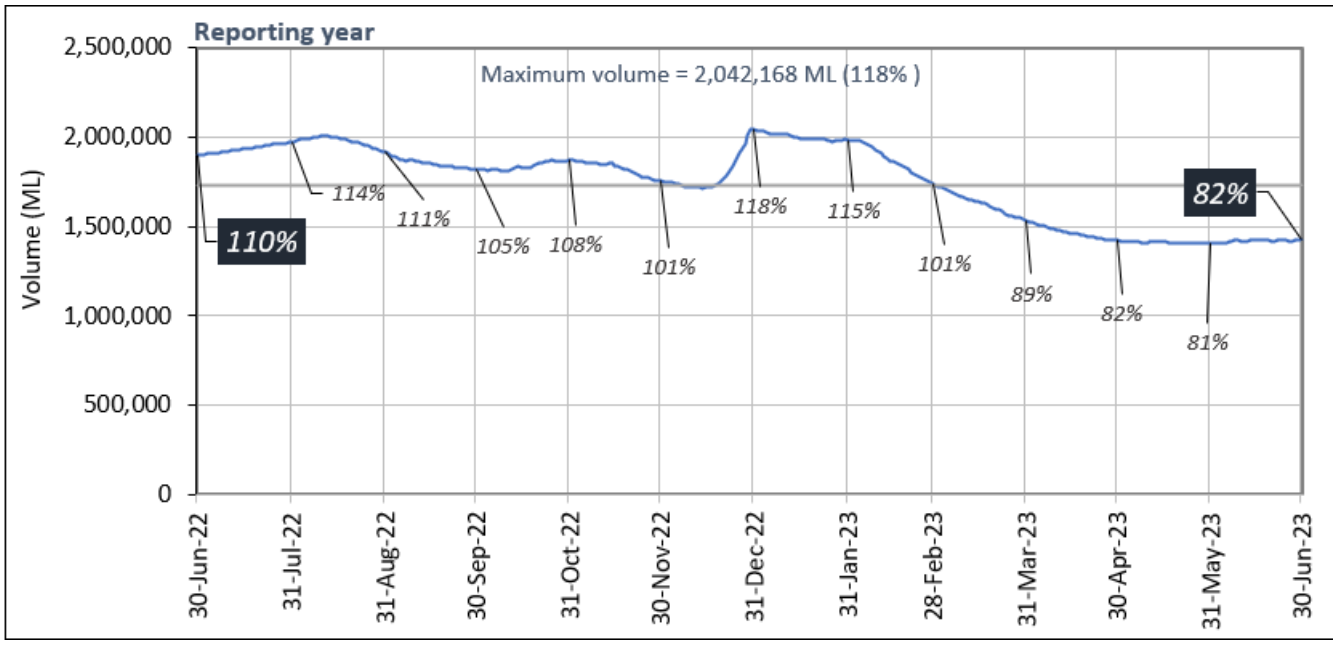


Figure 23: Menindee Lakes historical storage volumes

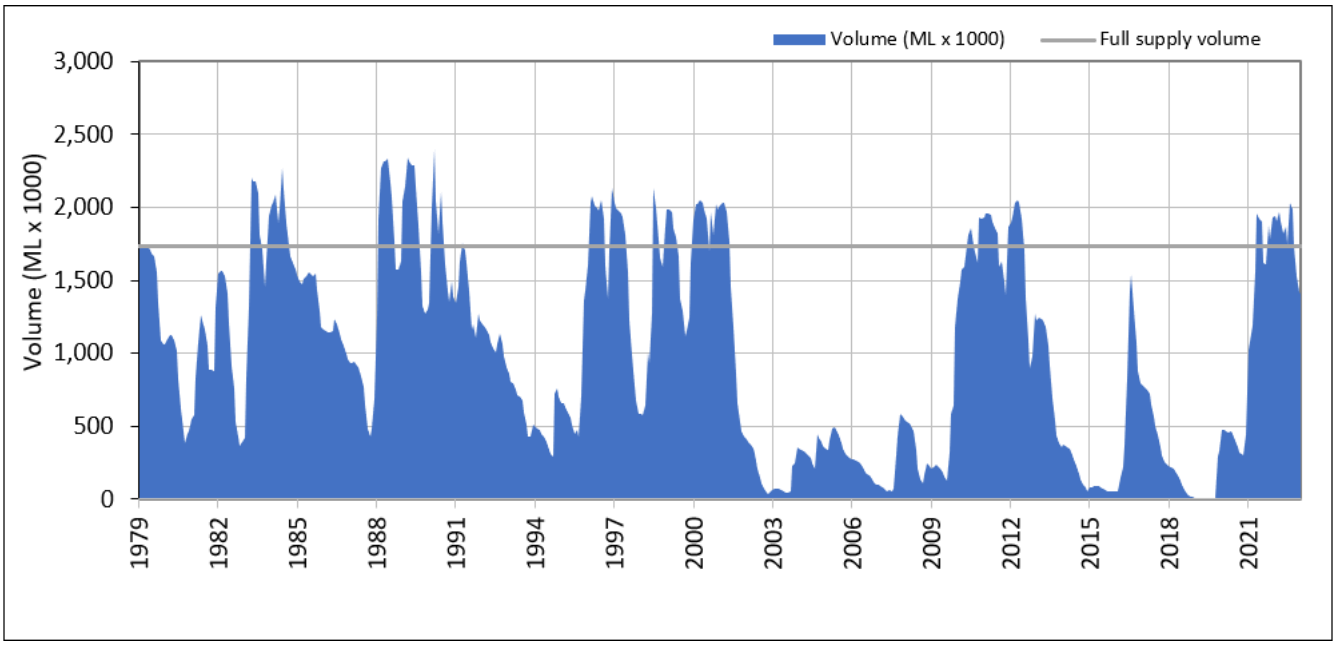
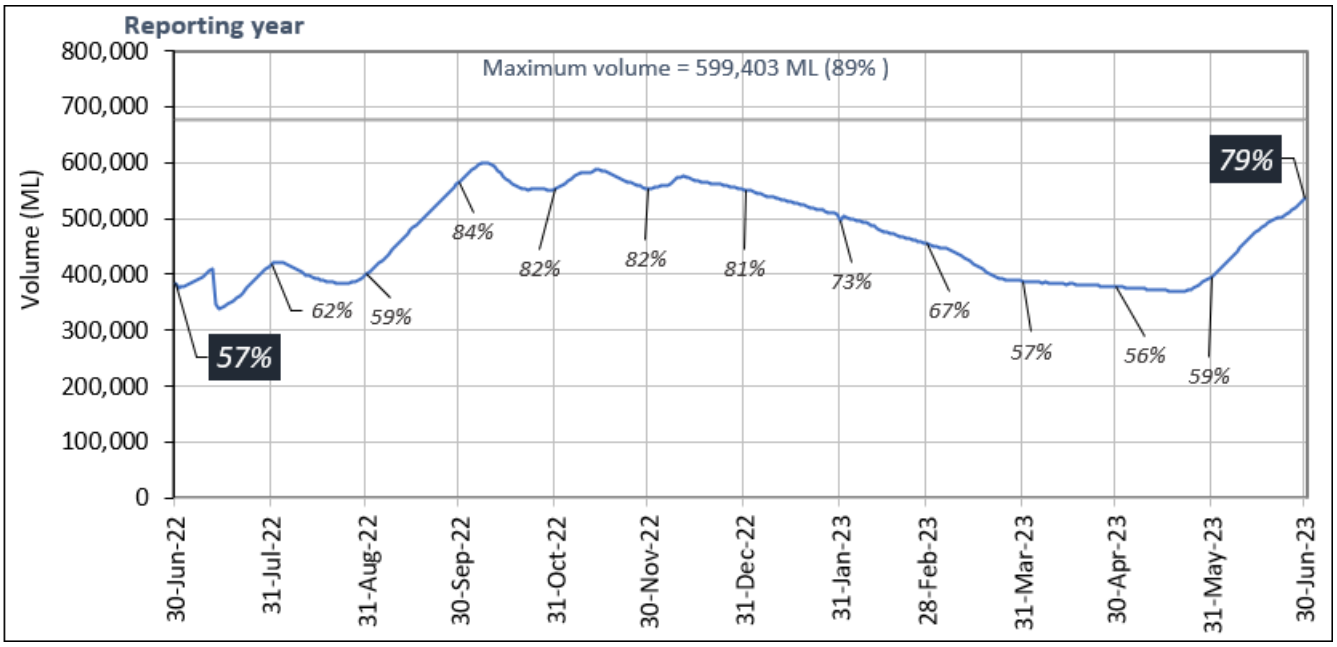


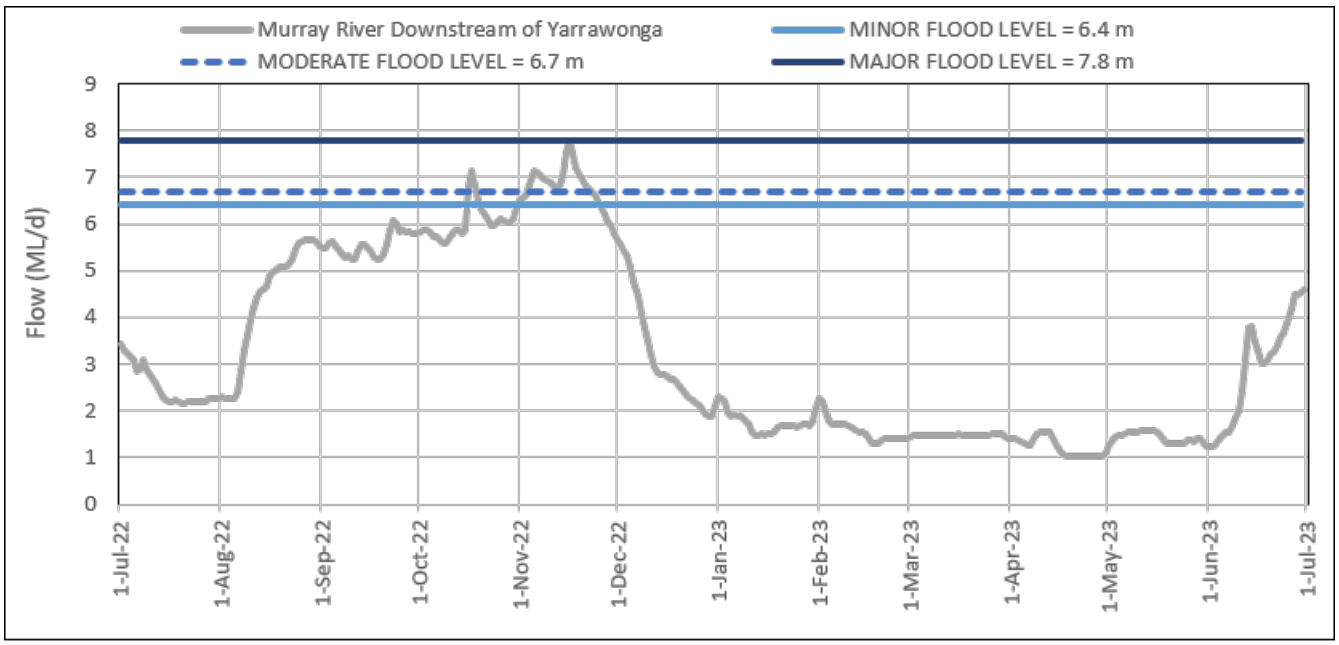
Figure 24: Lake Victoria volume and percentage of full supply volume



Major flow events

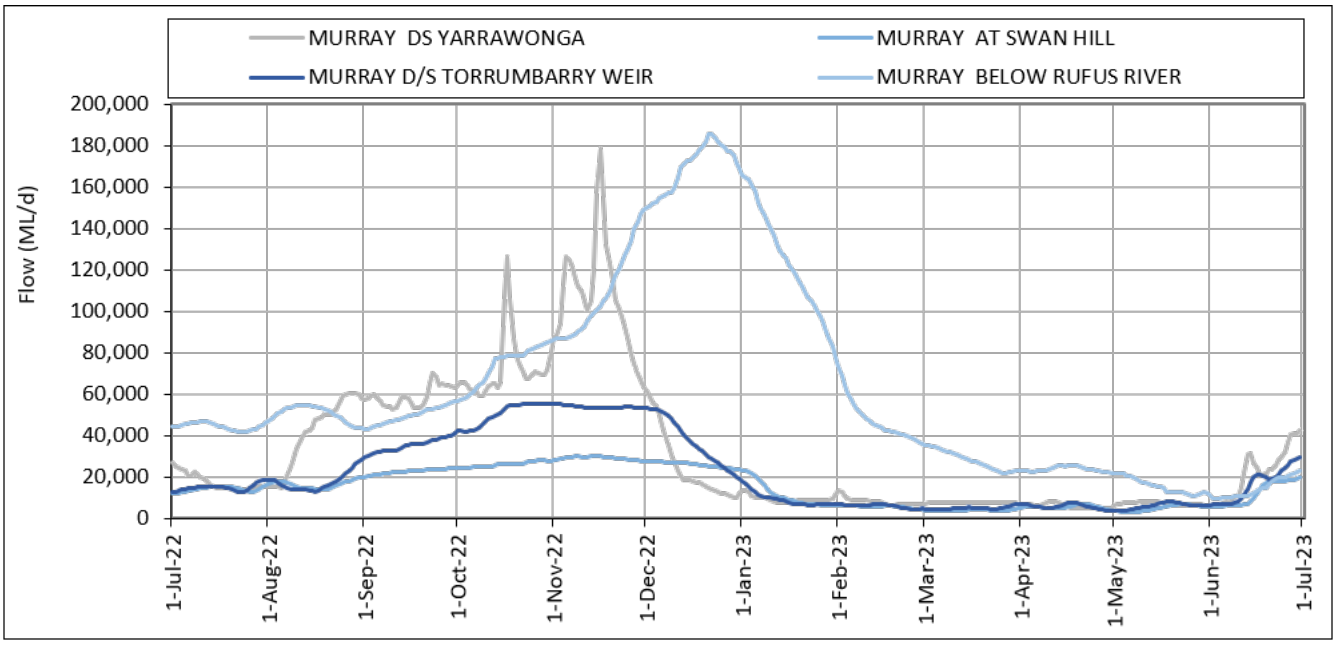
There were two separate events that exceeded the flood level indicators for the Murray River Downstream of Yarrawonga within the reporting period. The Largest event occurred in November 2022 with a peak of 7.8 metres on the 16 November 2022. The next largest event occurred in October 2022 with a peak of 7.1 metres on the 17 October 2022. River height at Yarrawonga remained below the major flooding indicator level of 7.8 metres for the entire year (Figure 25).

Figure 25: River height of Murray River downstream of Yarrawonga Weir



A peak average daily flow rate of approximately 179,000 megalitres per day occurred in November 2022 downstream of Yarrawonga Weir on the Murray River (Figure 26).

Figure 26: Flows in the Murray River for the reporting period



Surface water resources and management

Legislation

The water source was managed under rules and requirements set out in the *Water Sharing Plan for the New South Wales Murray and Lower Darling Regulated Rivers Water Sources 2016*. This 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 *Water Management Act 2000*.

Access rights

- Access licence share components increased (net) by 45 in the reporting period. Changes were due to increase in General Security by 50 and an decrease in Domestic and Stock [Stock] by 5 (Figure 27).
- Total issued share component on 30 June 2023 was 2,500,175, including 252,579 supplementary shares (Table 4).

Figure 27: Issued share component since the introduction of the water sharing plan

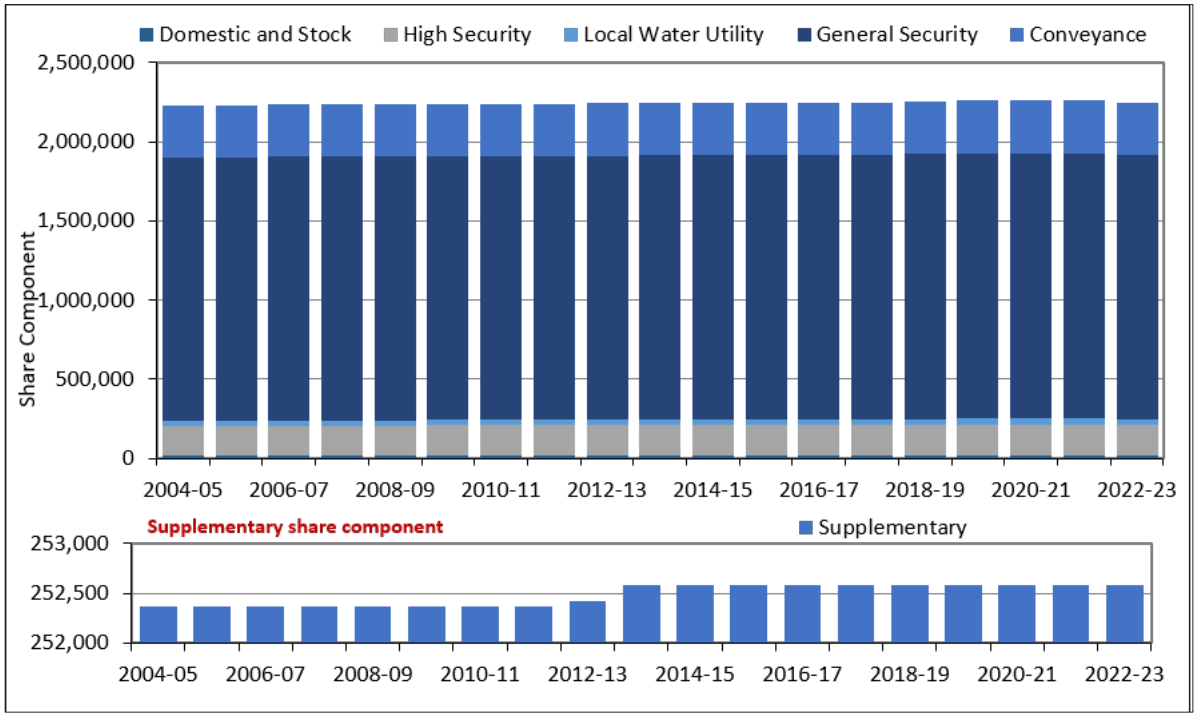


Table 4: Issued share component on 30 June 2023

Category	Issued share component
Domestic And Stock	13,700
Domestic And Stock (Domestic)	1,298
Domestic And Stock (Stock)	2,058
Local Water Utility[Domestic And Commercial]	8,694
Local Water Utility	33,497
Conveyance	330,000
General Security	1,674,096
High Security	189,704
High Security (Research)	1
High Security (Town Water Supply)	3,195
Regulated River (High Security) [Community and Education]	47
Supplementary Water	252,579
Total	2,508,869

Allocation account summary

A summary illustration of the accounting for Conveyance, General Security and High Security access licence categories in the NSW Murray River is provide in Figure 28, Figure 29 and Figure 30 respectively. Detailed information on the water accounts for all categories of licence issued are provided in Note 1 of this report.

Figure 28: Annual water account summary NSW Murray Conveyance

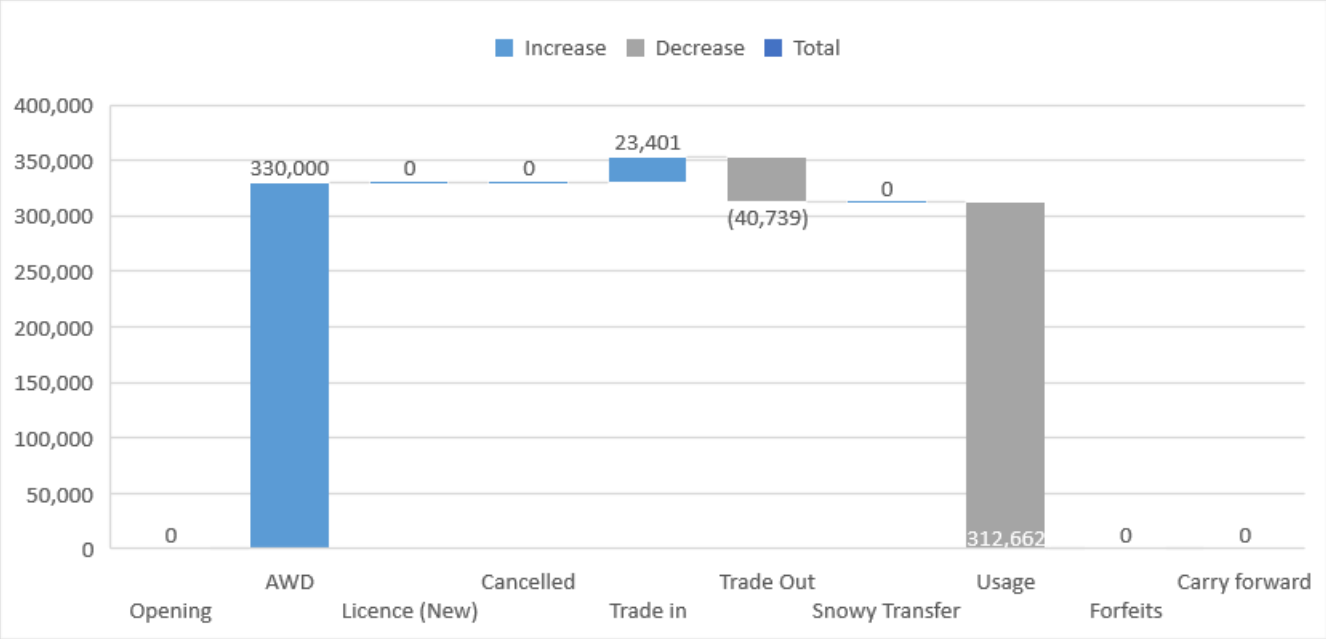


Figure 29: Annual water account summary NSW Murray General Security

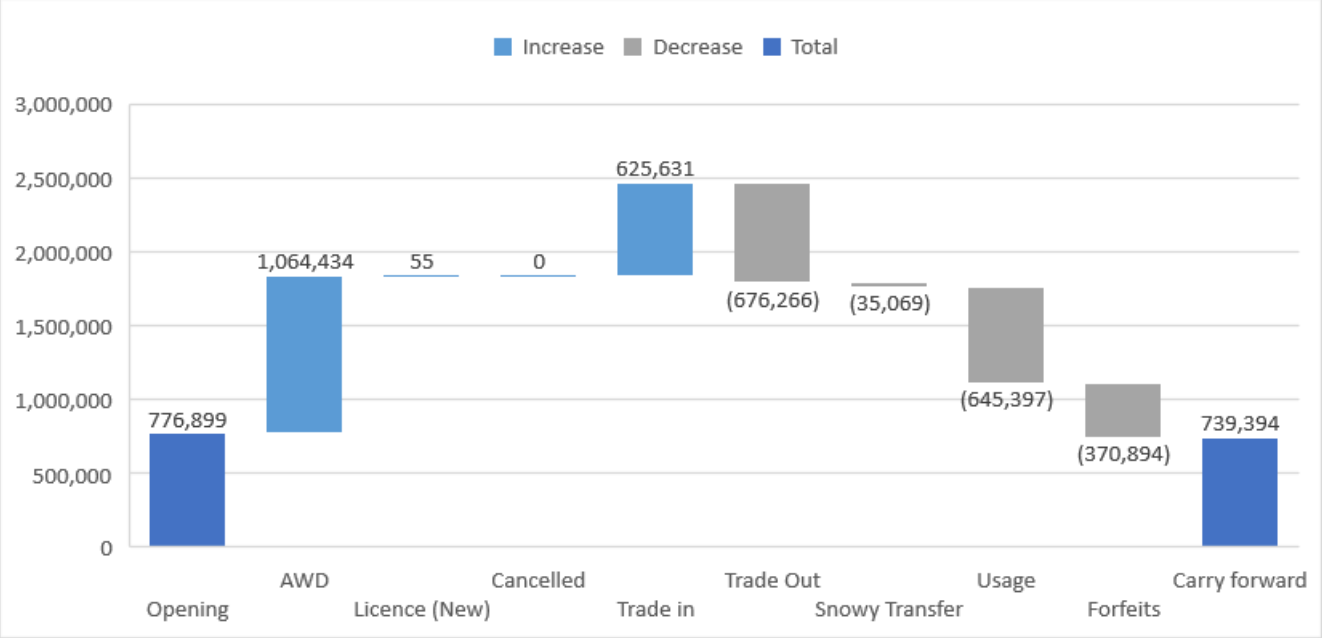
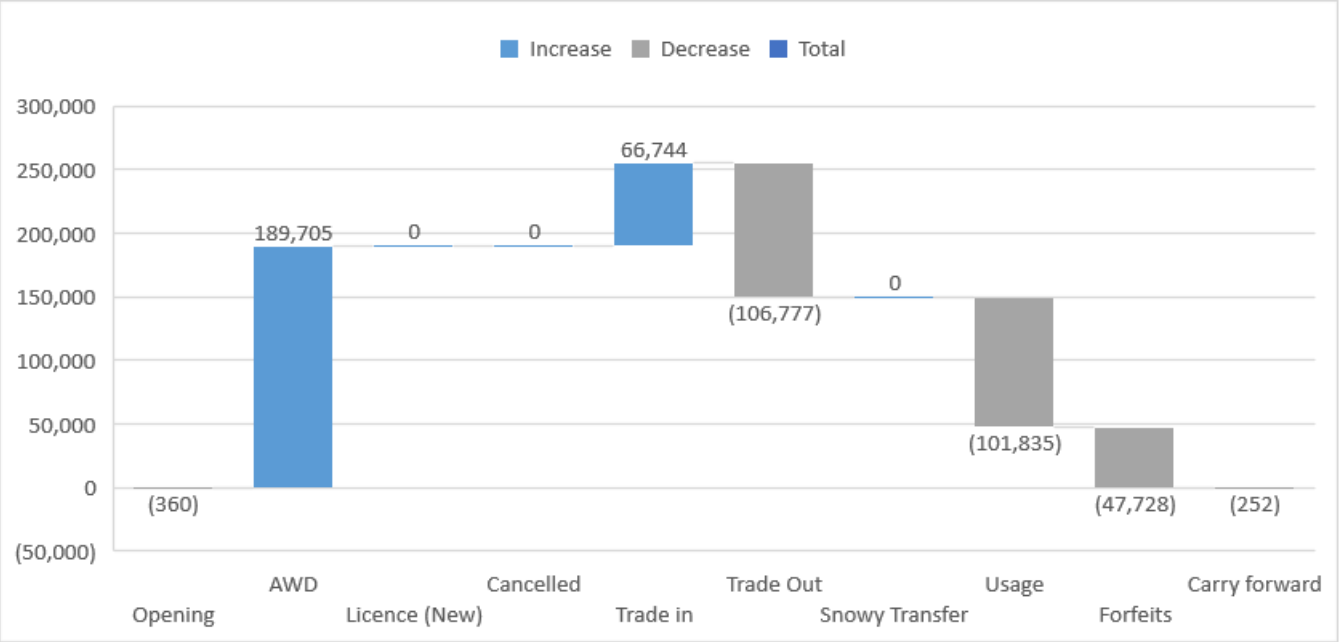


Figure 30: Annual water account summary NSW Murray High Security



Access licence account management

An annual accounting procedure is implemented in this water source to allow general-security licence holders to hold up to 1.1 megalitres per issued share and carryover up to 0.5 megalitres per issued share. All other categories have an account limit of 100% or one megalitre per share and cannot carryover water between water years. The access licence accounting rules are summarised in Table 5 and the rules for access to uncontrolled flow are summarised in Table 6.

Table 5: Water allocation licence accounting rules for the reporting period

Licence category	Carryover limit	AWD limit	AWD plus carryover limit	Annual use limit
Domestic and Stock	0%	100%	N/A	N/A
Domestic and Stock [Domestic]	0%	100%	N/A	N/A
Domestic and Stock [Stock]	0%	100%	N/A	N/A
Local Water Utility	0%	100%	N/A	N/A
Conveyance	0 ML/share	1 ML/share	N/A	N/A
General Security	0.5 ML/share	1.1 ML/share	1.1 ML/share	N/A
High Security	0 ML/share	1 ML/share	N/A	N/A
High Security (Community and Education)	0 ML/share	1 ML/share	N/A	N/A
High Security (Research)	0 ML/share	1 ML/share	N/A	N/A
High Security (Town Water Supply)	0 ML/share	1 ML/share	N/A	N/A

Licence category	Carryover limit	AWD limit	AWD plus carryover limit	Annual use limit
Supplementary Water	0 ML/share	1.0 ML/share[3]	N/A	N/A

Table 6: Uncontrolled flow access accounting rules for the reporting period

Licence category	AWD limit for uncontrolled flow access	AWD plus carryover plus uncontrolled usage limit
General Security	0.6 ML/share	1 ML/share

Extreme events stage and temporary water restrictions

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

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

Table 7 outlines the conditions that may be associated with different stages of criticality for surface water quality. Further information is available at
Drought, floods and extreme events | Water (nsw.gov.au)

Table 7: Determination of stages of criticality for surface water quantity

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

[3] a one-off additional allocation of 0.1 ML per share was made for supplementary water in 2022-23, as all other water needs had been met and that the NSW Murray Sustainable Diversion Limits (SDL) is 21% in credit, indicating that there is under use.

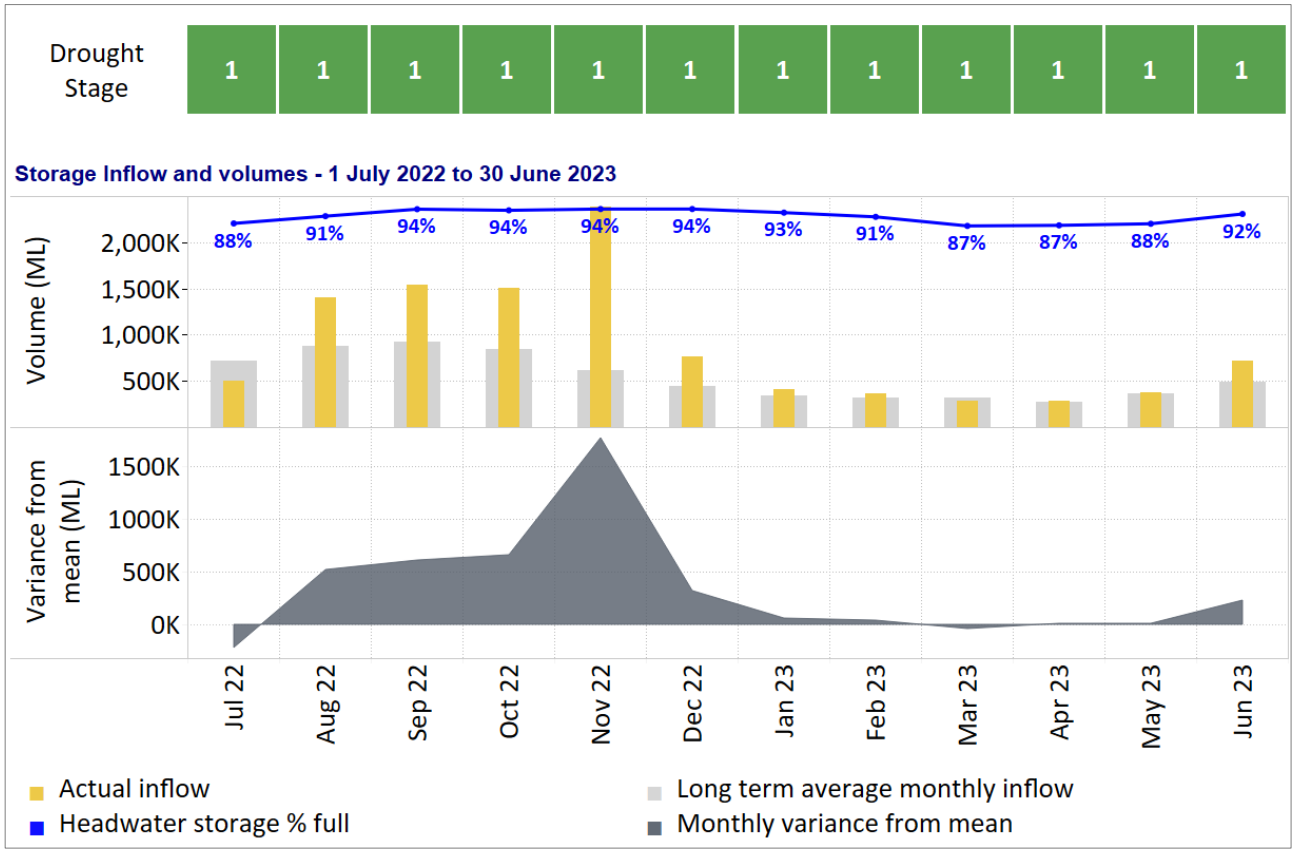
Temporary water restrictions for the reporting period

.

Extreme events stage

- The Murray catchment was classified as being in Stage 1 for the entirety of the reporting period.
- Major storage inflow (Hume natural[4] plus Dartmouth) was typically at or exceeding long term monthly averages for the majority of the water year. (Figure 31).

Figure 31: Drought stage for the reporting period referenced with monthly headwater storage inflows and monthly storage inflow variance from mean



Water availability

Detailed available water determinations are tabulated in Note 2 of this report.

[4] Data excludes re-regulated inflow from the Snowy Hydro scheme to better gauge the climatic impact on system inflows

In summary:

- ‘Domestic and Stock’, ‘Local Water Utility’ (including subcategory ‘Domestic and Commercial’) and ‘High Security’ subcategories ‘Community and Education’, ‘Research’ and ‘Town Water Supply’, received an opening available water determination (AWD) of 100%, the maximum allowable under the water sharing plan.
- ‘High Security’ access licences received an opening AWD of 0.97 megalitres per share, as per the requirements of the water sharing plan. An additional announcement of 0.03 ML was allocated to accounts on 15 August 2022, taking the category to the maximum allowable.
- General security carried over 776,899 megalitres from the prior water year[5] (46% of issued share for this category) and additionally received 0.43 megalitres per share on 1 July 2022, taking the total effective opening allocation to 90%.
- A subsequent announcement of 0.06 megalitre per share occurred on 15 July 2022 (Figure 32) followed by multiple increases up to 15 August 2022, taking total general security effective allocation to maximum permitted levels for this category (110%).
- Total water availability for regulated supply licence categories under water sharing plan management conditions is presented in Figure 33. and shows equally high levels for General Security with the previous year which was the highest since 2016–17.
- In addition to regulated supply licences, supplementary access licence holders received an opening AWD of 1 megalitre per share, with a further 0.1 megalitre per share announced on 20 October 2022 bring the total announcement to 1.1 megalitres per share. The agreement to exceed the 1 megalitre per share maximum allowable resulted from the accumulated credit (i.e., underuse) in the water source compared with their long-term annual account limit. At water source level, access to supplementary allocation was available for 354 days during the reporting period (Figure 34).
- By volume more than half of the total measured tributary inflow of 9,728,468 megalitres to the regulated Murray downstream of the major storages was contributed by the Murrumbidgee (30%) and Darling Rivers (26%). Of the total tributary inflows 60% was contributed by New South Wales streams (Figure 35).

[5] Carryover figure is presented pre snowy transfer adjustments. See Note 1 – Allocation account summary for post adjusted carryovers.

Figure 32: Incremental available water determination and carryover volumes for 'General Security' as a proportion of share component

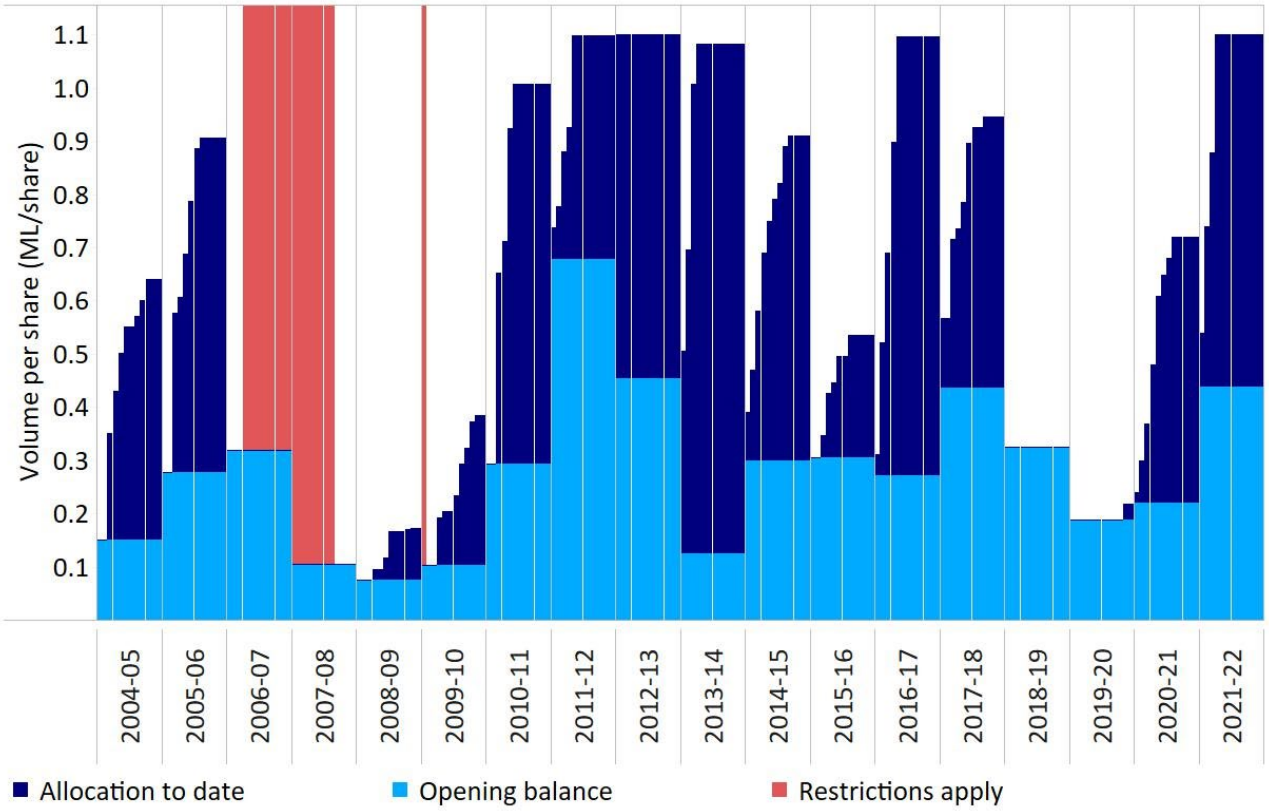


Figure 33: Water availability (carryover + available water determinations)

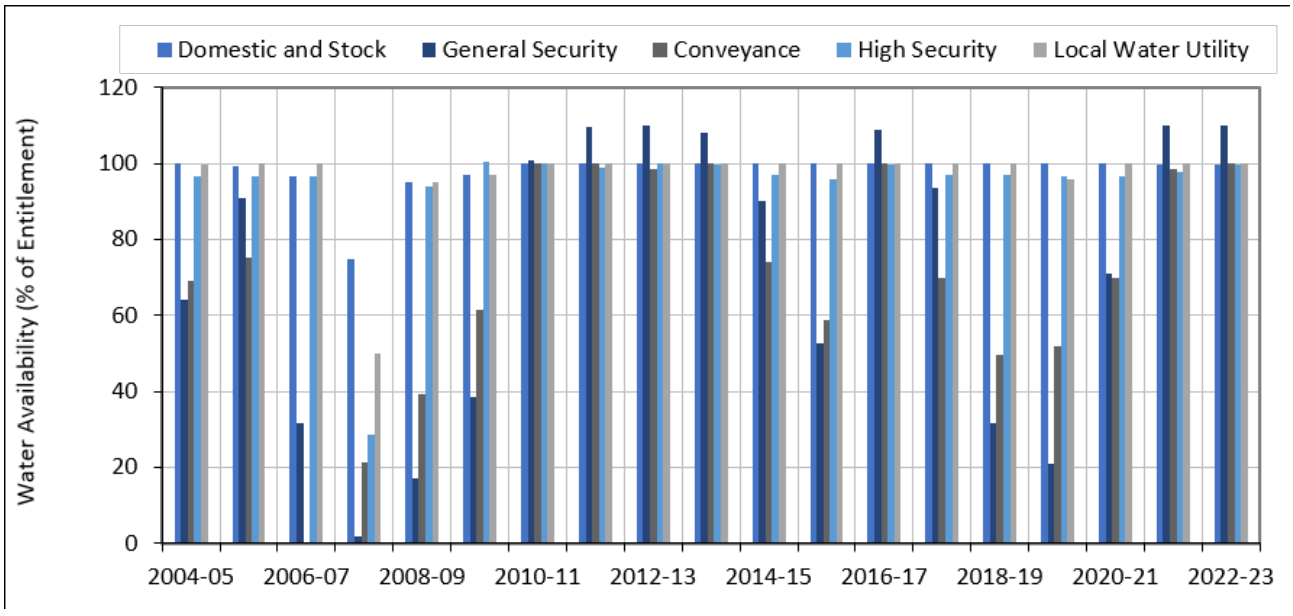


Figure 34: Supplement event access history

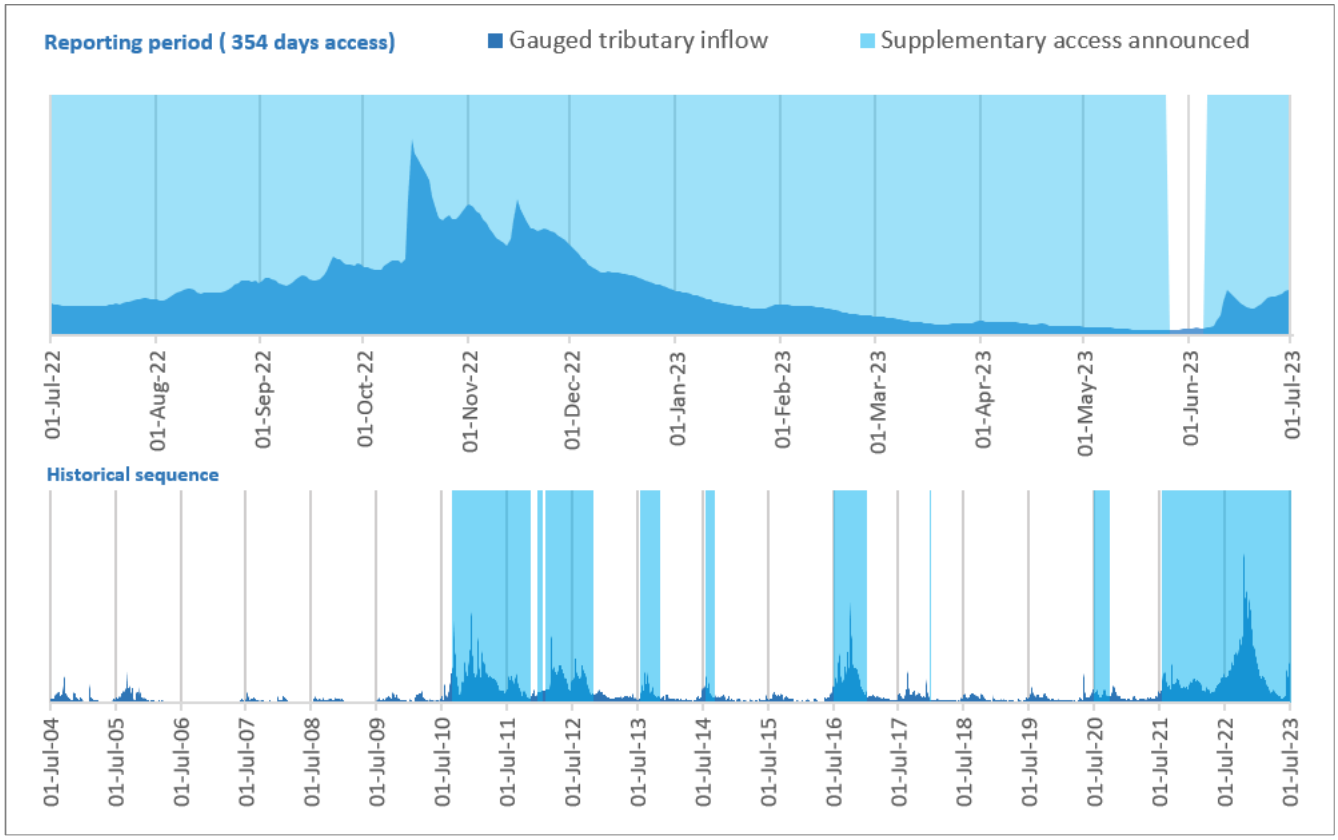
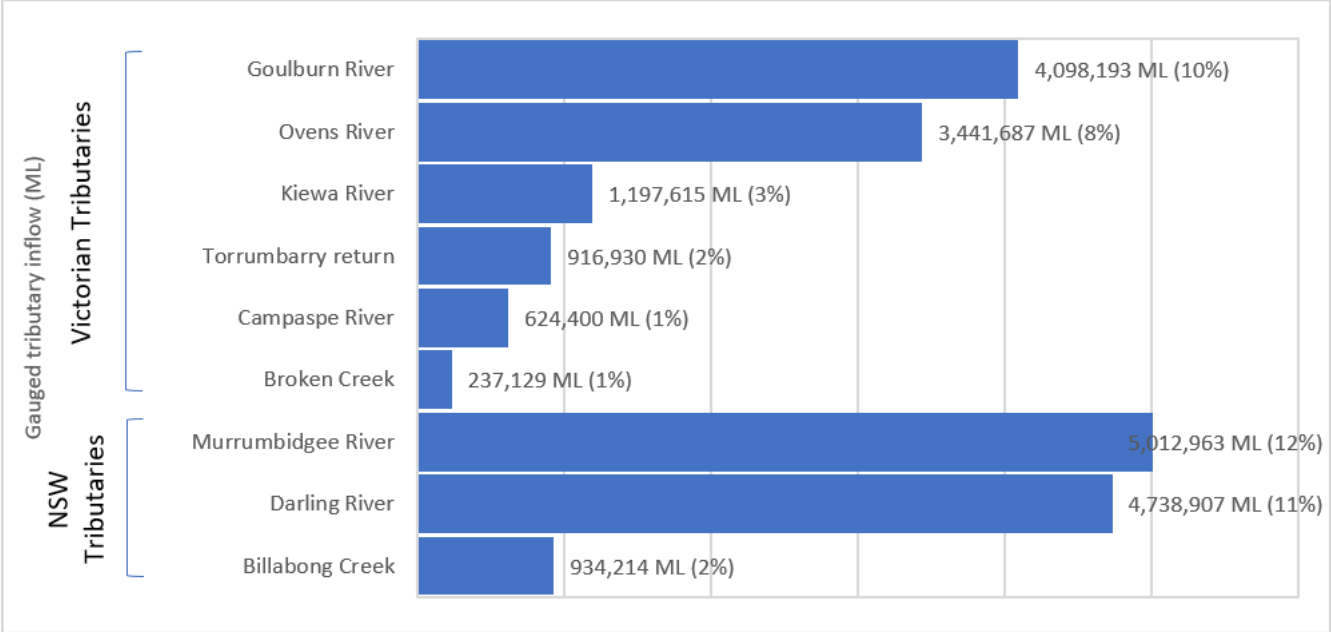


Figure 35: Measured tributary inflow contributions

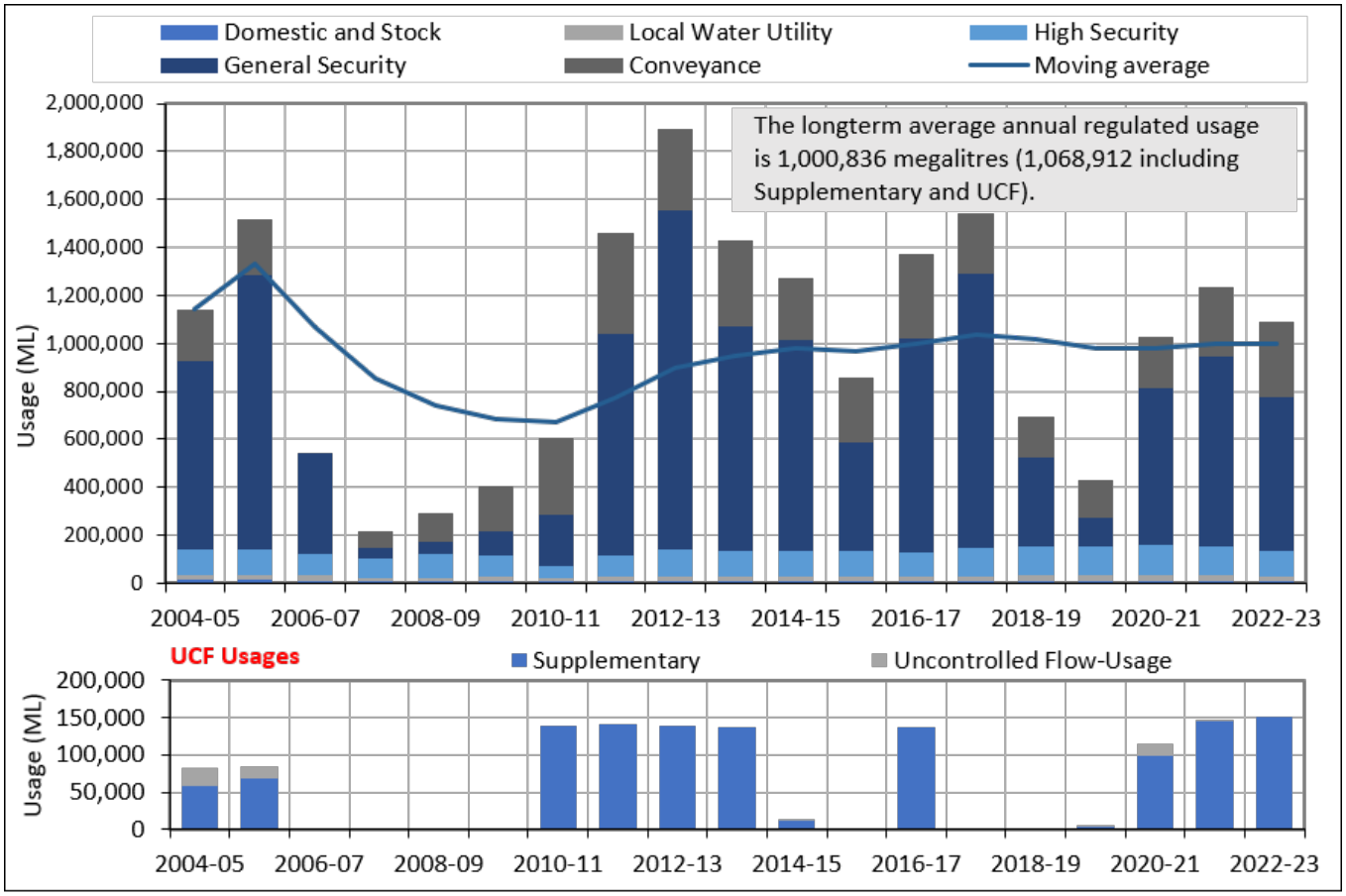


Account usage

Account usage refers to the total volume of water debited against an access licence.

- Account usage from the regulated supply totalled 1,089,818 megalitres for the reporting period (Figure 36), a similar usage volume to the prior reporting period.
- Additionally, 151,374 megalitres was accounted for as supplementary usage and 0 megalitres was uncontrolled flow usage.
- Considering all forms of usage, average annual usage under water sharing plan conditions (2004-05 to 2022-23) is 1,068,912 megalitres or 1,000,836 megalitres excluding access to uncontrolled flows.
- For the reporting period total usage was made up of 54% consumptive usage and 46% held environmental water usage.
- Refer to Note 3 in this GPWAR for further usage details.

Figure 36: Total usage since commencement of the water sharing plan



Utilisation and inactive share

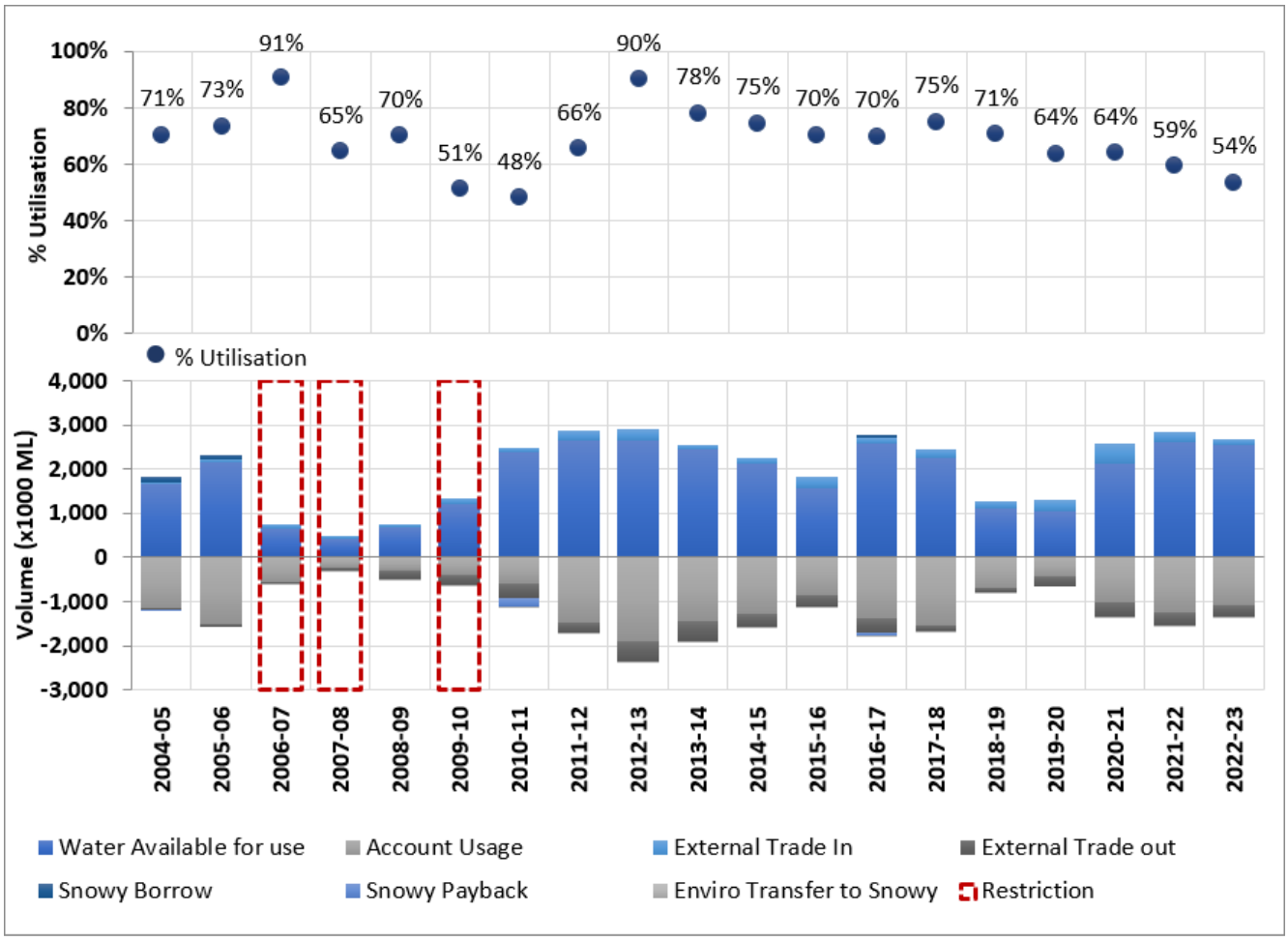
An access licence entitlement is considered inactive if the holding does not use water or access the temporary trade market for the reporting period. Utilisation reflects the amount of water used from regulated supplies (excludes supplementary water), relative to the maximum amount available for use.

- 4% of general-security share component was inactive for the reporting period, an increase of 1 from the previous year (Table 8).
- Similarly considering all categories of access licence with regulated supply, 4% were inactive.
- 43% of supplementary water was inactive for the reporting period an increase of 2 % from the previous period
- The utilisation of available water from regulated supplies (excludes supplementary) decreased from 59% to 54% in the reporting year and the lowest since 2010–11 (Figure 37).

Table 8: Inactive licence summary for the reporting period

Licence Category	Inactive Licences (number)	Inactive Share Component	Inactive Share Component % of total	Previous year comparison
Domestic and Stock	301	2,644	19%	21%
Domestic and Stock [Stock]	103	554	27%	30%
Domestic and Stock [Domestic]	140	381	29%	22%
Local water utility	0	0	0%	0%
Local Water Utility [Domestic and Commercial]	0	0	0%	0%
Regulated River (Conveyance)	0	0	0%	0%
Regulated river (General Security)	757	68,847	4%	3%
Regulated river (High Security)	346	10,818	6%	4%
Regulated River (High Security) [Community and Education]	0	0	0%	40%
Regulated River (High Security) [Research]	1	1	100%	100%
Regulated River (High Security) [Town Water Supply]	0	0	0%	0%
Total regulated supply	1,648	83,245	4%	3%
Supplementary water	122	109,492	43%	41%

Figure 37: Access licence account utilisation



Temporary trading (allocation assignments)

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

- 826,178 megalitres was traded out of NSW Murray access licences.
- 717,933 megalitres was traded into NSW Murray access licences (including internal).
- This trading results in a net trade out of 108,245 megalitres, being the 2nd consecutive year of net trade out of the water source (Figure 38).
- There was a net trade in from Murrumbidgee (62,667 megalitres), a net trade out to Victoria (13,157 megalitres), a net trade out to Lower Darling (82,460 megalitres) and a net trade out to South Australia (75,295 megalitres) (Figure 39).
- The water moved out of the NSW Murray was to Victoria (13%), Lower Darling (36%)., South Australia (31%) and Murrumbidgee (20%) .The balance of the Murrumbidgee inter-valley trade account balance (IVT) was 88,954 megalitres on 30 June 2023 (volume owed to the Murray). Detailed information on the IVT account is provided in note 5 of this GPWAR.

Trade Restrictions

A temporary trade restriction was imposed on interstate assignments of water allocations from Victoria and South Australia to access licences in the NSW Murray, Lower Darling and Murrumbidgee Regulated River water sources from 5th August 2022 to 30th September 2023. This is to mitigate the risk that water traded from Victoria or South Australia to NSW access licence holders is not available to be delivered in the future because of the inability to capture inflows while Hume Dam is spilling.

Future allocations may also be eroded if trade volumes from interstate accrue under these circumstances, as undelivered trade water would prevent additional water (storage inflows) being captured and allocated to NSW water users

Figure 38: Allocation assignments (trade) out of the NSW Murray

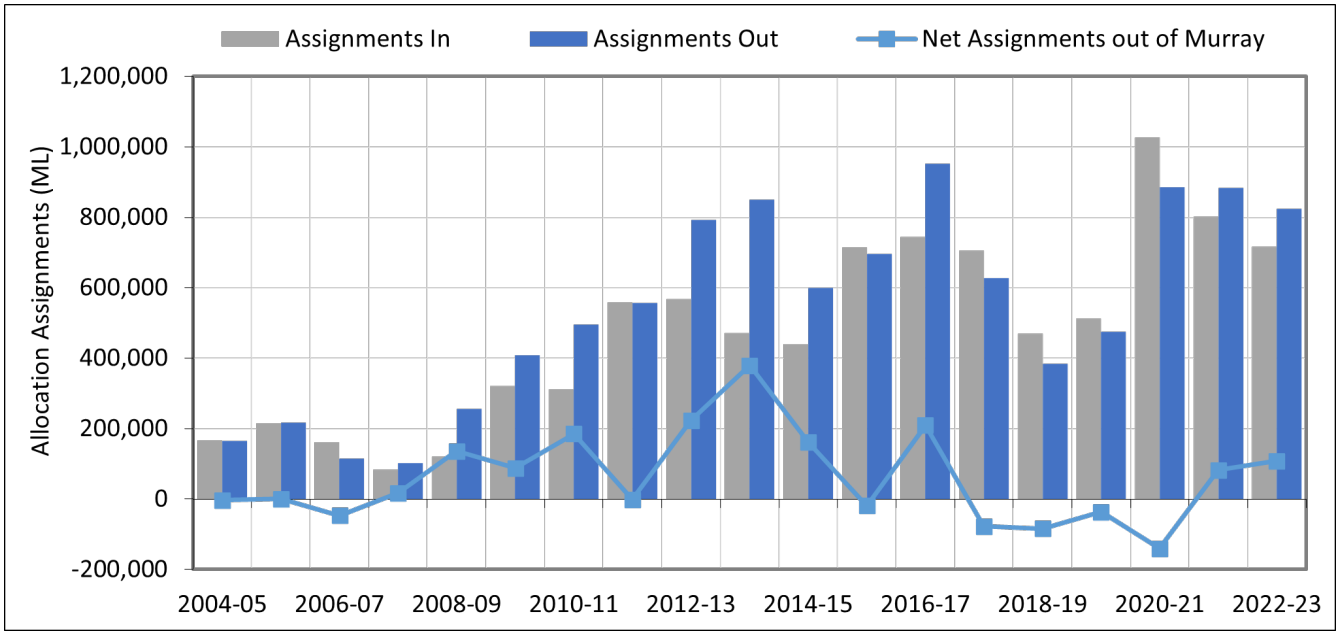
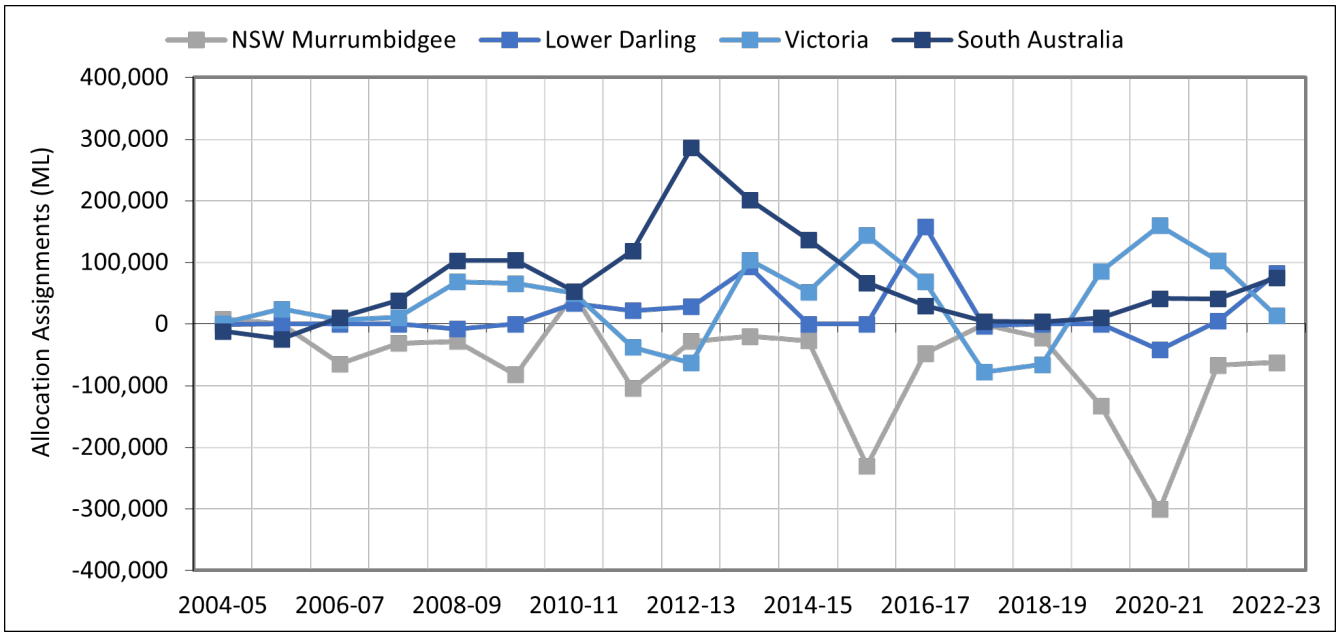


Figure 39: Net volume of allocation assignment (trade) out of NSW Murray by water source



Commercial statistics

For the purposes of this section, trades are considered processed for commercial purposes if the consideration of the trade (assignment) exceeds $1 per megalitre/share.

- There were 1,430 commercial transactions in the reporting period, a 48% decrease on the prior reporting period (Figure 41),
- The total market value $12,517,190 in the reporting period, a 62% decrease on the prior reporting period,
- The average price was $33 per megalitre, a 53% decrease on the previous reporting period.
- The maximum price for temporary water was $579 per megalitre.

Figure 40: NSW Murray allocation assignments commercial price statistics

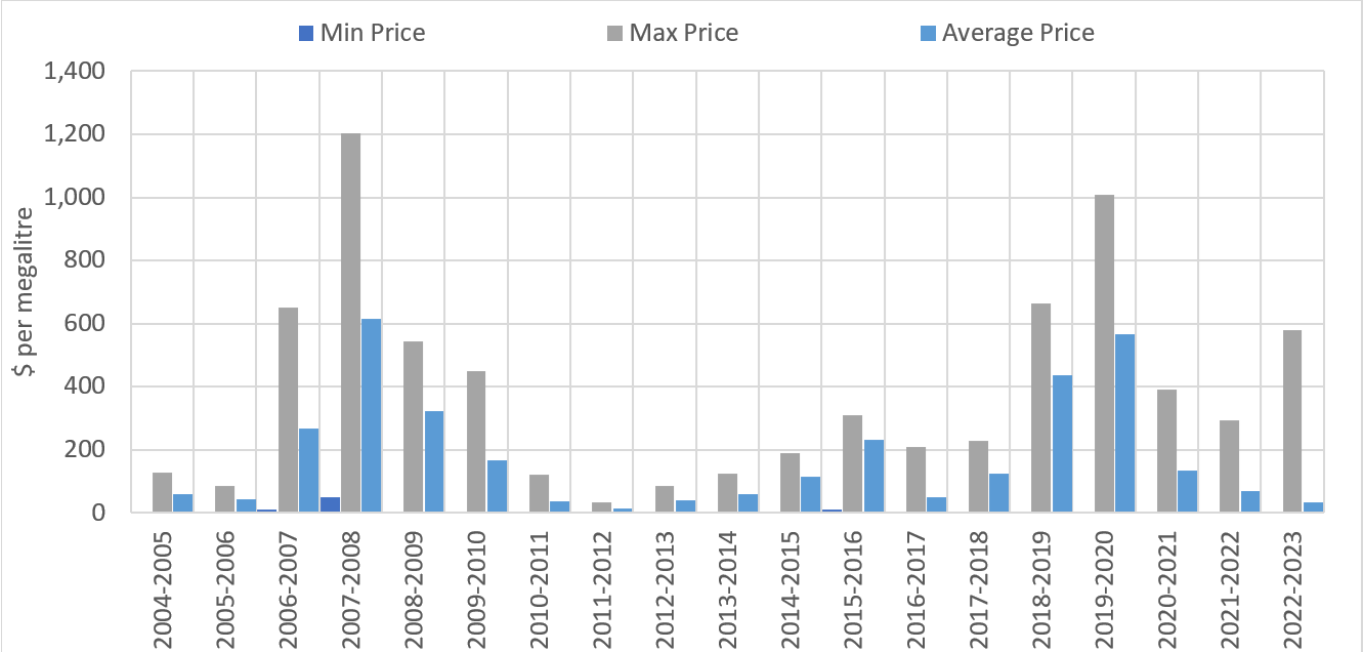
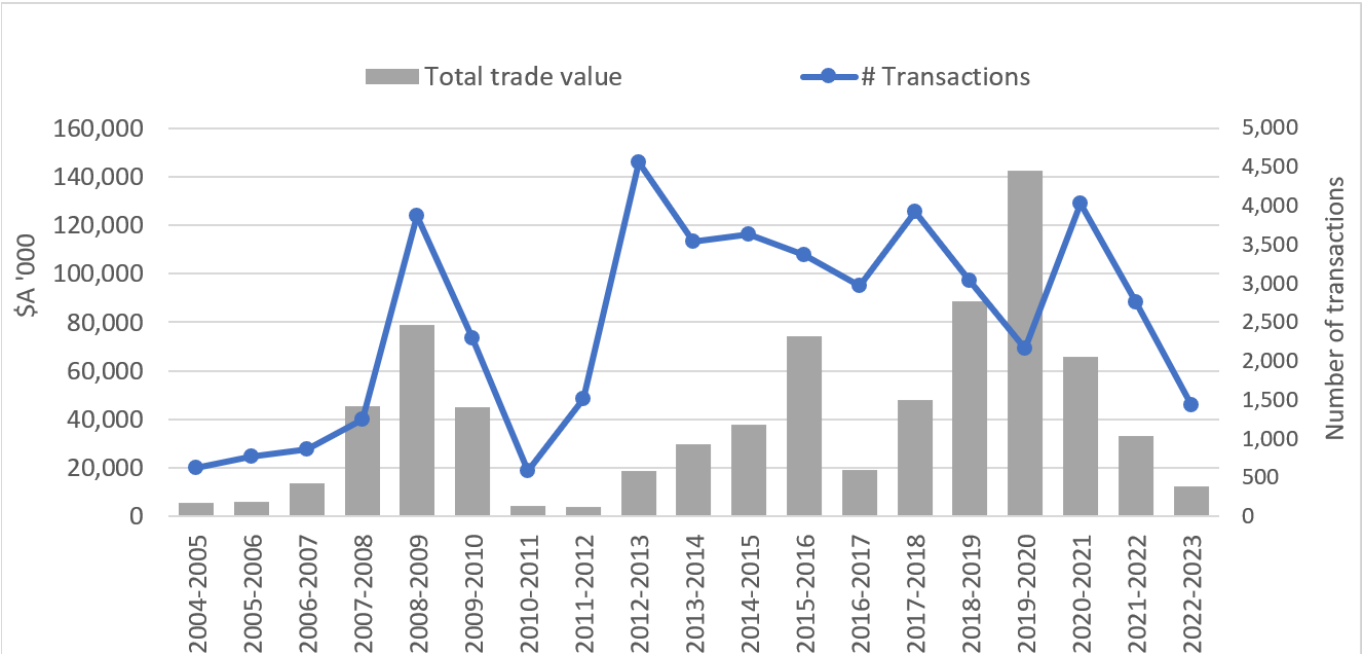


Figure 41: NSW Murray allocation assignment commercial value statistics



Permanent trading (share assignments and licence transfers)

Division 4 (dealings with access licences) of the *Water Management Act 2000* allows for a range of dealing options that permanently effect the title of the water access licence. Two of the more common dealing practises under this division are assignments of rights under access licences (clause 71Q) and transfer of access licences (clause 71M). With consideration to these dealing types from a commercial[6] perspective:

General Security share component

- There were 34 transactions processed with a total market value of $13,909,485, a 27% decrease to the prior reporting period
- The average price per share was $2,657 for the reporting period which is the highest since the Water Sharing Plan commenced
- The Average Price has ranged from a low of $662 to a high of $2,657 (between 2004–05 and 2022–23). (Figure 42).
- The maximum price per share for the reporting period was $3,025, a 17% decrease from the prior reporting period
- The general security average sale price within the NSW Murray relative to other NSW regulated river water sources selling share in the reporting period is provided in Figure 44.

High Security' share component

- A total of 67 high security commercial transactions worth $42,252,735 which was a 159% increase to the prior reporting period.
- The average of price per share for 'High Security' share component has ranged from $1,315 to $9,205 (2004–05 to 2022–2023). For the reporting period the average price was $9,205 which is the highest value recorded) (Figure 45). This was an 3% increase on the prior reporting period.
- For the reporting period the maximum price per share was $9,500, which is a 5% decrease to the previous reporting period
- The high security average sale price within the NSW Murray relative to other NSW regulated river water sources selling share in the reporting period is provided in Figure 47.

[6] A permanent trade is considered commercial if the consideration exceeds $1 per share

Conveyance share component

The average price for Conveyance share component has ranged from $1,120 per share to $3,301, however no trades were processed in the reporting period for this category of licence.

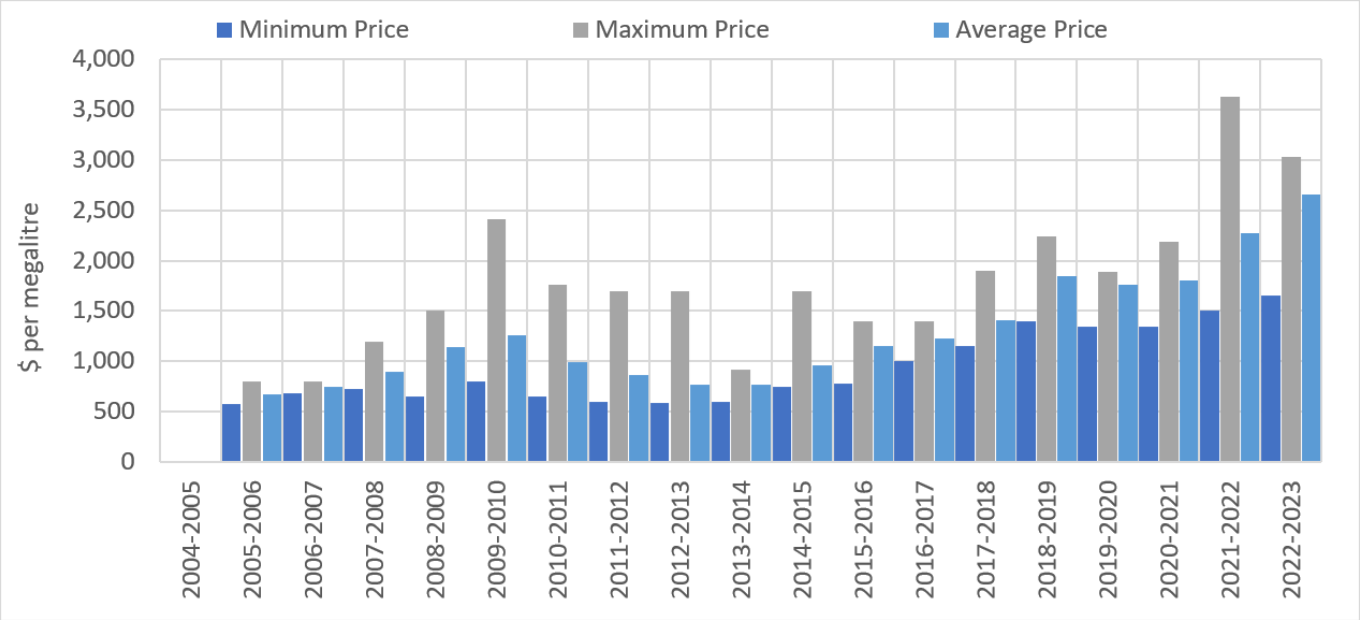
Supplementary' share component

- No trades were processed in the reporting period for this category of licence.
- The average price has ranged from $100 per share to $561 (2004–05 to 2022–23).

Licence holder dealings (71M)

Commercial trade activity via a change of licence holder dealing (71M) increased in the reporting period relative to the prior year. 31 transactions were processed which moved a total number of 29,735[7] shares to new holders (Figure 48). Price analysis for 71M has been excluded from this reporting. These dealings are more complex in nature, often subject to bundled land and water purchases or agreements to purchase multiple categories of licence for a nominated value.

Figure 42: NSW Murray commercial price statistics — General Security share



[7] Considers all categories of licence. Only transactions where the total consideration of the dealing exceeds $1.

Figure 43: NSW Murray commercial value statistics — General Security share

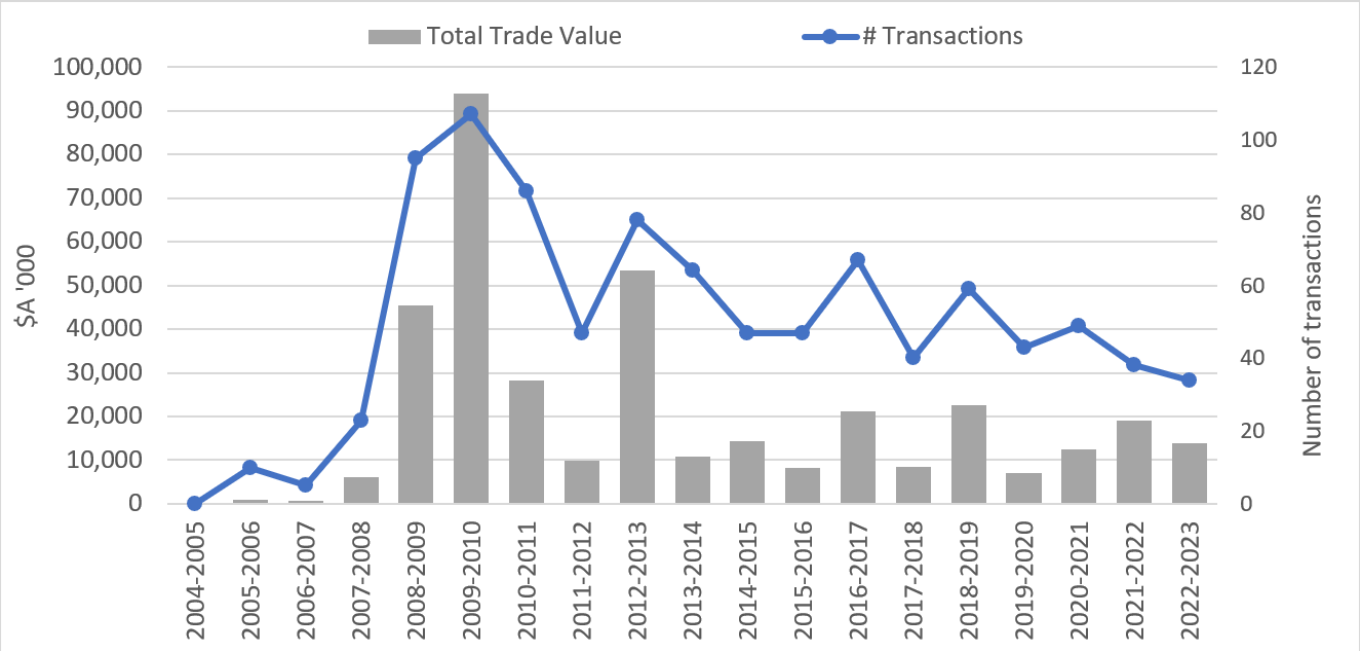


Figure 44: General Security average share price relative comparison for reporting period

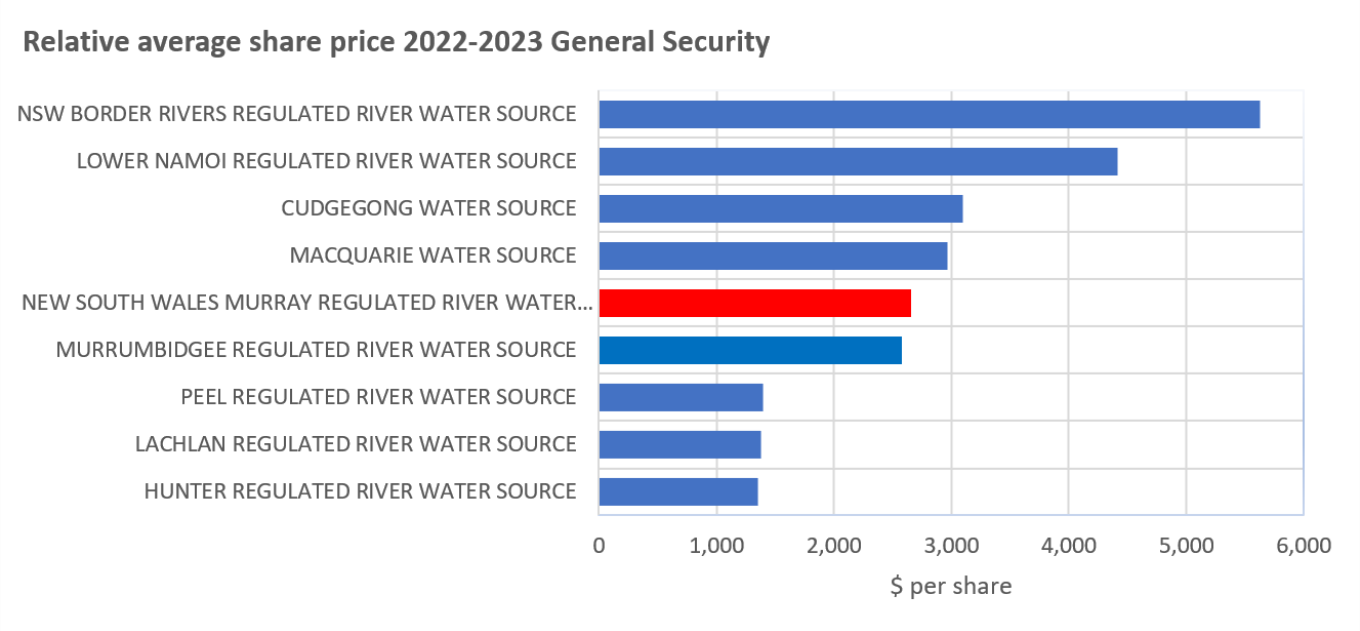


Figure 45: NSW Murray commercial price statistics — High Security share

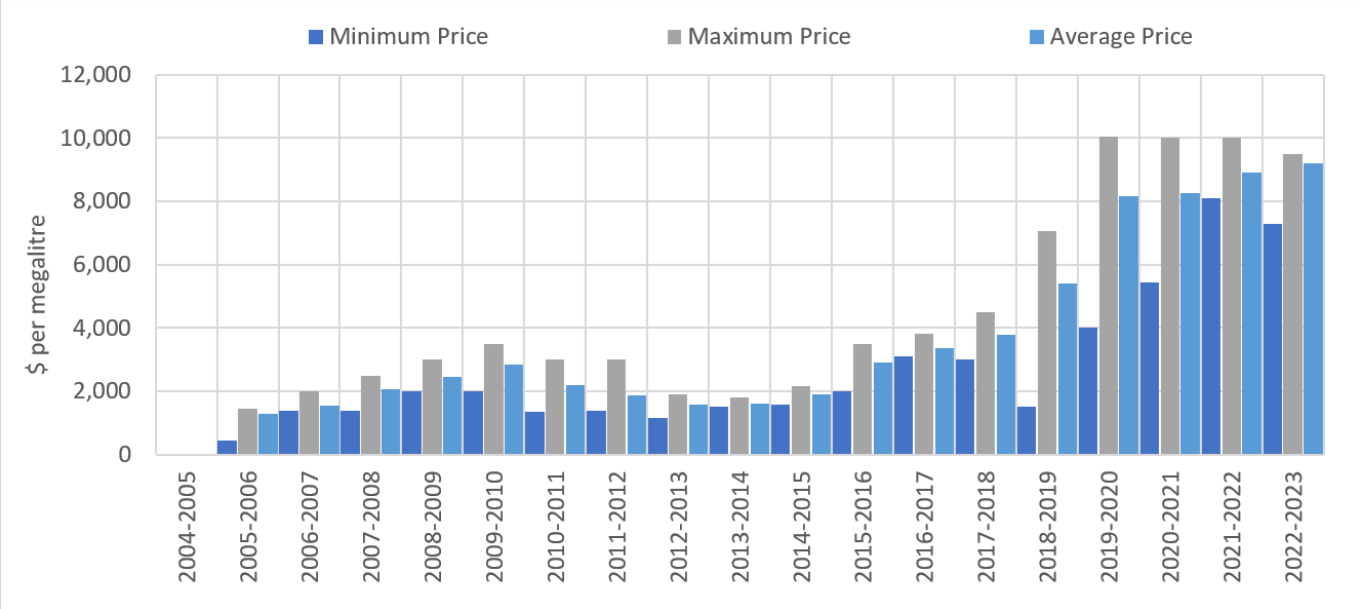


Figure 46: NSW Murray commercial value statistics — High Security share

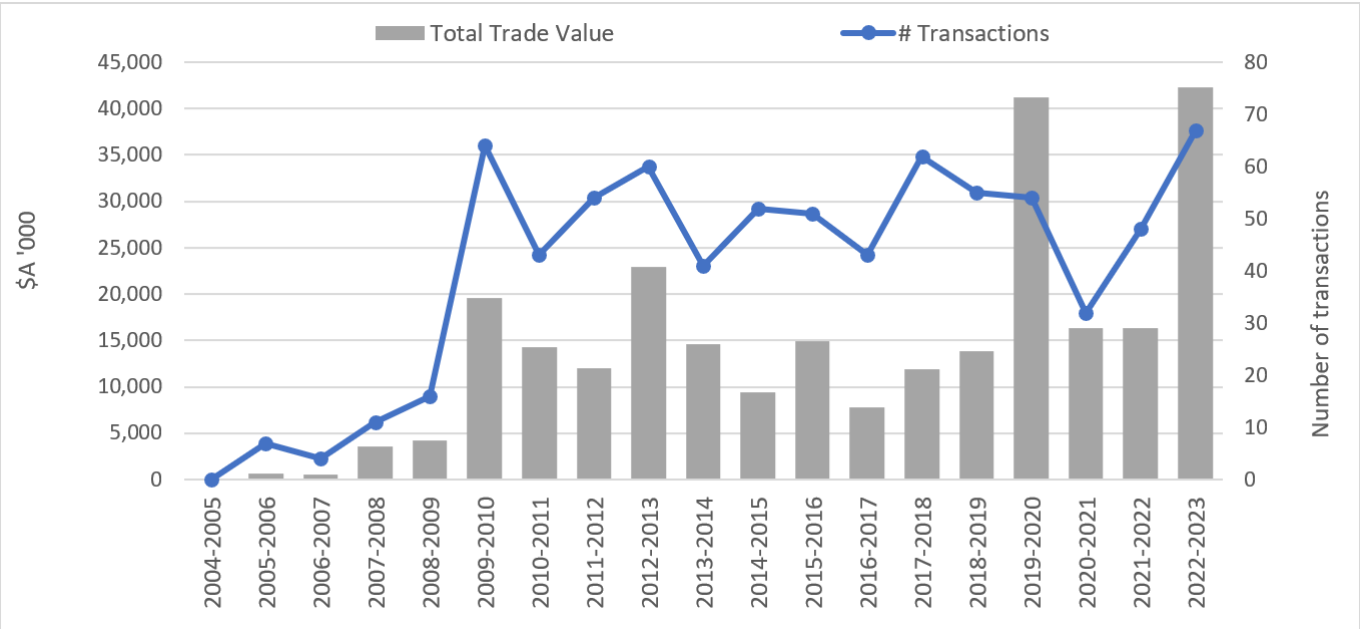


Figure 47: High Security average share price relative comparison for reporting period

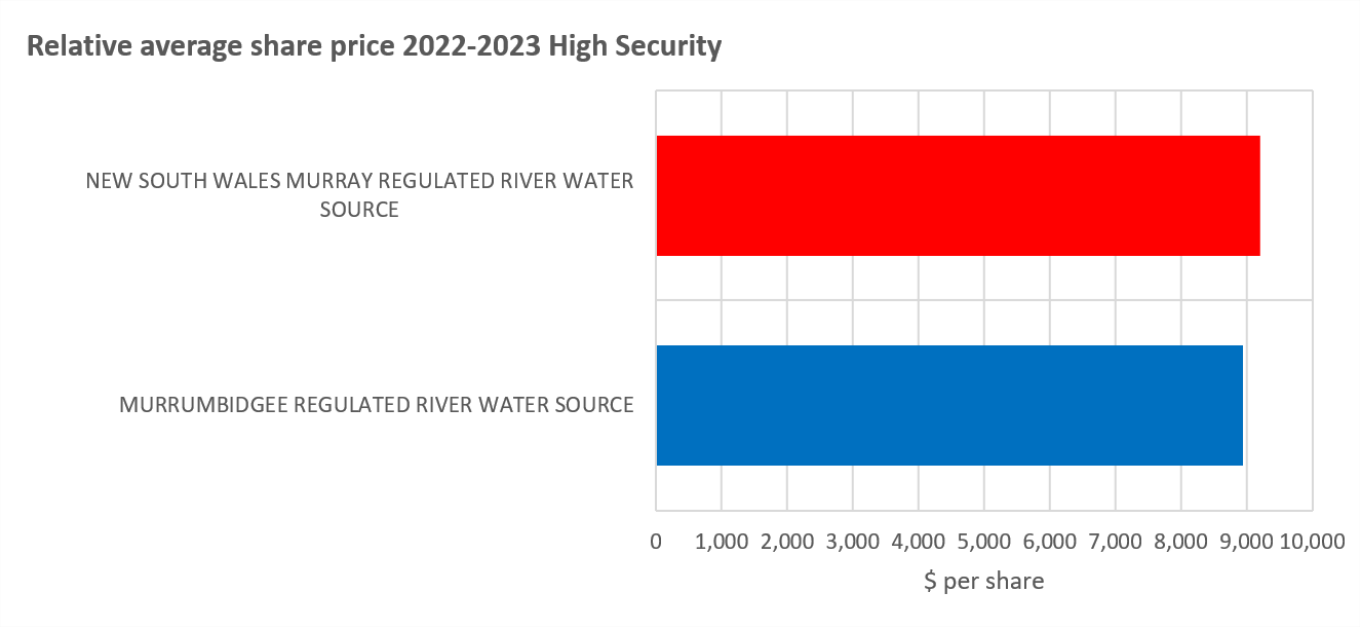
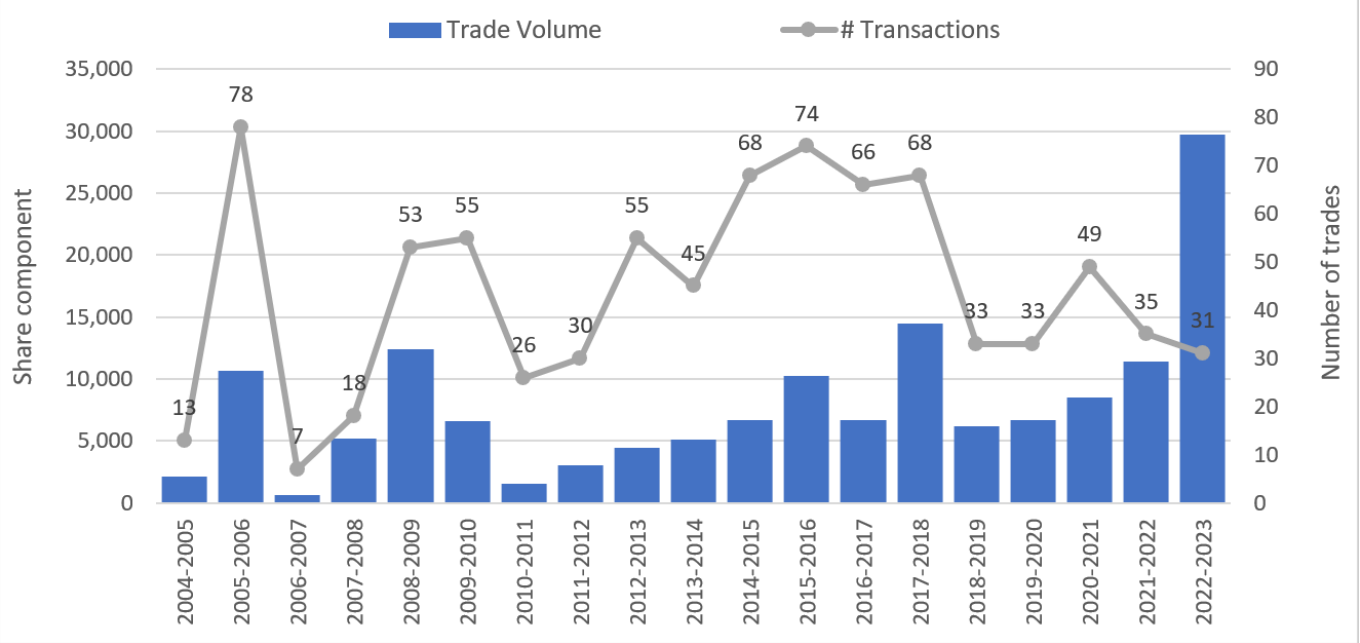


Figure 48: Transfer of licence (change of holder 71M dealing)



Environmental water

Held environmental water

Held environmental water refers to access licences that are managed for the purpose of sustaining and improving environmental outcomes within the system.

Held environmental water, issued share was unchanged for the reporting period. As of 30 June 2023, the total held environmental water portfolio totalled 660,107 shares (Figure 49) consisting of:

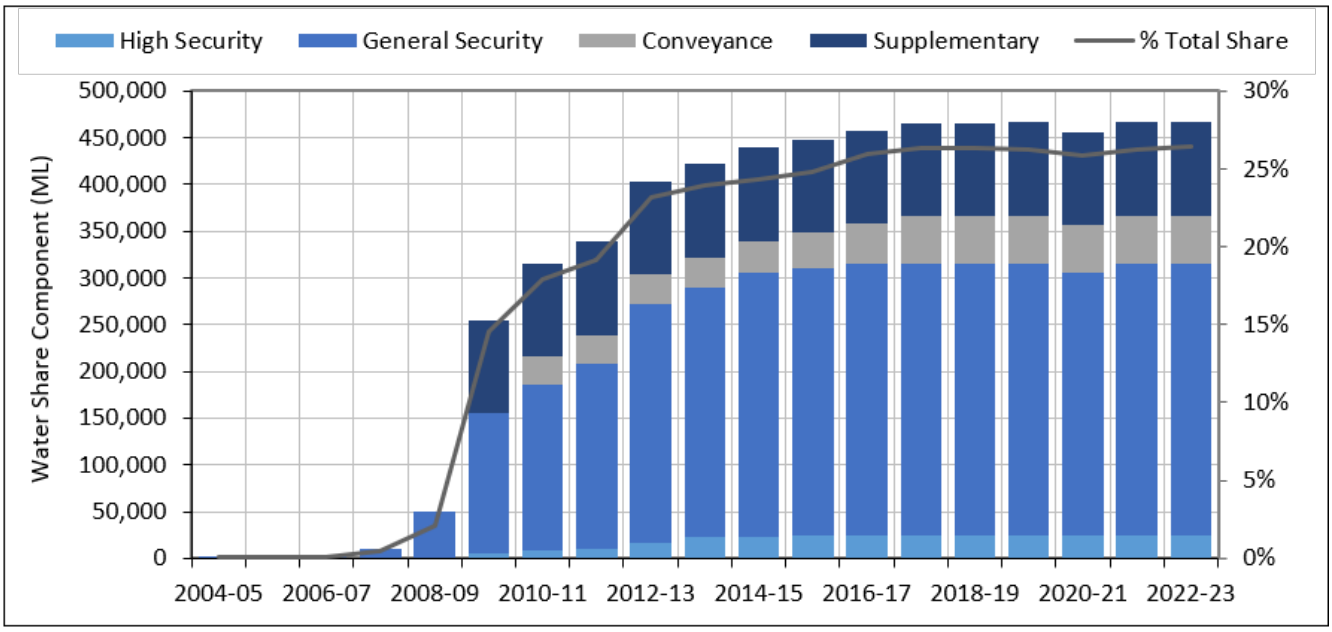
- 50,214 'Conveyance'
- 484,673 'General Security' (including 193,826 within the Murray Irrigation holding)
- 25,009 'High Security'
- 100,211 'Supplementary'.

Total held environmental water account usage was 570,103 megalitres (Figure 50), the highest on record. Additionally, 35,069 megalitres of held environmental account water was transferred for release in the Snowy River and River Murray increased flow contributions (Figure 51).

Held environmental utilisation[8] increased to 84% from 60% in the reporting period (Figure 52). This analysis excludes environmental water delivered via private landholders through internal trading mechanisms. Significant volumes of allocation were carried forward to the 2022–23 water year (117,114 megalitres)

Additional information on held environmental water is available in Note 6 of this GPWAR.

Figure 49: Held environmental water share component in the NSW Murray catchment[9]



[8] Assumed as the amount of usage plus water traded out to external water sources or sold to consumptive holders plus water transferred for release to the Snowy River as a percentage of the effective allocation (carryover plus AWD), plus water traded in from external water sources, or internal consumptive users

[9] General Security (MIL) refers to water held by the Commonwealth within Murray Irrigation Limited and hence is not a separate licence but form part of the MIL general security licence

Figure 50: Held environmental usage by licence category since the commencement of the water sharing plan

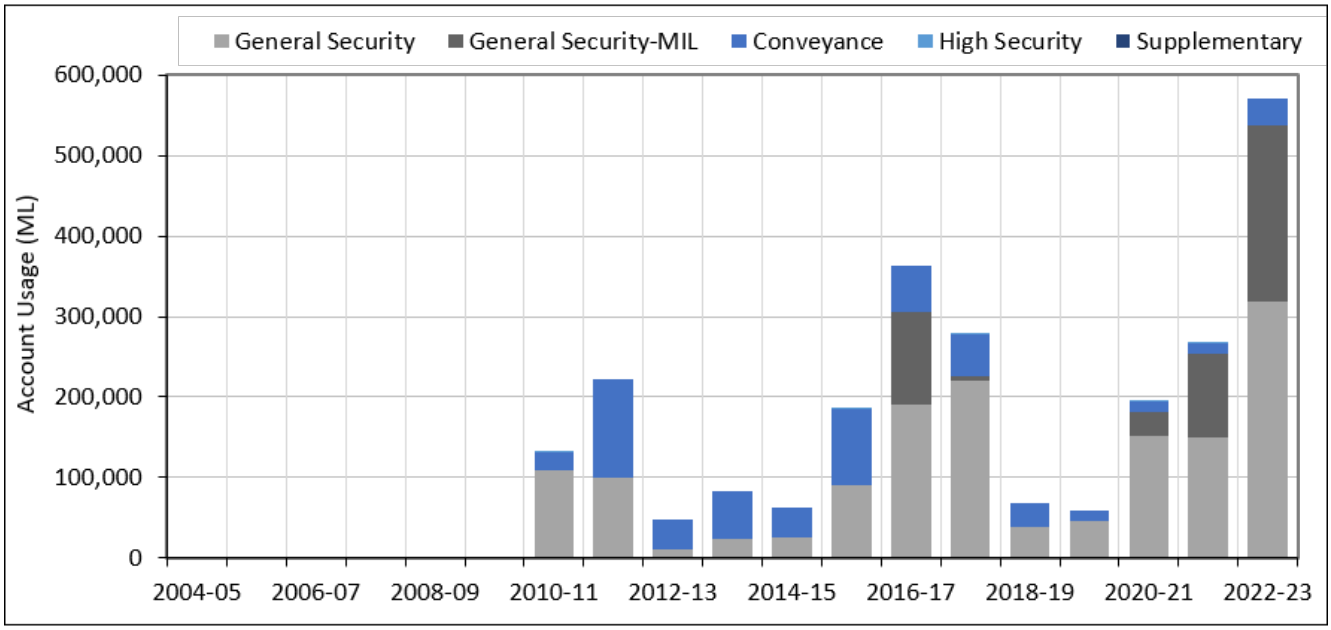


Figure 51: Held environmental water allocations transferred to the water for rivers program since the commencement of the water sharing plan

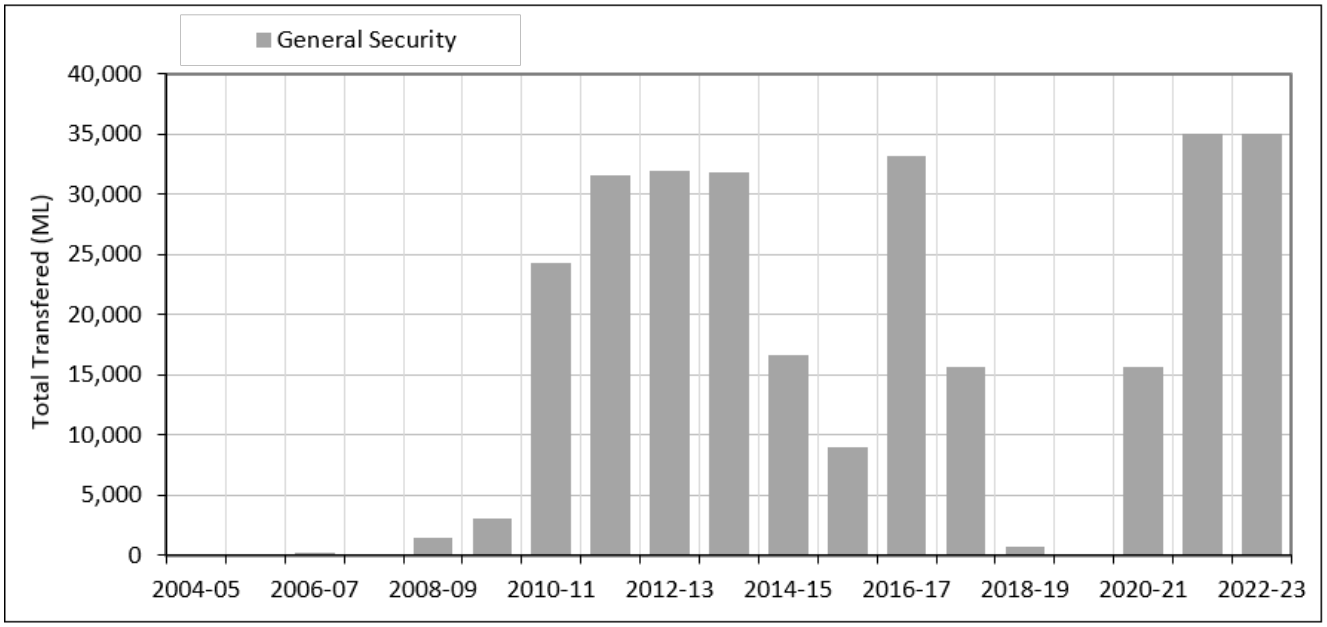
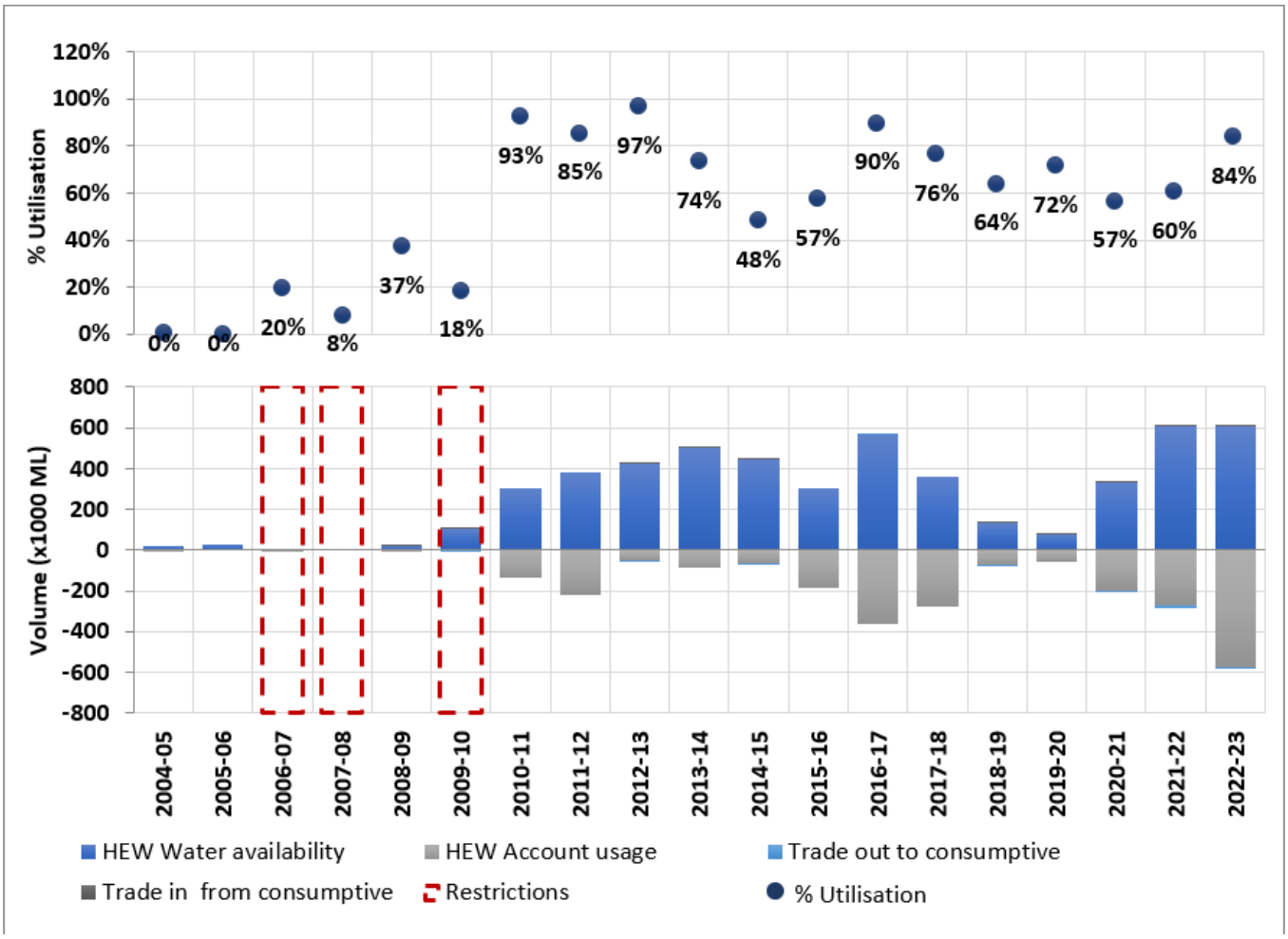


Figure 52: Held environmental utilisation of available water since the commencement of the water sharing plan[10]



River Murray Increased Flows

Water savings achieved through the water for rivers program provides up to 70,000 megalitres annually for environmental outcomes in the Murray River system. These annual savings are collectively managed as 'River Murray Increased Flows' (RMIF). During the reporting period no water under RMIF was released from Hume Dam.

Planned environmental water

Planned environmental water refers to a range of environmental allowances and provisions that are implemented under the water sharing plan to improve environmental outcomes. Details of these provisions are provided in Note 7 of this GPWAR.

[10] Supplementary licences have been excluded. Trade to or from the held environmental water holding within Murray Irrigation between water sources was considered negligible and therefore excluded. Water availability is plotted as carryover volume plus available water determinations for held environmental licences/

Barmah–Millewa environmental water allowance

Accounting for the Barmah–Millewa environmental water allowance (B-M EWA) during the reporting period is summarised below.

- an opening balance (carryover) of 197,840 megalitres (available)
- credits (allocation) of 75,000 megalitres
- Hume Dam spill forfeits of 72,840 megalitres
- evaporation forfeits of 2,450 megalitres
- account usage of zero megalitres
- carry-forward volume of 197,550 megalitres

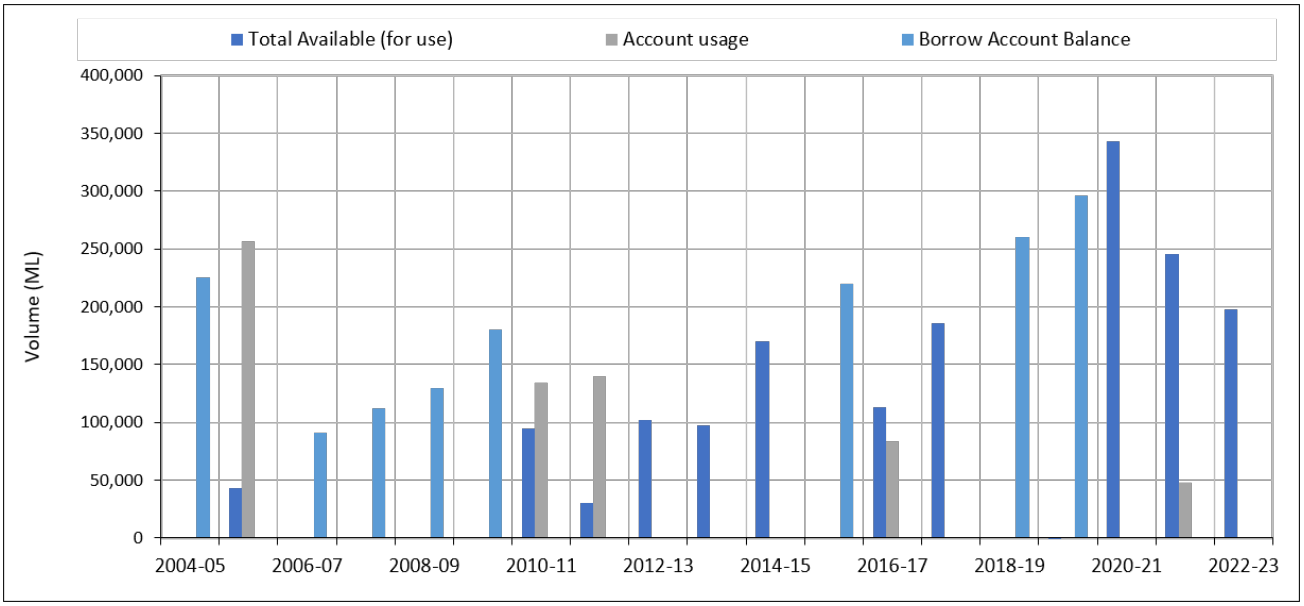
Access to the water allocated to the B-M EWA may be affected by B-M EWA borrow (see below).

B-M EWA borrow

Provisions in the water sharing plan stipulate that water will be removed from the B-M EWA, when 'General Security' allocations have not reached a target threshold (0.3 megalitres per share or 0.5 megalitres per share) in the plan defined 'exceptional circumstances'. This water is tracked and is to be repaid (in full or progressively depending on the volume exceedance) once the targets are exceeded. As a result, the water available for use in the B-M EWA is dependent on the balance of water withdrawn. For the purposes of this GPWAR, the tracking of this water is referred to as 'borrow'.

Figure 53 provides a graphical representation of the behaviour of the B-M EWA since the commencement of the water sharing plan. Total water available (for use) is the maximum available throughout the year (may not have occurred until late in the water year). The borrow account balance is presented as of 30 June for each water year.

Figure 53: B-M EWA summary since commencement of the water sharing plan



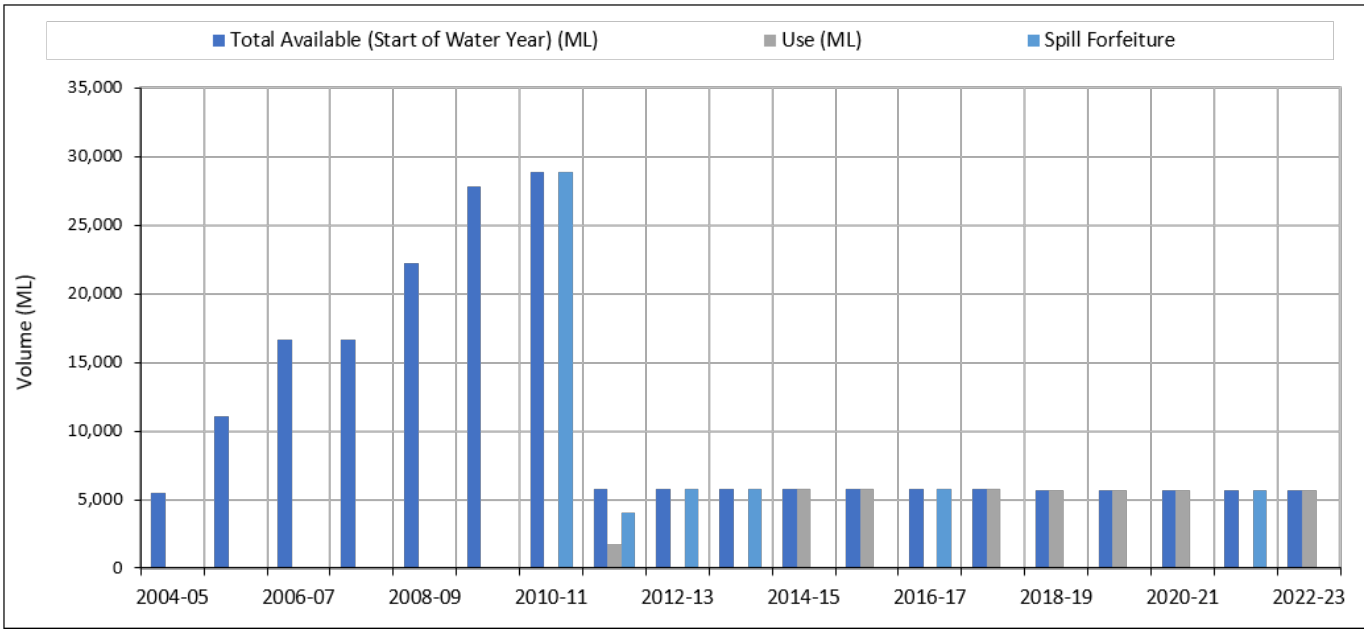
Murray additional allowance

Accounting for the Murray Additional Allowance (MAA) during the reporting period is summarised below.

- an opening balance (carryover) of zero megalitres
- credits (allocation) of 5,691 megalitres
- account usage of 5,691 megalitres
- Hume Dam spill forfeits of zero megalitres
- carry-forward volume of zero megalitres.

Figure 54 provides a graphical representation of the behaviour of the AEA since the commencement of the water sharing plan.

Figure 54: NSW Murray Additional Environmental Allowance summary since commencement of the water sharing plan



Barmah–Millewa overdraw

The Barmah–Millewa overdraw account prescribed under clause 28 of the water sharing plan has not been credited with any water since the commencement of water sharing plan management conditions.

Water accounting statements

Significant water accounting policies

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

We have excluded the 'Statement of physical flows' for this GPWAR as we have presented all transactions in the statements 'Water assets and liabilities' and 'Changes in water assets and water liabilities.

We have included a diagram representing the physical movements of water to provide a clearer depiction of the accounting processes associated with physical flow movement.

For a detailed explanation on how to interpret the NSW Department of Climate Change, Energy, the Environment and Water, water accounting statements refer to *Interpreting New South Wales Office of Water General Purpose Water Accounting Reports*, which is available for download on from the NSW Department of Climate Change, Energy, the Environment and Water website (www.dcceew.nsw.gov.au/water/home).

Quantification of data

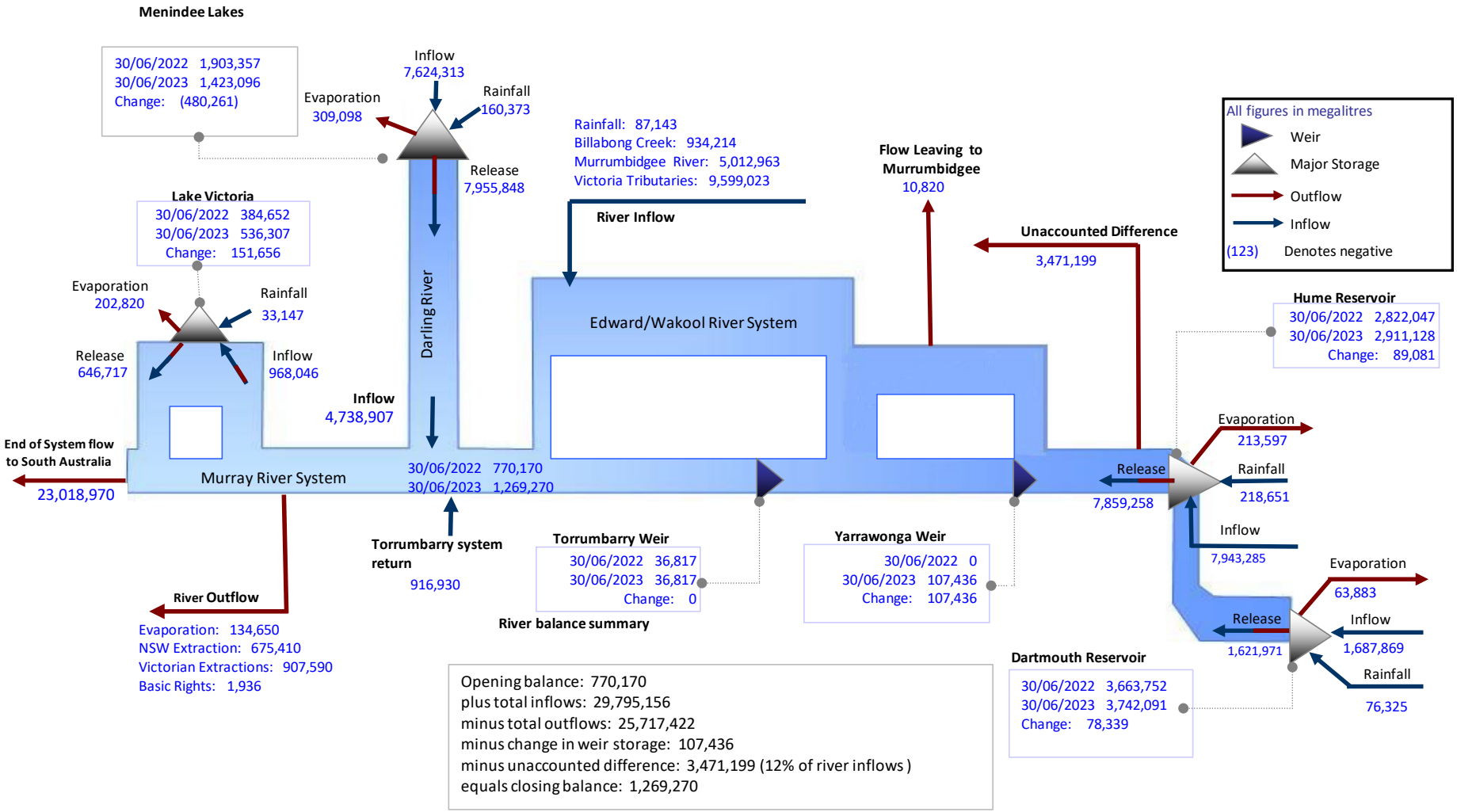
Data accuracy

We have gathered the data used to account for water movement and management 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, we have added an assessment of accuracy to all figures in the water accounting statements (Table 9).

Table 9: Water account data accuracy estimates key

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

2022–23 Physical flows mass balance diagram



Statement of water assets and liabilities

For the year ended 30 June 2023[11]

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

Surface water assets

1.Surface Water Storage	Accuracy	Notes	30-06-2023	30-06-2022
Dartmouth	A	8	3,742,091	3,663,752
Hume	A	8	2,911,128	2,822,047
Menindee Lakes	A	8	1,421,654	1,901,914
Lake Victoria	A	8	536,307	384,652
Lake Mulwala (Yarrawonga Weir)	A	8	107,436	0
Torrumbarry Weir	A	8	36,817	36,817
Murray Regulated River	A	9	1,269,270	770,170
Total surface water storage(Asws)			**10,024,702**	9,579,352
Change in surface water storage			**445,350**	3,487,297

2.Claims to water	Accuracy	Notes	30-06-2023	30-06-2022
Intervalley trade account (IVT) (Owed to Murray)	A1	5	88,954	127,570
Change in Intervalley trade account	-	-	(38,616)	35,233

Surface water liabilities

3.Allocation account balances	Accuracy	Notes	30-06-2023	30-06-2022
Domestic And Stock	A1	1	(49)	(34)
Domestic And Stock (Domestic)	A1	1	0	(2)
Domestic And Stock (Stock)	A1	1	0	0
General Security	A1	1	739,393	776,898
High Security	A1	1	(252)	(360)
Local Water Utility [Domestic and Commercial]	A1	1	0	0
High Security (Research)	A1	1	0	0
High Security (Town Water Supply)	A1	1	0	(0)
Local Water Utility	A1	1	0	0
Regulated River (High Security)[Community	A1	1	0	0
Conveyance	A1	1	(0)	(0)
Total allocation account balances (Lalloc)			**739,092**	776,502
Change in allocation accounts			**(37,410)**	57,184

4.Planned environmental water provisions	Accuracy	Notes	30-06-2023	30-06-2022
Additional Environmental Allowance	A1	7	0	0
Barmah Millewa environmental allowance	A1	7	197,550	197,840
Total PEW balances (LPEW)	-	-	197,550	197,840
Change in PEW balances	-	-	(290)	(145,640)

Surface water net changes

5.Total Surface Water Net Changes	30-06-2023	30-06-2022
Net surface water assets (Asws+Aivt-Lalloc-LPEW)	9,176,677	8,732,580
Change in net surface water assets	**444,434**	3,610,985

[11] Prior year recalculated and restated since 2020-21 publication. Some minor variation is expected.

Statement of changes in water assets and liabilities

1 July 2022 to 30 June 2023

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

Surface Water Storage Inflows	Accuracy	Notes	30-06-2023	30-06-2022
Dartmouth	-	-	-	-
Inflow	A	11	1,687,869	1,257,516
Rainfall	B	12	76,325	75,886
Hume	-	-	-	-
Inflow (refer to notes for contributing components)	A	10, 11	7,943,285	5,153,347
Rainfall	B	12	218,651	211,370
Menindee Lakes	-	-	-	-
Inflow	A	11	7,624,313	5,045,780
Rainfall	B	12	160,373	135,712
Lake Victoria	-	-	-	-
Inflow	A	11	968,046	913,186
Rainfall	B	12	33,147	31,595
River	-	-	-	-
Rainfall	C	13	87,143	51,677
Gauged inflow (including Lower Darling Inflow)	A	14	20,285,108	9,565,629
Inflow other (Torrumbarry system return)	A	14	916,930	186,290
Inflow from storage releases (Hume. Lake Victoria)	A	16	8,505,975	4,638,882
Total Surface Water Storage Increases (Isws)	-	-	48,507,164	27,266,871

Surface Water Storage Outflows	Accuracy	Notes	30-06-2023	30-06-2022
Dartmouth	-	-	-	-
Evaporation	B	12	63,883	57,360
Release (valve/spillway)	A	16	1,621,971	167,099
Hume	-	-	-	-
Evaporation	B	12	213,597	213,583
Release (valve/spillway)	A	16	7,859,258	4,046,361
Menindee Lakes	-	-	-	-
Evaporation	B	12	309,098	474,886
Release (valve/spillway)	A	16	7,955,848	3,880,605
Lake Victoria	-	-	-	-
Evaporation	B	12	202,820	342,289
Release (valve/spillway)	A	16	646,717	592,521
River	-	-	-	-
Evaporation	C	13	134,650	122,407
Flow leaving (Flow to South Australia)	A	17	23,018,970	9,118,310
Other outflow (Flow to Lake Victoria note 11, Finley Escape note 17)	A	11,17	978,866	925,356
Extractions: Access Licences	A	18,19	1,583,000	2,357,901
Extractions: Basic landholder rights	C	21	1,936	1,936
Total Surface Water Storage Decreases (Dsws)	-	-	**44,590,615**	22,300,612
Unaccounted difference (Outflow) (Usws)	D	23	3,471,199	1,478,962
Net Surface Water Storage Inflow (Isws-Dsws-Usws)	-	-	**445,350**	3,487,297

2. Changes to claims in water

Increases	Accuracy	Notes	30-06-2023	30-06-2022
Net outflow from Murray to Murrumbidgee (Finley Escape in/Darlot out)	A1	5	0	0
Water traded out of Murrumbidgee	A1	5	130,883	100,082
Total IVT account increases (Ipew)	-	-	130,883	100,082

Decreases	Accuracy	Notes	30-06-2023	30-06-2022
IVT clearances from Murrumbidgee (via Balranald or Snowy RAR transfer)	A1	5	0	0
Net tagged trade into Murrumbidgee	A1	5	(2,513)	(36,824)
Spill (IVT reset)	A1	5	124,007	95,637
Water traded into Murrumbidgee	A1	5	48,005	6,037
Total IVT account decrease (Divt)	-	-	**169,499**	64,850
Net IVT Increase (Iivt-Divt)	-	-	**(38,616)**	35,233

3. Changes in allocation accounts

Allocation Account Increases	Accuracy	Notes	30-06-2023	30-06-2022
Available water determination	-	-	-	-
Domestic And Stock	A1	2	13,700	13,700
Domestic And Stock (Domestic)	A1	2	1,298	1,299
Domestic And Stock (Stock)	A1	2	2,063	2,063
General Security	A1	2	1,064,434	1,121,300
High Security	A1	2	189,705	189,705
Local Water Utility [Domestic And Commercial]	A1	2	8,694	8,694
High Security (Research)	A1	2	1	1
High Security (Town Water Supply)	A1	2	3,195	3,195
Local Water Utility	A1	2	33,497	33,497
Regulated River (High Security)[Community]	A1	2	47	47
Conveyance	A1	2	330,000	330,000
Unregulated flow demand	-	-	-	-
Supplementary water	A	23	151,374	145,650
Uncontrolled flow (general security)	A	23	0	88
New licence	-	-	-	-
General Security	A1	1	55	0
Assignments in	A1	1, 4	715,776	801,544
Total Allocation Account Increases (Iaa)	-	-	**2,513,839**	2,650,782

Allocation Account Decreases	Accuracy	Notes	30-06-2023	30-06-2022
Account usage	-	-	-	-
Domestic And Stock	A1	1,3	8,531	8,619
Domestic And Stock (Domestic)	A1	1,3	825	886
Domestic And Stock (Stock)	A1	1,3	1,175	1,255
Eagle Creek (Temporary Conveyance)	A1	1,3	0	0
General Security	A1	1,3	645,397	793,500
High Security	A1	1,3	101,835	114,590
Local Water Utility[Domestic And Commercial]	A1	1,3	4,320	5,817
High Security (Town Water Supply)	A1	1,3	3,195	3,195
Local Water Utility	A1	1,3	16,183	16,581
Mathoura (Temporary Conveyance)	A1	1,3	0	0
Moira (Temporary Conveyance)	A1	1,3	0	0
Regulated River (High Security)[Community]	A1	1,3	17	14
Conveyance	A1	1,3	312,662	292,037
West Corurgan (Temporary Conveyance)	A1	1,3	0	0
Unregulated flow usage	-	-	-	-
Supplementary water	A1	22	151,374	145,650
Uncontrolled flow (general security)	A1	22	0	88
Account forfeits	-	-	-	-
Domestic And Stock	A1	1	5,185	5,095
Domestic And Stock (Domestic)	A1	1	471	410
Domestic And Stock (Stock)	A1	1	883	808
General Security	A1	1	370,894	231,084
High Security	A1	1	47,728	25,936
Local Water Utility[Domestic And Commercial]	A1	1	4,374	2,877
High Security (Research)	A1	1	1	1
High Security (Town Water Supply)	A1	1	17,074	16,276
Local Water Utility	A1	1	0	0
Mathoura (Temporary Conveyance)	A1	1	30	33
Regulated River (High Security)[Community]	A1	1	0	10,740
Conveyance	A1	1	-	-
Licence cancelled	-	-	0	0
Domestic And Stock	A1	1	0	3
Domestic And Stock (Domestic)	A1	1	5	0
General Security	A1	1	0	0
High Security	A1	1	0	0
Snowy transfer	-	-	-	-
General Security	A1	1,20	35,069	35,069
Assignments out	A1	1,4	824,021	883,035
Total Allocation Account Decreases (Daa)	-	-	**2,551,249**	2,593,598
Net Allocation Account Balance Increases (Iaa-Daa)	-	-	(37,410)	57,184

4. Changes in environmental provisions (see notes for detailed changes)

Increases	Accuracy	Notes	30-06-2023	30-06-2022
Account increases	A1	7	80,691	80,691
Total PEW account increases (Ipew)	-	-	**80,691**	80,691

Decreases	Accuracy	Notes	30-06-2023	30-06-2022
Account usage	A1	7	5,691	47,890
Other account decreases	A1	7	75,290	178,441
Total PEW account decreases (Dpew)	-	-	**80,981**	226,331
Net Environmental Contingency Allowance increase (Ipew - Dpew)	-	-	**(290)**	(145,640)

5. Overall changes

5.Total Surface Water Changes	30-06-2023	30-06-2022
Change in Net Surface Water Assets (Isws-Dsws-Usws+Iivt-Divt-Iaa+Daa-Ipew+Dpew	**444,434**	3,610,985

Note disclosures

Reconciliation and future prospect descriptions

Reconciliation of change in net water asset to net change in physical water storage[12]	2022–2023 ML	2021–2022 ML
Change in net surface water assets	444,434	3,610,985
Non-physical adjustments	-	
Net change in allocation accounts (water liability)	(37,410)	57,184-
Net change in environmental provisions (water liability)	(290)	(145,640)
Net change in claims for water: inter-valley (water asset)	38,616	(35,233)
Net change in physical surface water storage	445,350	3,487,297

Reconciliation of closing water storage to total surface water assets	30 June 2023 ML	30 June 2022 ML
Closing surface water storage	-	-
Hume Dam	2,911,128	2,822,047
Dartmouth Dam	3,742,091	3,663,752
Menindee Lakes	1,421,654	1,901,914
Lake Victoria	536,307	384,652
Less Victorian storage share	(4,313,530)	(4,481,190)
Less South Australian storage share	(0)	(336,200)
Total surface water assets (NSW)	**4,297,650**	3,954,975

Balances summary (reconciliation)	30-06-2023	**30-06-2022**
Total water in storage	10,024,702	9,579,352
(plus) water recoverable	88,954	127,570
(minus) water commitments	936,643	974,342
(equals) net water surface water assets	9,177,014	8,732,580
Change in net surface water assets	**444,434**	**3,610,985**

[12] Prior year recalculated and restated since 2020-21 publication. Some minor variation is expected.

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 NSW Murray Regulated River Water Source. This includes carryovers and available water determinations at the time of reporting, along with probability information about the reliability of the Murray River system.

Latest water availability

You can find the latest information on water availability, including water allocation statements, water allocations summaries and the latest available water determinations, on the NSW Department of Climate Change, Energy, the Environment and Water webpage at https://www.dpie.nsw.gov.au/water/allocations-availability/water-accounting

You can also subscribe to receive the latest updates.

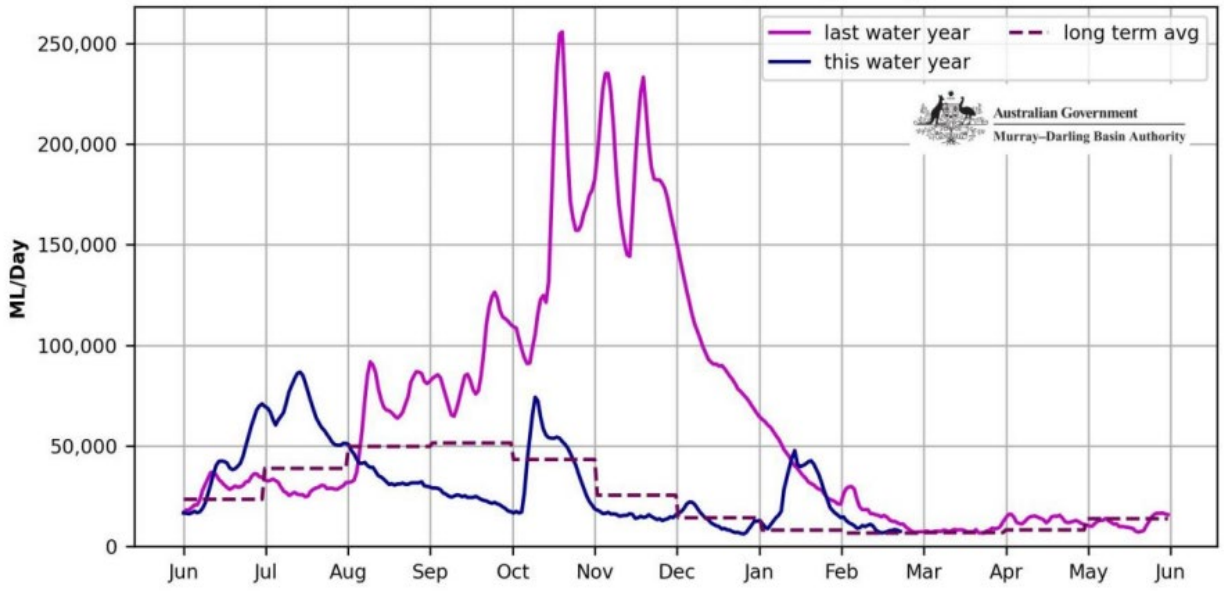
Latest storage volumes

See real-time information on storage volumes for the NSW Murray at https://waterinsights.waternsw.com.au/

Significant events since 2022–23

Since August 2023, Murray System inflows have decreased relative to the previous reporting period and dropped below the long term average inflows from August 2023 till October 2023 and again from late October 2023 through to January 2024 (Figure 55).

Figure 55: Murray system inflows, week ending Wednesday 28 February 2024. Source: River Murray Weekly Reports: River Murray weekly reports | Murray–Darling Basin Authority (mdba.gov.au)



System reliability[13]

The MDBA's long-term planning model (BIGMOD) reflects water sharing plan management conditions in the NSW Murray. It provides indicative system reliability information for the commencement and closure of a watering season.

In a given year, the simulation indicates high-security entitlements are likely to have full start of year (1 July) allocation of 100% for 3% of the time (and equal or exceed 97% for 90% of the time) (Figure 56). By the end of the water year, effective allocation improves to 97% or greater for 100% of the time, and 100% for 69% of the time (Figure 57).

For general-security holders, long-term opening allocations reach 100% effective allocation just 4% of the time (Figure 58). However, by the end of the water year this significantly increases with 100% of effective allocation achieved 71% of the time (Figure 59).

[13] Models used by MDBA and 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.

Figure 56: Start of water year simulated availability for 'High Security' licences

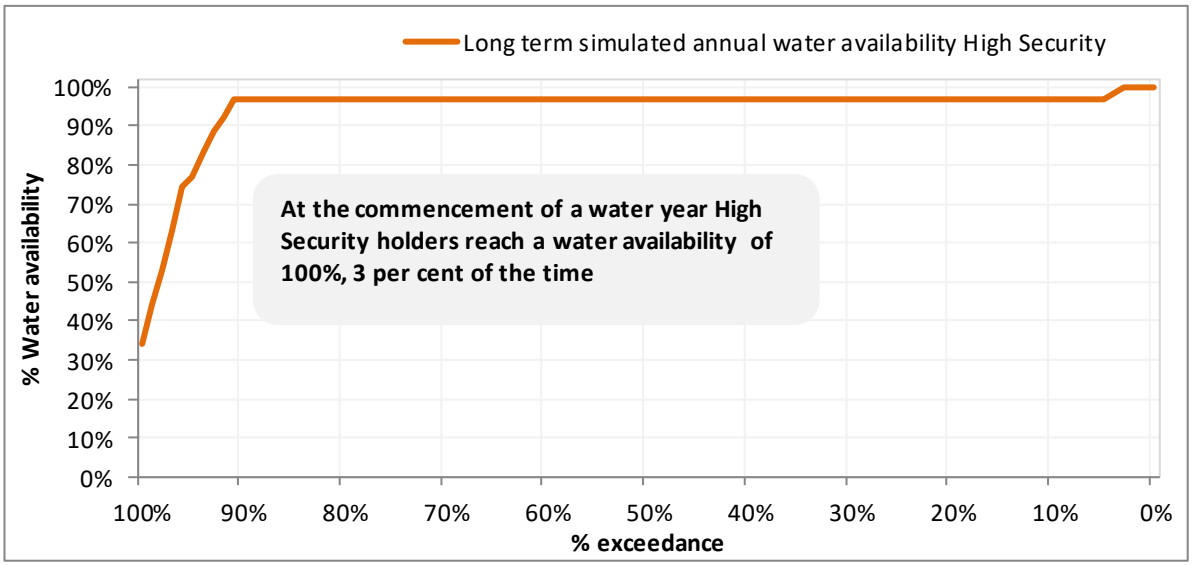


Figure 57: End of water year simulated availability for 'High Security' licences

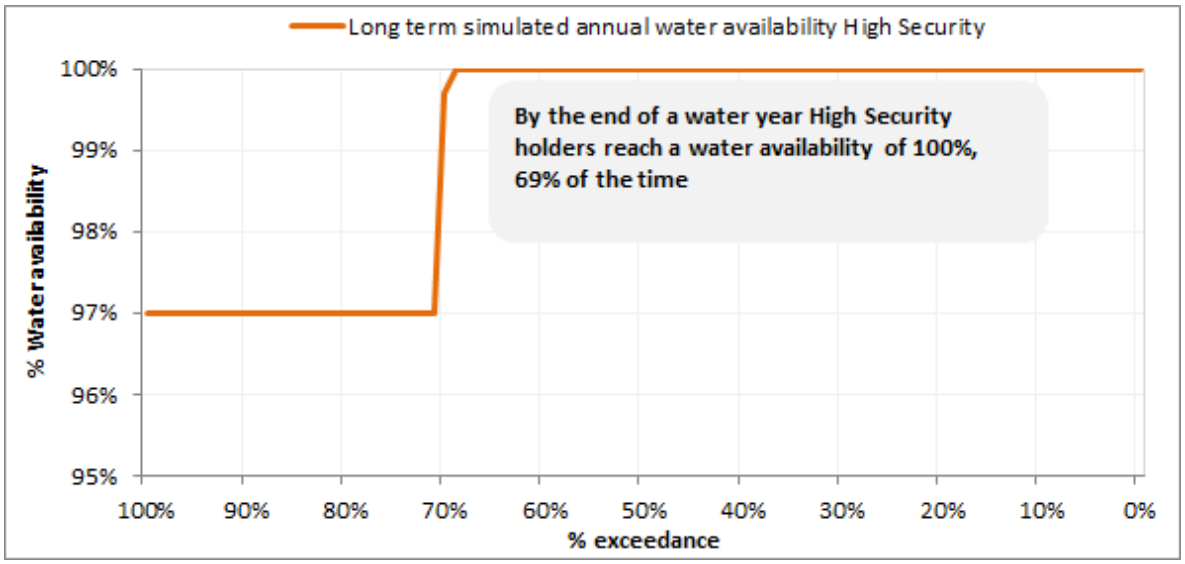


Figure 58: Start of water year availability for 'General Security' licences

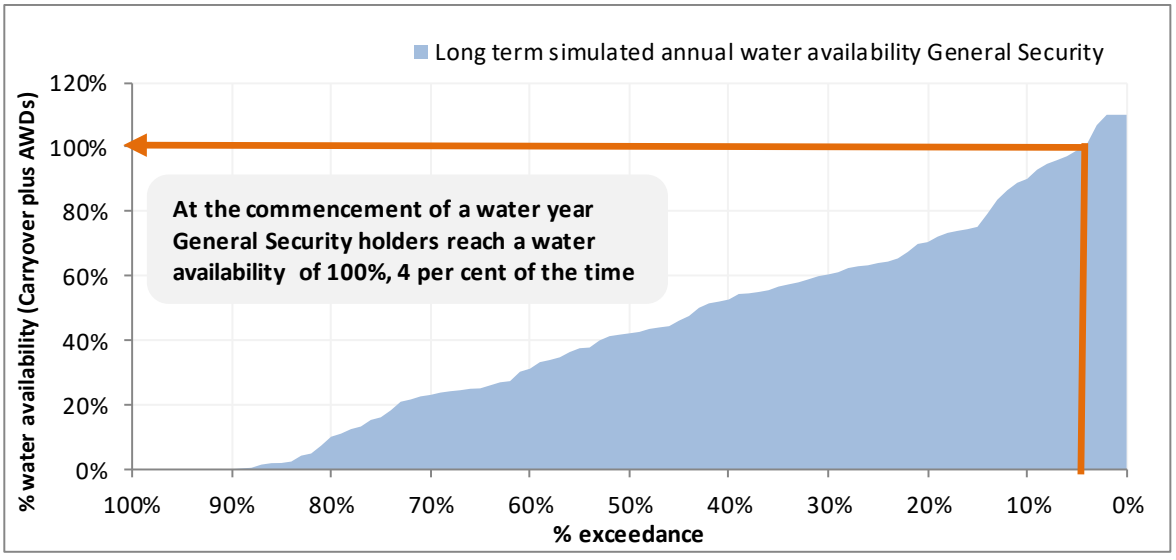
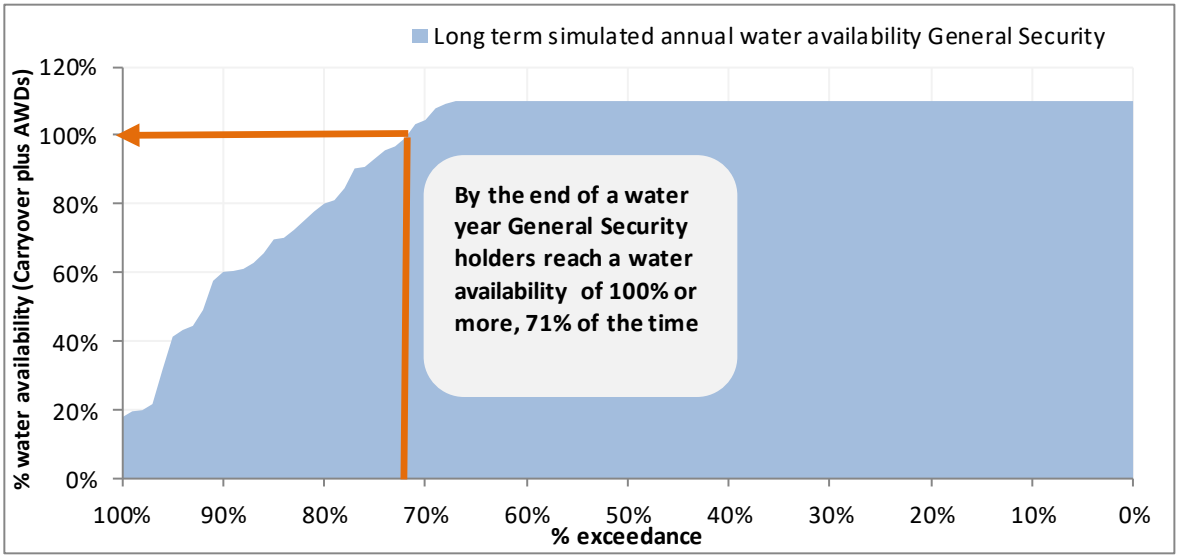


Figure 59: Full year water year availability for 'General Security' licences



Future carryovers and available water determinations 2023–24

Table 10. Carryovers and available water determinations 2023–24 (as of 22 February 2024)

Date	Individual Announcement	Share Component	Allocation Volume (ML)	Cumulative Volume (ML)	Allocation Volume (%)	Cumulative Volume (%)	Balance Avail (ML)	Balance Not Avail (ML)	Balance Total (ML)	Balance Available (%)	Balance Total (%)
Domestic and Stock											
1-Jul-23	Opening	13,700			0.0%	0.0%	(49)	0	(49)	(0.4)%	(0.4)%
1-Jul-23	AWD 100.0 %	13,700	13,700	13,700	100.0%	100.0%	13,651	0	13,651	99.6%	99.6%
Domestic and Stock [Domestic]											
1-Jul-23	Opening	1,298			0.0%	0.0%	2	0	2	0.2%	0.2%
1-Jul-23	AWD 100.0 %	1,298	1,298	1,298	100.0%	100.0%	1,300	0	1,300	100.2%	100.2%
13-Sep-23	Pro-rata AWD	1,300	2	1,300	0.1%	100.0%	1,300	0	1,300	100.2%	100.2%
Domestic and Stock [Stock]											
1-Jul-23	Opening	2,058			0.0%	0.0%	0	0	0	0.0%	0.0%
1-Jul-23	AWD 100.0 %	2,058	2,058	2,058	100.0%	100.0%	2,058	0	2,058	100.0%	100.0%
Local Water Utility											
1-Jul-23	Opening	33,497			0.0%	0.0%	0	0	0	0.0%	0.0%
1-Jul-23	AWD 100.0 %	33,497	33,497	33,497	100.0%	100.0%	33,497	0	33,497	100.0%	100.0%
Local Water Utility [Domestic and Commercial]											
1-Jul-23	Opening	8,694			0.0%	0.0%	0	0	0	0.0%	0.0%
1-Jul-23	AWD 100.0 %	8,694	8,694	8,694	100.0%	100.0%	8,694	0	8,694	100.0%	100.0%
Regulated River (Conveyance)											
1-Jul-23	Opening	330,000			0.0%	0.0%	0	0	0	0.0%	0.0%
1-Jul-23	AWD 0.7136 ML per Share	330,000	235,488	235,488	71.4%	71.4%	235,488	0	235,488	71.4%	71.4%
17-Jul-23	AWD 0.2864 ML per Share	330,000	94,512	330,000	28.6%	100.0%	330,000	0	330,000	100.0%	100.0%
Regulated River (General Security)											
1-Jul-23	Opening	1,674,096			0.0%	0.0%	755,380	0	755,380	45.1%	45.1%
1-Jul-23	AWD 0.55 ML per Share	1,674,096	920,774	920,774	55.0%	55.0%	1,676,153	0	1,676,153	100.1%	100.1%

Date	Individual Announcement	Share Component	Allocation Volume (ML)	Cumulative Volume (ML)	Allocation Volume (%)	Cumulative Volume (%)	Balance Avail (ML)	Balance Not Avail (ML)	Balance Total (ML)	Balance Available (%)	Balance Total (%)
17-Jul-23	AWD 0.55 ML per Share	1,674,096	165,288	1,086,062	9.9%	64.9%	1,841,442	0	1,841,442	110.0%	110.0%
Regulated River (High Security)											
1-Jul-23	Opening	189,704			0.0%	0.0%	182	0	182	0.1%	0.1%
1-Jul-23	AWD 0.97 ML per Share	189,704	184,017	184,017	97.0%	97.0%	184,199	0	184,199	97.1%	97.1%
17-Jul-23	AWD 0.03 ML per Share	189,704	5,688	189,705	3.0%	100.0%	189,887	0	189,887	100.1%	100.1%
Regulated River (High Security) [Community and Education]											
1-Jul-23	Opening	47			0.0%	0.0%	0	0	0	0.0%	0.0%
1-Jul-23	AWD 100.0 %	47	47	47	100.0%	100.0%	47	0	47	100.0%	100.0%
Regulated River (High Security) [Research]											
1-Jul-23	Opening	1			0.0%	0.0%	0	0	0	0.0%	0.0%
1-Jul-23	AWD 100.0 %	1	1	1	100.0%	100.0%	1	0	1	100.0%	100.0%
Regulated River (High Security) [Town Water Supply]											
1-Jul-23	Opening	3,195			0.0%	0.0%	0	0	0	0.0%	0.0%
1-Jul-23	AWD 100.0 %	3,195	3,195	3,195	100.0%	100.0%	3,195	0	3,195	100.0%	100.0%
Supplementary Water											
1-Jul-23	Opening	252,579			0.0%	0.0%	0	0	0	0.0%	0.0%
1-Jul-23	AWD 1.0 ML per Share	252,579	252,579	252,579	100.0%	100.0%	252,579	0	252,579	100.0%	100.0%

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 and administration data

Policy

Water Sharing Plan for the New South Wales Murray and Lower Darling Regulated Rivers Water Sources 2016

Available on the NSW Department of Climate Change, Energy, the Environment and Water website (www.dcceew.nsw.gov.au/water/home)

Data accuracy

A1 — Nil inaccuracy +/- 0%

Providing agency

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

Data source

Water Accounting System (jointly owned by WaterNSW and NSW Department of Climate Change, Energy, the Environment and Water)

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. This is a list of typical transactions that can apply to an allocation account:

- available water determination (AWD) (detailed in Note 2)
- allocation account usage (detailed in Note 3)
- forfeiture due to:
  - no or limited carryover being permitted (end of year forfeit)
  - account limit breaches
  - evaporation reductions on carryover
  - cancellation of licence
- trade of allocation water between accounts (detailed in Note 4)
- determined carryover volume
- transfer Snowy water savings (detailed in Note 20).

Additional information

Table 12 provides a balanced summary of the water allocation accounts for each category of access licence. Table 11 provides a description of each of the table components.

Table 11: Explanatory information for allocation and environmental account summaries in Table 12 and Table 20.

Heading	Description
Share	The total volume of entitlement in the specific licence category on the specified date
Opening balance	Volume of water that has been carried forward from previous years allocation account
AWD	**Available water determination**: The total annual volume of water added to the allocation account as a result of allocation assessments This figure includes additional AWD made as a result of a storage spill reset as defined in the water sharing plan.
Lic New	**Licences – New**: Increase in account water as a result of the issuing of a new licence
Lic Can	**Licences – Cancelled**: Decrease in account water as a result of a license cancellation where account balance has not been traded to another license
Asn In	**Assignments – In**: Increase in account water as a result of temporary trade in
Asn Out	**Assignments – Out**: Decrease in account water as a result of temporary trade out
Transfer Snowy	**Transfer Snowy water savings**: An adjustment to account water as a result of Snowy water savings projects, with all water held in assigned Snowy environmental licences on 31 January transferred to Snowy Hydro to be used in planning
Usage	**Account usage**: Volume of water that is extracted or diverted from the river and is accountable against the access license allocation

Heading	Description
UCF	**Uncontrolled extractions**: Volume of water that is extracted under high-flow conditions that is not accountable against the licence This differs from Supplementary water in that it becomes accountable once specific allocation levels are exceeded.
During year forfeit	Account water forfeited throughout the year as a result of the accounting rules specified in the water sharing plan Forfeited water may occur due to account limits being reached, conversions between license categories and various types of other license dealings. It also includes any reductions on carryover volumes due to storage evaporation as required by the water sharing plan.
EoY forfeit	**End of year forfeit**: Account water that is forfeited at the end of the water year as a result of carryover rules that restrict the carry forward volume
EoY Avail	**End of year balance – Available**: Account balance that is available to be taken at the conclusion of the water year
EoY NA	**End of year balance – Available – Not available**: Account balance that is not available to be taken at the conclusion of the water year
Carry fwd	**Carry forward**: Represents the account water that is permitted to be carried forward into the next water year as determined by the carryover rules
( )	Negative figures are shown in red brackets

Table 12: Allocation account balance summary for the NSW Murray regulated river 2022–23. See Table 11 for explanation of headings.

Licence category	Share 30 June 2023	Opening Balance	AWD	Lic New	Lic Can	Asn In	Asn Out	Snowy savings	Usage	UCF	During year forfeit	EoY Avail	EoY NA	EoY forfeit	Carry fwd
Domestic And Stock	13,700	(34)	13,700	0	0	0	0		8,531	0	0	5,136	0	5,185	(49)
Domestic And Stock (Domestic)	1,298	(2)	1,298	0	0	0	0		825	0	0	471	0	471	0
Domestic And Stock (Stock)	2,058	0	2,063	0	5	0	0		1,175	0	0	883	0	883	0
Local Water Utility [Domestic and Commercial]	8,694	0	8,694	0	0	0	0		4,320	0	0	4,374	0	4,374	0
Local Water Utility	33,497	0	33,497	0	0	0	240		16,183	0	0	17,074	0	17,074	0
Conveyance	330,000	0	330,000	0	0	23,401	40,739		312,662	0	0	0	0	0	0
General Security	1,674,096	776,899	1,064,434	55	0	625,631	676,266	35,069	645,397	0	0	1,110,288	0	370,894	739,394
High Security	189,704	(360)	189,705	0	0	66,744	106,777		101,835	0	0	47,477	0	47,728	(252)
High Security (Research)	1	0	1	0	0	0	0		0	0	0	1	0	1	0
High Security (Town Water Supply)	3,195	(0)	3,195	0	0	0	0		3,195	0	0	0	0	0	0
Regulated River (High Security) [Community	47	0	47	0	0	0	0		17	0	0	30	0	30	0
Supplementary Water	252,579	0	277,837	0	0	2,157	2,157		0	151,374	0	126,463	0	126,463	0

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 calculates the volume of water added to an individual's licence allocation account. Announcements of allocations are made on a seasonal basis — usually corresponding with the financial year — and are updated on a regular basis or following significant inflow events. Under the *Water Management Act 2000* the announcements are termed 'available water determinations' (AWD).

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 New South Wales Murray and Lower Darling Regulated Rivers Water Sources 2016
  - Part 7 — Limits to the availability of water
    - Division 2 — Available Water Determinations.

Available on the NSW Department of Climate Change, Energy, the Environment and Water website at www.dcceew.nsw.gov.au/water/home

Data accuracy

A1 — Nil inaccuracy +/- 0%

Providing agency

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

Methodology

The AWD procedure itself is generally divided into two sections: the available water asset; and system commitments. Once we have allowed for the required system commitments, the remaining water asset is available for distribution to the access licence categories in order of priority (Table 13).

Announcements are expressed as either a percentage of the share component for all access licences, where share components are specified as megalitres per year, or megalitres per unit share for all regulated river (high security) access licences, regulated river (general security) access licences and supplementary water access licences.

Table 13: Priority of access licence categories

Licence category	AWD priority
General Security	Low
High Security	High
Conveyance	Low
Domestic and Stock[14]	Very high
Local Water Utility	Very high

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

System Commitments: This is an assessment of the existing commitments that have to be delivered from the available water asset in either the current or future years. Key components include:

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

Available water determinations are limited to an equivalent volume of 100% of share component (entitlement) for all categories other than general security. The sum of available water determinations for general-security holders cannot exceed 1.1 megalitres per share.

[14] Domestic and Stock is further broken down into three 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.

Additional information

Table 15 presents the allocation summary report for the reporting period. Table 14 describes the terms used in the allocation summary report.

Table 14: Allocation summary report notes

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

Table 15: Allocation announcements in the reporting period for the NSW Murray regulated river water source[15]

Date	Individual Announcement	Share Component	Allocation Volume (ML)	Cumulative Volume (ML)	Allocation Volume (%)	Cumulative Volume (%)	Balance Avail (ML)	Balance Not Avail (ML)	Balance Total (ML)	Balance Avail (%)	Balance Total (%)
Domestic and Stock											
1-Jul-22	Open	13,700	-	-	-	-	(21)	0	_(21)	(0.1)%	(0.1)%
1-Jul-22	AWD 100.0%	13,700	13,700	13,700	100.0%	100.0%	13,680	0	13,680	99.9%	99.9%
Domestic and Stock [Domestic]											
1-Jul-22	Open	1,298	-	-	-	-	(2)	0	(2)	(0.2)%	(0.2)%
1-Jul-22	AWD 100.0%	1,298	1,298	1,298	100.0%	100.0%	1,296	0	1,296	99.8%	99.8%
Domestic and Stock [Stock]											
1-Jul-22	Open	2,063	-	-	-	-	0	0	0	0.0%	0.0%
1-Jul-22	AWD 100.0%	2,063	2,063	2,063	100.0%	100.0%	2,063	0	2,063	100.0%	100.0%
Local Water Utility											
1-Jul-22	Open	33,497	-	-	-	-	0	0	0	0.0%	0.0%
1-Jul-22	AWD 100.0%	33,497	33,497	33,497	100.0%	100.0%	33,497	0	33,497	100.0%	100.0%
Local Water Utility [Domestic and Commercial]											
1-Jul-22	Open	8,694	-	-	-	-	0	0	0	0.0%	0.0%
1-Jul-22	AWD 100.0%	8,694	8,694	8,694	100.0%	100.0%	8,694	0	8,694	100.0%	100.0%
Regulated River (Conveyance)											
1-Jul-22	Open	-	-	-	-	-	0	0	0	0.0%	0.0%
1-Jul-22	AWD 0.667 ML per Share	330,000	220,110	220,110	66.7%	66.7%	220,110	0	220,110	66.7%	66.7%
15-Jul-22	AWD 0.0233 ML per Share	330,000	7,689	227,799	2.3%	69.0%	227,799	0	227,799	69.0%	69.0%
1-Aug-22	AWD 0.0077 ML per Share	330,000	2,541	230,340	0.8%	69.8%	230,340	0	230,340	69.8%	69.8%
15-Aug-22	AWD 0.302 ML per Share	330,000	99,660	330,000	30.2%	100.0%	330,000	0	330,000	100.0%	100.0%

[15] The AWD report does not include the adjustment of carryover for Snowy Transfers.

Date	Individual Announcement	Share Component	Allocation Volume (ML)	Cumulative Volume (ML)	Allocation Volume (%)	Cumulative Volume (%)	Balance Avail (ML)	Balance Not Avail (ML)	Balance Total (ML)	Balance Avail (%)	Balance Total (%)
Regulated River (General Security)											
1-Jul-22	Open	1,674,096	-	-	-	-	793,380	0	793,380	47.4%	47.4%
1-Jul-22	AWD 0.43 ML per Share	1,674,096	719,870	719,870	43.0%	43.0%	1,513,250	0	1,513,250	90.4%	90.4%
15-Jul-22	AWD 0.06 ML per Share	1,674,096	100,443	820,313	6.0%	49.0%	1,613,693	0	1,613,693	96.4%	96.4%
1-Aug-22	AWD 0.02 ML per Share	1,674,096	33,482	853,795	2.0%	51.0%	1,647,175	0	1,647,175	98.4%	98.4%
15-Aug-22	AWD 0.59 ML per Share	1,674,096	194,699	1,048,494	11.6%	62.6%	1,841,874	0	1,841,874	110.0%	110.0%
Regulated River (High Security)											
1-Jul-22	Open	189,704	-	-	-	-	5,581	0	5,581	2.9%	2.9%
1-Jul-22	AWD 0.97 ML per Share	189,704	184,017	184,017	97.0%	97.0%	189,598	0	189,598	99.9%	99.9%
15-Aug-22	AWD 0.03 ML per Share	189,704	5,688	189,705	3.0%	100.0%	195,285	0	195,285	102.9%	102.9%
Regulated River (High Security) [Community and Education]											
1-Jul-22	Open	47	-	-	-	-	0	0	0	0.0%	0.0%
1-Jul-22	AWD 100.0%	47	47	47	100.0%	100.0%	47	0	47	100.0%	100.0%
Regulated River (High Security) [Research]											
1-Jul-22	Open	1	-	-	-	-	0	0	0	0.0%	0.0%
1-Jul-22	AWD 100.0%	1	1	1	100.0%	100.0%	1	0	1	100.0%	100.0%
Regulated River (High Security) [Town Water Supply]											
1-Jul-22	Open	3,195	-	-	-	-	0	0	0	0.0%	0.0%
1-Jul-22	AWD 100.0%	3,195	3,195	3,195	100.0%	100.0%	3,195	0	3,195	100.0%	100.0%
Supplementary Water											
Open	Open	252,579	-	-	-	-	0	0	0	0.0%	0.0%
1-Jul-22	AWD 1.0 ML per Share	252,579	252,579	252,579	100.0%	100.0%	252,579	0	252,579	100.0%	100.0%
20-Oct-22	AWD 0.1 ML per Share	252,579	25,258	277,837	10.0%	110.0%	277,837	0	277,837	110.0%	110.0%

Note 3 — Allocation account usage

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

Data type

Measured/administration data

Policy

Water Sharing Plan for the New South Wales Murray and Lower Darling Regulated Rivers Water Sources 2016

Data accuracy

A — Estimated in the range +/- 10%

Providing agency

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

Data source

- Water Accounting System (jointly owned by WaterNSW and NSW Department of Climate Change, Energy, the Environment and Water)
- MDBA: Murray MDBA Monthly Report

Methodology

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

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

- usage based on periods of announcement — during periods of supplementary water announcements extractions can be debited against the supplementary water licences
- usage based on water orders — users place orders for water against an access licence and usages are debited against accounts in proportion to the orders placed

- licence category apportionment — if no water orders are available, water extracted is apportioned against categories of access licence in order of priority are presented in Table 16. The prioritising is based on the nature of and rules around each of the licence categories.

Victorian account usage is obtained from the MDBA monthly reports.

Table 16: Licence category metered usage apportionment table

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

Additional information

A summary of account usage for the reporting period is presented in Table 17.

Table 17: Account usage summary

Licence category	Account usage NSW Murray by licence category (ML)	Total account usage Victoria (ML)
Domestic and Stock	8,531	not applicable
Domestic and Stock [Domestic]	825	not applicable
Domestic and Stock [Stock]	1,175	not applicable
Eagle Creek Temporary Critical Conveyance [Critical Conveyance]	0	not applicable
Local Water Utility	16,183	not applicable
Local Water Utility (Domestic and Commercial)	4, 320	not applicable
Mathoura Temporary Critical Conveyance [Critical Conveyance]	0	not applicable
Moira Temporary Critical Conveyance [Critical Conveyance]	0	not applicable
West Corurgan Temporary Critical Conveyance [Critical Conveyance]	0	not applicable
Conveyance	312,662	not applicable

Licence category	Account usage NSW Murray by licence category (ML)	Total account usage Victoria (ML)
General Security[16]	645,397	not applicable
High Security	101,835	not applicable
High Security (Community and Education)	17	not applicable
High Security (Research)	0	not applicable
High Security (Town Water Supply)	3,195	not applicable
Supplementary Water	151,374	not applicable
Total Usage	1,245,513	907,590

[16] Excludes uncontrolled flow extractions as are not debited against an account

Note 4 — Account water trading (allocation assignments)

This represents the temporary trading (allocation assignments) of water between allocation accounts within the regulated NSW Murray water source and between the NSW Murray licence holders and holders in external water sources.

Data type

Administration

Policy

- Water Sharing Plan for the New South Wales Murray and Lower Darling Regulated Rivers Water Sources 2016
  - Part 10 Access licence dealing rules
  - Clause 58 Assignment of rights dealings
  - Clause 61 Assignment of water allocation dealings
  - Clause 62 Interstate access licence transfer and assignment of water allocation

Available on the NSW Department of Climate Change, Energy, the Environment and Water website www.dcceew.nsw.gov.au/water/home

Data accuracy

A1 — Nil inaccuracy +/- 0%

Providing agency

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

Data source

Water Accounting System (jointly owned by WaterNSW and NSW Department of Climate Change, Energy, the Environment and Water)

Methodology

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

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

Trade between water sources will either increase the committed liability for the year (trade into the Murray) or decrease the committed liability for the year (trade out of the NSW Murray). The

imbalance created from trading to and from the Murray water source is monitored and managed with the inter-valley trade account (see Note 5).

Additional information

Table 18 presents the internal and external trading figures between licence categories and water sources. All figures represent a volume in megalitres.

Table 18: NSW Murray catchment allocation assignment summary

From Water Source – Licence Category	To Murrumbidgee General security	To Murrumbidgee High security	To NSW Murray General security	To NSW Murray High security	To NSW Murray RR conveyance	To NSW Murray Supplementary	To Lower Darling General security	To Lower Darling High security	To S.A Interstate licence	To Victoria Interstate licence	Total
Murrumbidgee – General security	0	0	62,042	1,730	5571	0	0	0	0	0	69,343
Murrumbidgee – High security	0	0	58,775	2,448	655	0	2,533	0	0	0	39,402
Murrumbidgee –Conveyance	0	0	1,588	0	0	0	0	0	0	0	1,588
NSW Murray – General security	30,183	8,030	432,495	21,400	17,175	0	81,750	700	57,545	26,987	676,266
NSW Murray – High security	2,323	958	50,998	28,926	655	0	2,740	0	15,395	4,781	106,777
NSW Murray – Local Water Utility	0	0	40	200	0	0	0	0	0	0	240
NSW Murray – RR conveyance	6,171	0	31,283	505	0	0	300	0	2,480	0	40,739
NSW Murray – Supplementary	0	0	0	0	0	2,157	0	0	0	0	2,157
Lower Darling - General security	0	0	1,462	1,296	0	0	0	0	0	0	2,758
Lower Darling – High security	0	0	272	0	0	0	0	0	0	0	272
S.A – Interstate licence	0	0	125	0	0	0	0	0	0	0	125
Victoria – Interstate licence	0	0	8,372	10,238	0	0	0	0	0	0	18,611
Total – Licence Category	38,677	8,988	625,631	66,744	23,401	2,157	84,790	700	75,420	31,768	958,277

Murray Total Trade	Volume (ML)
Internal trade	585,834
External Trade In	240,344
External Trade Out	132,099

Note 5 — Inter-valley trade account

The inter-valley trade (IVT) account provides an ongoing balance of valley debts and claims for water due to the temporary trading of account water between the southern connected valleys of the Murray–Darling Basin.

For the NSW Murray this is presented in the accounting statements as an asset account whereby a positive balance is indicative of a claim to water (NSW Murray owed water), and a negative balance indicative of a future obligation (NSW Murray owes water).

Data type

Derived from measured data

Policy

- *Water Act 2007* (Cwlth)
  - The Murray–Darling Basin Agreement (Schedule 1) — Transferring Water Entitlements and Allocations (Schedule D)
- *Water Management Act 2000* (NSW)
  - Dealings with access licences (Division 4)
    - 71T Assignment of water allocations between access licences
    - 71V Interstate assignment of water allocations
- Water Sharing Plan for the New South Wales Murray and Lower Darling Regulated Rivers Water Sources 2016
  - Part 10 Access licence dealing rules
    - Clause 61 Assignment of water allocation dealings
    - Clause 62 Interstate access licence transfer and assignment of water allocation

Available on NSW Department of Climate Change, Energy, the Environment and Water website (www.dcceew.nsw.gov.au/water/home)

Data accuracy

A1 — Nil inaccuracy +/- 0%

Providing agency

WaterNSW

Data Sources

- Provided spreadsheet
- Water Accounting System
- HYDSTRA

Methodology

The balance of the IVT account is calculated by adjusting the carried forward balance of the IVT account from the previous year and applying a series of transactions (described in the additional information section below). A positive balance indicates that the Murrumbidgee owes water to the Murray System while a negative balance indicates that Murray system owes water to the Murrumbidgee System.

Additional information

The IVT trade balance summary table presented in Table 19 provides information compiled from the best information available at the time of publication. These figures may change in the future as updated information becomes available. All figures are in megalitres.

Notes on Table 19 — IVT accounting descriptions

- (1) The volume of water traded into the Murrumbidgee Valley from the NSW Murray, NSW Lower Darling, Victoria or South Australia will result in the Murray IVT being decreased.
- (2) The volume of water traded out of the Murrumbidgee Valley to the NSW Murray, NSW Lower Darling, Victoria or South Australia will result in the Murray IVT being increased.
- (3) The MDBA requests that NSW deliver a proportion of the water that was traded to users outside of the Murrumbidgee. NSW supplies the requested volume and accounts for it by calculating the resulting additional volume of water passing the Murrumbidgee River at Balranald. The accounted volume supplied is agreed between WaterNSW and MDBA, and the Murray IVT account is decreased accordingly.
- (4) On occasion, Snowy Hydro Limited may be requested to transfer a portion of either the Murrumbidgee or Murray required annual release (RAR) to assist with the settlement of the IVT account when it gets too far out of balance (although there is no legal obligation on it to perform such releases). These are often referred to as ‘notional’ releases. The following points illustrate this process:

- Excessive Trade from Murrumbidgee to Murray creates a need to transfer Murrumbidgee RAR via the Murray development thus decreasing the Murray IVT account (reducing Murrumbidgee debt to Murray).
- Excessive trade from Murray to Murrumbidgee creates a need to transfer Murray RAR via the Murrumbidgee development thus increasing the Murray IVT account (reducing Murray debt to Murrumbidgee).
- (5) Tagged trading is a dealing that occurs when a licence holder within a valley nominates to extract their allocation for that licence from a different water source. Any water delivered to a point of extraction within the Murrumbidgee to meet allocation associated with another water source results in a decrease to the Murray IVT.
- (6) During periods of high summer demand, transfers of water can occur from the Murray to the Murrumbidgee via Murray Irrigation Limited (MIL) infrastructure to bypass delivery constraints that can occur in the Yanco Creek System and the Coleambally Irrigation channel network. Water passed into the Murrumbidgee via MIL, subject to MIL ability to deliver via their channel system, can help to meet the demands in Billabong Creek. The net change in the IVT as a result is calculated by assessing the difference between the flow diverted from MIL to Billabong Creek (via Finley escape) and the water that leaves the Murrumbidgee via the Billabong Creek at Darlot for the corresponding period (i.e. estimating volume extracted by users on Billabong Creek). This figure is presented as 'Finley borrow' in Table 19.
- When a spill occurs from a Murrumbidgee storage it could be seen as a spill of the IVT or of Murrumbidgee water. The decision as to which spills is currently discretionary. Water managers base this decision on relative water availability in the NSW Murray or Murrumbidgee: if Murrumbidgee had greater availability, it would be deemed more appropriate for the Murrumbidgee water to spill meaning a loss of resource to Murrumbidgee water users; conversely if the Murray had greater availability then a decision to spill the IVT would be made which could result in a loss of resource for the NSW Murray.

Table 19: Murray- Murrumbidgee inter-valley trade account summary

Water year ending 30 June	Starting balance	1. Inter-valley trade – Into Murrumbidgee (1)	2. Inter-valley trade – Out of Murrumbidgee (2)	Inter-valley trade – Net Into Murray	Murrumbidgee IVT acc adj Decreases via Snowy (4)	Murrumbidgee IVT acc adj Via Balranald (3)	Murrumbidgee IVT acc adj Net tagged trade (5)	Murrumbidgee IVT acc adj IVT Spill	Murrumbidgee IVT acc adj Increases Finley borrow (6)	IVT Closing balance
2004–05	0	11,805	3,779	(8,026)	0	4,185	0	0	12,211	0
2005–06	0	16,646	21,748	5,102	0	20,282	0	0	10,162	(5,018)
2006–07	(5,018)	1,209	97,195	95,986	20,000	70,968	0	0	0	0
2007–08	0	2,729	141,825	139,096	0	63,500	0	0	728	76,324
2008–09	76,324	17,223	406,976	389,753	200,000	44,981	0	0	6,245	227,341
2009–10	227,341	55,659	166,443	110,784	200,000	119,567	0	0	5,318	23,876
2010–11	23,876	130,929	180,031	49,102	0	57,751	0	0	12,766	27,993
2011–12	27,993	85,062	151,880	66,818	78,000	12,083	0	0	965	5,693
2012–13	5,693	179,426	234,574	55,148	(39,000)	87,542	200	0	5,049	17,148
2013–14	17,148	59,917	180,850	120,933	0	40,282	0	0	1,389	99,188
2014–15	98,188	94,248	139,893	45,645	0	148,299	(4,605)	0	9,882	11,021
2015–16	11,021	14,059	275,373	261,314	0	202,431	(23,081)	0	3,654	96,638
2016–17	96,638	14,564	48,414	33,850	0	80,000	(37,792)	0	0	88,280
2017–18	88,280	151,138	74,221	(76,917)	0	0	25,151	0	0	(13,788)
2018–19	(13,788)	18,091	54,985	36,894	0	0	5,281	0	583	18,408
2019–20	18,745[17]	63,386	197,072	133,686	0	156,726	(7,976)	0	2,563	6,244
2020–21	6,244	21,988	323,131	301,143	0	249,108	(29,835)	0	4,223	92,337
2021-22	92,338	6,037	100,082	94,045	0	0	(36,824)	95,637	0	127,570
2022-23	127,570	48,005	130,883	82,878	0	0	(2,513)	124,007	0	88,954

[17] Adjusting entry applied

Note 6 — Held environmental water

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

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

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

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

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 New South Wales Murray and Lower Darling Regulated Rivers Water Sources 2016

Available on NSW Department of Climate Change, Energy, the Environment and Water website (www.dcceew.nsw.gov.au/water/home)

Data accuracy

A1 — Estimated in the range +/- 10%

Providing agency

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

Data source

NSW Department of Climate Change, Energy, the Environment and Water environmental water portal

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. Typical transactions that can apply to an environmental allocation account include:

- 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)
- 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

Table 20 provides a summary of held environmental water for the reporting period. Table 11 provides an explanation for each component in the summary report. Table 21 defines change for held environmental water between the current and previous reporting periods. Table 22 summarises the movement between held environmental water licences and consumptive licences via temporary trading (allocation assignments).

Table 20: NSW Murray regulated water source 2022–23 environmental account balance summary. See Table 11 for explanation of headings.

Category	Share	Opening balance	AWD	Lic New	Lic Can	Ass In	Ass Out	Transfer Snowy	Acc. usage	During year forfeit	EoY Avail	EoY NA	EoY forfeit	Carry fwd
Conveyance	50,214	0	50,214	0	0	23,401	40,739	0	32,876	0	0	0	0	0
General Security	484,673	226,367	306,774	0	0	481,516	528,790	35,069	319,141	0	131,656	0	14,542	117,114
High Security	25,009	0	25,009	0	0	0	25,009	0	0	0	0	0	0	0
Supplementary	100,211	0	110,232	0	0	0	0	0	0	0	110,232	0	110,232	0

Table 21: NSW Murray regulated water source environmental holding summary

Category	Volume 30 June 2022	Volume 30 June 2023	Volume diff	No. licences 30 June 2022	No. licences 30 June 2023	No. licence difference
Regulated River (Conveyance)	50,214	50,214	0	2	2	0
Regulated River (General Security)	484,673	484,673	0	17	17	0
Regulated River (General Security) – In Murray Irrigation or part held licences	25,009	25,009	0	1	1	0
Regulated River (High Security)	100,211	100,211	0	10	10	0
Supplementary Water	50,214	50,214	0	5	5	0

Table 22: Temporary water movement by licence type (held environmental water allocation assignments)

From Type – Water source	To Environ NSW Murray	To Environ Murrumbidgee	To Environ Lower Darling	To Environ South Australia	To Consumptive NSW Murray	To Consumptive Murrumbidgee	To Consumptive South Australia	Total
Environmental – NSW Murray	339,144	5,571	84,583	0	7,069	600	2,480	439,447
Environmental – Murrumbidgee	8,517	0	0	0	0	0	0	8.,517
Consumptive – NSW Murray	2,198	0	0	0	0	0	0	2,198
Consumptive – Murrumbidgee	712	0	0	0	0	0	0	712
Total	350,571	5,571	84,583	0	7,069	600	2,480	450,928

Consumptive to environmental = 2,910 ML

Environmental to consumptive = 10,149 ML

Environmental to environmental = 437,815 ML

Note 7 — Environmental provisions

There a number of planned environmental provisions allowed for within the regulated NSW Murray water source, implemented under the water sharing plan, with the aim of enhancing environmental benefits.

A long-term extraction limit

A long-term extraction limit is set in place that ensures the growth in diversions is contained and the requirements set out under schedule F of the Murray–Darling Basin Agreement are maintained. If long-term average annual diversions exceed this limit, provisions are in place to implement a reduction in the available water determinations until the average diversions are bought back under the required limit.

Barmah–Millewa environmental water allowance (B-M EWA) and overdraw

An environmental water allowance and overdraw availability has been established for environmental watering in the Barmah–Millewa forest and other wetlands, and to increase the frequency of high flows during spring and early summer in the Murray River. These rules are designed to complement those applied by Victoria.

The B-M EWA provides a volume of up to 75,000 megalitres each year to build up a reserve of planned environmental water, up to a maximum of 350,000 megalitres, for the maintenance of the Barmah–Millewa forest. In addition, under certain conditions water in the B-M EWA account can be borrowed by regulated Murray water source access licence holders, with the borrow being paid back when sufficient water becomes available.

The Barmah–Millewa overdraw is an additional account that provides a volume of up to 50,000 megalitres per water year to provide water to Barmah–Millewa forest provided that sufficient water reserves are available to NSW so as not to constrain available water determinations to any of the licence categories under the plan.

Water in either of the B-M EWA or overdraw accounts is made available from Hume Dam to provide environmentally beneficial outcomes for the Barmah–Millewa forest, in accordance with any relevant inter-state agreements.

For details on rules relating to the management of these accounts in relation to crediting of water, carryover and forfeit rules, refer to water sharing plan.

Murray additional environmental allowance (AEA)

Releases from the Murray AEA may be made for any environmental purpose consistent with objectives as set out in the water sharing plan. The allowance may be credited annually with up to 0.03 megalitres, while accumulating a maximum of up to 0.15 megalitres per share of high-security entitlement. For details on rules relating to the management of this account, refer to water sharing plan.

Adaptive environmental water access licences

Two access licences with a total share component of 32,027-unit shares were established as consequence of the Murray Irrigation Limited privatisation arrangements (30,000 megalitres conveyance licence) and water savings resulting from works installed to regulate inflows to Moira Lake (2,027 megalitres high security licence). These licences form part of the held environmental entitlement described in Note 6.

Data type

Measured/Administration

Policy

- Water Sharing Plan for the New South Wales Murray and Lower Darling Regulated Rivers Water Sources 2016
  - Part 4 Planned Environmental Water Provisions

Available on the NSW Department of Climate Change, Energy, the Environment and Water website (www.dcceew.nsw.gov.au/water/home)

Data accuracy

A1 — Nil inaccuracy +/- 0%

Providing agency

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

Data source

- Water Accounting System (jointly owned by WaterNSW and NSW Department of Climate Change, Energy, the Environment and Water)
- WaterNSW annual compliance report (internal document)

Additional information

Account balance summaries for the B-M EWA and the additional environmental allowance are presented in Table 23 and Table 24 respectively. The Barmah–Millewa overdraw account has not yet been credited under water sharing plan management conditions.

Table 23: Barmah–Millewa environmental allowance

Water Year	Account carryover	Credits	Spill	Evaporation forfeit	Use	Account balance	Available for use	Borrow carryover	Borrow	Borrow repay	Borrow account
2004-05	175,000	50,000	0	0	0	225,000	0	175,000	50,000	0	225,000
2005-06	225,000	75,000	0	0	256,450	43,550	43,550	225,000	50,000	275,000	0
2006-07	43,550	47,500	0	0	0	91,050	0	0	91,050	0	91,050
2007-08	91,050	21,500	0	0	0	112,550	0	91,050	21,500	0	112,550
2008-09	112,550	17,500	0	0	0	130,050	0	112,550	17,500	0	130,050
2009-10	130,050	50,000	0	0	0	180,050	0	130,050	50,000	0	180,050
2010-11	180,050	50,000	0	720	134,500	94,830	94,830	180,050	48,500	228,550	0
2011-12	94,830	75,000	0	0	139,800	30,030	30,030	0	0	0	0
2012-13	30,030	75,000	2,440	850	0	101,740	101,740	0	0	0	0
2013-14	101,740	75,000	76,730	2,460	0	97,550	97,550	0	0	0	0
2014-15	97,550	75,000	0	2,420	0	170,130	170,130	0	0	0	0
2015-16	170,130	50,000	0	0	0	220,130	0	0	220,130	0	220,130
2016-17	220,130	75,000	94,510	3,370	84,030	113,220	113,220	220,130	25,590	245,720	0
2017-18	113,220	75,000	0	2,570	0	185,650	185,650	0	187,280	187,280	0
2018-19	185,650	75,000	0	0	0	260,650	0	0	260,650	0	260,650
2019-20	260,650	33,000	0	0	0	293,650	-2,440	260,650	35,440	0	296,090
2020-21	293,650	50,000	0	170	0	343,480	343,480	296,090	46,060	342,150	0
2021-22	343,480	75,000	168,980	3,770	47,890	197,840	197,840	0	350,000	350,000	0
2022-23	197,840	75,000	72,840	2,450	0	197,550	197,550	0	0	0	0

Table 24: Additional environmental allowance

Water Year	Carryover	HS Share	AWD reached 0.97ML/Share	Credit	Account Limit Forfeit	Use	Spill Forfeiture	Balance
2004-05	0	184,256	Yes	5,528	0	0	0	5,528
2005-06	5,528	184,256	Yes	5,528	0	0	0	11,055
2006-07	11,055	185,223	Yes	5,557	0	0	0	16,612
2007-08	16,612	186,293	No	0	0	0	0	16,612
2008-09	16,612	187,170	Yes	5,615	0	0	0	22,227
2009-10	22,227	187,557	Yes	5,627	0	0	0	27,854
2010-11	27,854	191,584	Yes	5,748	4,723	0	28,878	0
2011-12	0	191,584	Yes	5,748	0	1,750	3,998	0
2012-13	0	191,584	Yes	5,748	0	0	5,748	0
2013-14	0	191,584	Yes	5,748	0	0	5,748	0
2014-15	0	191,637	Yes	5,749	0	5,751	0	(2)
2015-16	(2)	191,789	Yes	5,754	0	5,754	0	(2)
2016-17	(2)	193,746	Yes	5,812	0	0	5,810	0
2017-18	0	193,747	Yes	5,812	0	5,812	0	0
2018-19	0	189,704	Yes	5,691	0	5,691	0	0
2019-20	0	189,704	Yes	5,691	0	5,691	0	0
2020-21	0	189,704	Yes	5,691	0	5,691	0	0
2021-22	0	189,705	Yes	5,691	0	0	5,691	0
2022-23	0	189,705	Yes	5,691	0	5,691	0	0

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 that can't be accessed under normal operating conditions, for example the volume captured below the low-level outlet. It is assumed that the dead storage can be accessed if required via alternative access methods such as syphons.

The responsibility of operating Menindee Lakes is shared between NSW Department of Climate Change, Energy, the Environment and Water and the MDBA. It is under WaterNSW control when the storage volume falls below 480,000 megalitres until such time as the volume rises above 640,000 megalitres. The lakes then come under MDBA control until the volume falls back below 480,000 megalitres.

Data type

Derived from measured data

Policy

Not applicable

Data accuracy

A — Estimated in the range +/- 10%

Providing agency

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

Data source

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

Methodology

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

Additional information

A summary of capacity and dead storage volumes for major storages of the NSW Murray is presented in Table 25.

Table 25: Storage summary table

Name	Capacity (ML)	Dead storage (ML)
Hume Dam	3,005,156	1,790
Dartmouth Dam	3,856,000	71,000
Menindee Lakes	1,730,886	215,690
Lake Victoria	677,000	100,000
Lake Mulwala	117,500	NA
Torrumbarry Weir	36,810	NA

Storage volume plots for Hume, Dartmouth, Menindee and Lake Victoria storages are presented respectively in Figure 18, Figure 20, Figure 22, and Figure 24.

Note 9 — River channel storage

The volume of water stored in the river channel on 30 June of the reporting period

Policy

Not applicable

Data type

Derived from measured data

Data accuracy

B — Estimated in the range +/- 25%

Providing agency

MDBA

Data sources

Murray MDBA monthly summary spreadsheet

Methodology

Calculated as part of the MDBA Murray Flow Model using the following methodology.

For each river section:

$$V_i = Q_i \times T_i$$

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

$$\text{River Channel Storage} = \sum_{i=1}^{n} V_i$$

Table 26: Summary of river channel storage calculation components

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

Assumptions and approximations:

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

Note 10 — Snowy required annual release

Snowy Hydro Limited provides an annual fixed minimal accountable release, known as the 'required annual release' (RAR) to the Murray (1,062,000 megalitres per year). However, in years of severe drought when the current inflow sequence is worse (drier) than the historical dry sequence, the Snowy Hydro delivery of the RAR could put the Snowy Scheme at risk of running out of water. In those years the RAR may be reduced by the dry inflow sequence volume (DISV), which is the measure of the cumulative difference between the historic dry sequence and the current inflow sequence. Any shortfall in the delivery of the DISV will be repaid in the future when annual inflows improve.

Further adjustments to the RAR can also be made each year as a result of pre-releases made in the previous year or for water savings in the Murray that have been dedicated to Snowy River environmental flows. The RAR and those items that adjust it are monitored continually and updated whenever changes in the catchment dictate it. Montane release is environmental water to support the high-altitude streams that have been impacted by the Snowy Mountains Scheme. It is diverted to Hume Dam catchment, with the majority of volume lost before reaching the dam.

Snowy Hydro Limited operates under a May to April accounting year, which is different to the water accounting period being considered in this report. For the purpose of this GPWAR total contributions from Snowy Hydro to Hume dam, during a July to June water year are estimated in Note 11, Table 29. A high-level summary of key release components from Snowy Hydro for the May to April water year is provided Table 27.

Policy

Snowy Water Licence 2020

Data type

Derived from measured data

Data accuracy

A1 — Nil inaccuracy +/- 0%

Providing agency

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

Data sources

Snowy Mountains Authority water operations report

Methodology

Not applicable

Additional information

A summary of RAR accounting for the Snowy–Murray development is provided in Table 27. Further information on the operating requirements for Snowy Hydro Limited are available at Snowy Water Licence | Water (nsw.gov.au)

Table 27: Annual Snowy–Murray RAR delivery summary May to April Water Year.

Water Year	Total RAR delivered[18]	Pre-released RAR (for following water year)	Above target discretionary releases	Other releases to Hume
01-May-2018 to 30-Apr-2019	715,000	199,000	0	0
01-May-2019 to 30-Apr-2020	527,000	127,000	0	0
01-May-2020 to 30-Apr-2021	881,000	301,000	50,000	0
01-May-2021 to 30-Apr-2022	515,000	228,000	293,000	0
01-May-2022 to 30-Apr-2023	583,000	200,000	397,000	0

[18] Includes accountable deliveries to snowy montane rivers and Hume Dam

Note 11 — Storage inflow

Storage inflow refers to the volume of water flowing into the major headwater storages — Hume Dam, Dartmouth Dam, Menindee Lakes and Lake Victoria.

Policy

Not applicable

Data type

Derived from measured data

Data accuracy

A — Estimated in the range +/- 10%

Providing agency

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

Data sources

NSW Department of Climate Change, Energy, the Environment and Water: HYDSTRA, Integrated quantity and quality model (IQQM)

Methodology

In most of the major storages in NSW there is no direct measurement of inflows. However, it is possible to calculate inflows by using a mass balance approach (based on balancing the change in storage volume) where the inflow is the only the unknown. This is referred to 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. The daily inflows are then summed to provide an annual inflow figure according to the following formula, with components described in Table 28.

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

Table 28: Components for back-calculation of inflow

Symbol	Variable	Unit
I	Inflow	ML/day
ΔS	Change in storage volume	ML
O	Outflow	ML/day

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

Assumptions and approximations:

- Constant storage-specific pan evaporation factors are applied (one annual factor).
- Seepage was assumed to be zero.

Additional Information

Inflow to Hume is largely regulated by upstream infrastructure operated by Snowy Hydro, and releases from Dartmouth storage. A breakdown of the estimated contributing sources is provided in Table 29. Additional information on the required releases from Snowy Hydro are provided in Note 10.

Table 29: Contributing Inflow Summary Hume Dam

Water Year	Total inflow estimate	Delivered from Snowy Hydro infrastructure[19]	Dartmouth releases[20]	Natural Hume Inflow estimate[21]
2018-2019	2,963,986	765,462	1,500,831	697,694
2019-2020	3,061,307	752,540	1,101,887	1,206,880
2020-2021	3,334,301	1,182,257	137,095	2,014,949
2021-2022	5,153,347	1,075,280	167,099	3,910,968
2022-2023	7,943,285	969,898	1,621,971	5,351,416

[19] Releases at M1 power station July to June water year

[20] No loss processes have been allowed for between Dartmouth and Hume storage. By magnitude these are considered negligible.

[21] Total inflow estimate minus deliveries from Snowy Hydro, minus Dartmouth releases.

Note 12 — Storage evaporation and storage rainfall

This refers to the volume of water effective on Hume Dam, Dartmouth Dam, Menindee Lakes and Lake Victoria that is either lost as a result of evaporation or gained as a result of rainfall.

Data type

Derived from measured data

Policy

Not applicable

Data accuracy

B — Estimated in the range +/- 25%

Providing agency

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

Data source

- NSW Department of Climate Change, Energy, the Environment and Water: HYDSTRA
- QLD Department of Natural Resources: SILO

Methodology

Daily rainfall and Mortons shallow lake evaporation data (accessed via SILO) are applied to storage surface area time-series from HYDSTRA or MDBA-supplied time-series data to achieve a volume in megalitres, which is then aggregated to an annual figure according to the following formulas, with the formula components described in Table 30. The rainfall and evaporation data utilised is equivalent to the data used in the storage inflow back-calculation (Note 12).

Rainfall:

$$\sum_{i=1}^{n} V_i = \left(\frac{R_i \times \mathrm{A}_i}{100}\right)$$

Evaporation:

$$\sum_{i=1}^{n} V_i = \left(\frac{E_i \times \mathrm{A}_i}{100}\right)$$

Table 30: Components for storage evaporation and rainfall

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

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 Climate Change, Energy, the Environment and Water

Data source

- NSW Department of Climate Change, Energy, the Environment and Water: HYDSTRA, ARCGIS
- QLD Department of Natural Resources: SILO

Methodology

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

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

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

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

Rainfall:

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

Evaporation:

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

Table 31: Components for storage evaporation and rainfall

Symbol	Variable	Unit
V	Volume	ML/year
R	Rainfall	mm/day
A	Surface area - derived from height to surface areas lookup curve	m2
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 gauging stations.

Policy

Not applicable

Data type

Measured data

Data accuracy

A — Estimated in the range +/- 10%

Providing agency

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

Data sources

- NSW Department of Climate Change, Energy, the Environment and Water: HYDSTRA
- MDBA: Murray MDBA Monthly Report

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

Individual tributaries used in the calculation of the total gauged inflow for the reporting period are presented in Table 32. Daily inflows for the reporting period for NSW and Victorian tributaries are presented in Figure 60 and Figure 61 respectively.

Table 32: Summary of NSW Murray gauged tributary inflow

Type	Station code	Station name	Volume (ML)
Victoria Murray gauged tributary inflows	402205	Kiewa River	1,197,615
Victoria Murray gauged tributary inflows	405232	Goulburn River	4,098,193
Victoria Murray gauged tributary inflows	404210	Broken Creek	237,129
Victoria Murray gauged tributary inflows	406202	Campaspe River	624,400
Victoria Murray gauged tributary inflows	403241	Ovens River	3,441,687
Torrumbarry system return - (multiple tributaries and effluent returns)	-	-	916,930
Total Victorian gauged tributary inflow	-	-	10,515,954
NSW Murray tributary inflows	410130	Murrumbidgee River at D/S Balranald Weir	5,012,963
NSW Murray tributary inflows	410134	Billabong Creek at Darlot	934,214
NSW Murray tributary inflows	425007	Darling River at Burtundy	4,738,907
Total NSW gauged tributary inflow	-	Total NSW gauged tributary inflow	10,686,084
Total Murray Gauged Tributary Inflow	-	Total Murray Gauged Tributary Inflow	21,202,038

Figure 60: NSW daily tributary inflow to Murray

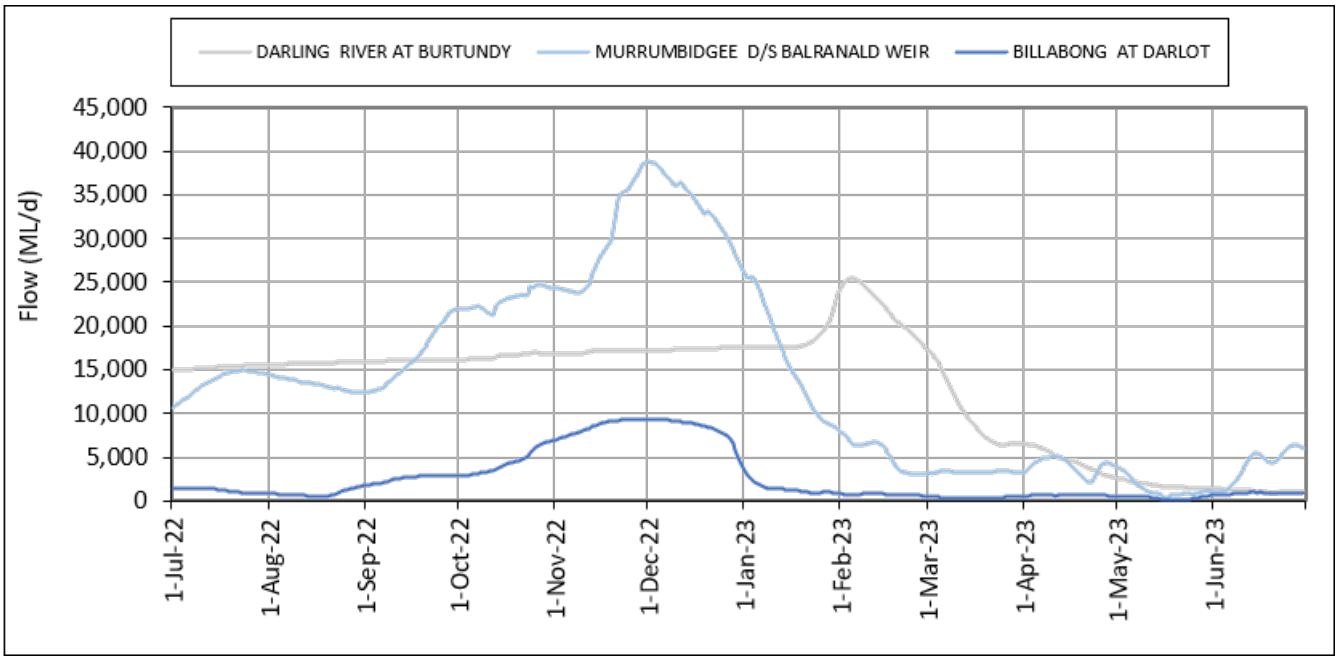
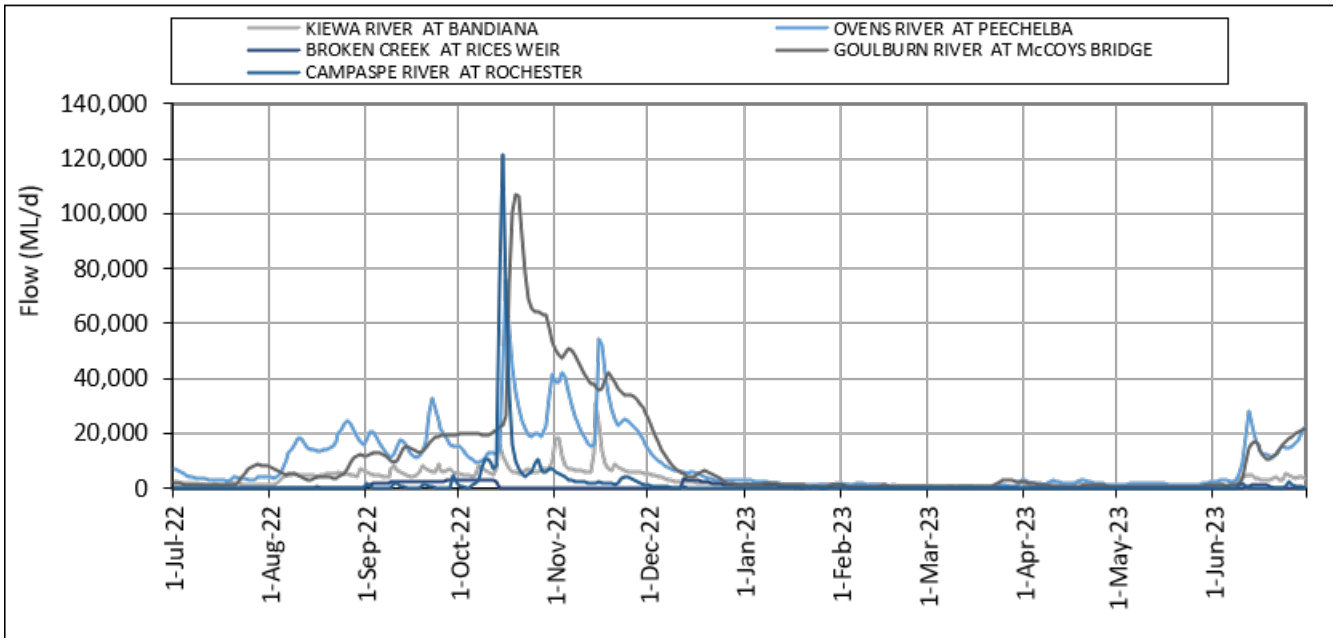


Figure 61: Victorian daily tributary inflow to Murray



Note 15 — Ungauged runoff estimate

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

Policy

Not applicable

Data type

Estimated

Data accuracy

C — Estimated in the range +/- 50%

Providing agency

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

Data sources

Not applicable

Methodology

For the purpose of this account, it was assumed that ungauged runoff was minimal and therefore assumed to be zero.

Note 16 — Dam releases, river inflow from dam releases

This refers to the volume of water released from Hume Dam, Dartmouth Dam and Lake Victoria storages. In the accounting process this release is represented as both a decrease in asset (of the dam) and an equal increase in asset (of the river).

It should be noted that the volume entering the Murray as a result of Menindee Lakes releases is provided as a gauged tributary inflow recorded at the Darling River at Burtundy and can be seen in Note 14.

Policy

Not applicable

Data type

Measured data

Data accuracy

A — Estimated in the range +/- 10%

Providing agency

MDBA

Data sources

MDBA-provided spreadsheets

Methodology

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

Additional information

Daily charts of storage release volumes in the reporting period for Hume, Dartmouth and Lake Victoria storages are provided in Figure 62, Figure 63 and Figure 64 respectively.

Figure 62: Hume Dam releases for the reporting period

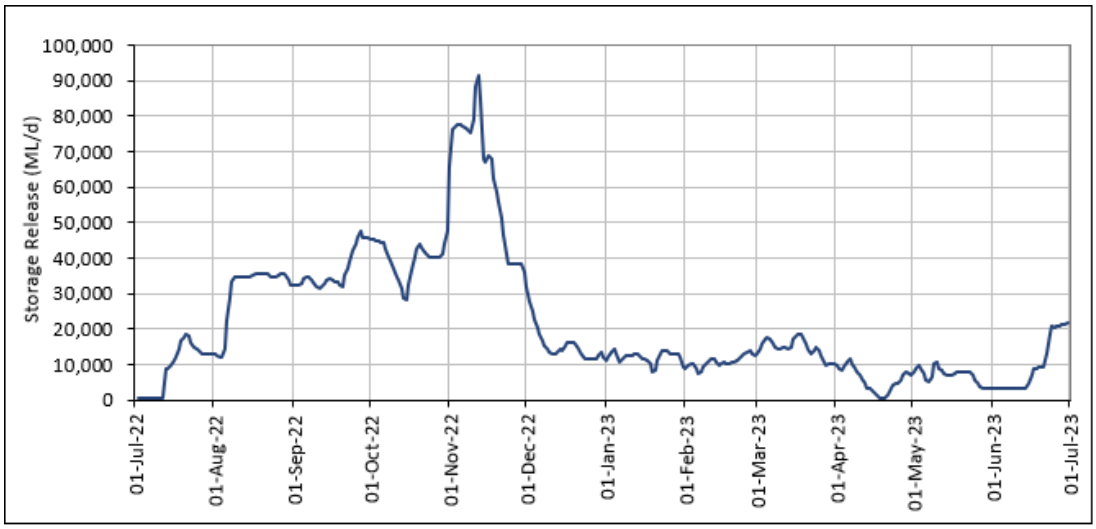


Figure 63: Dartmouth Dam releases for the reporting period

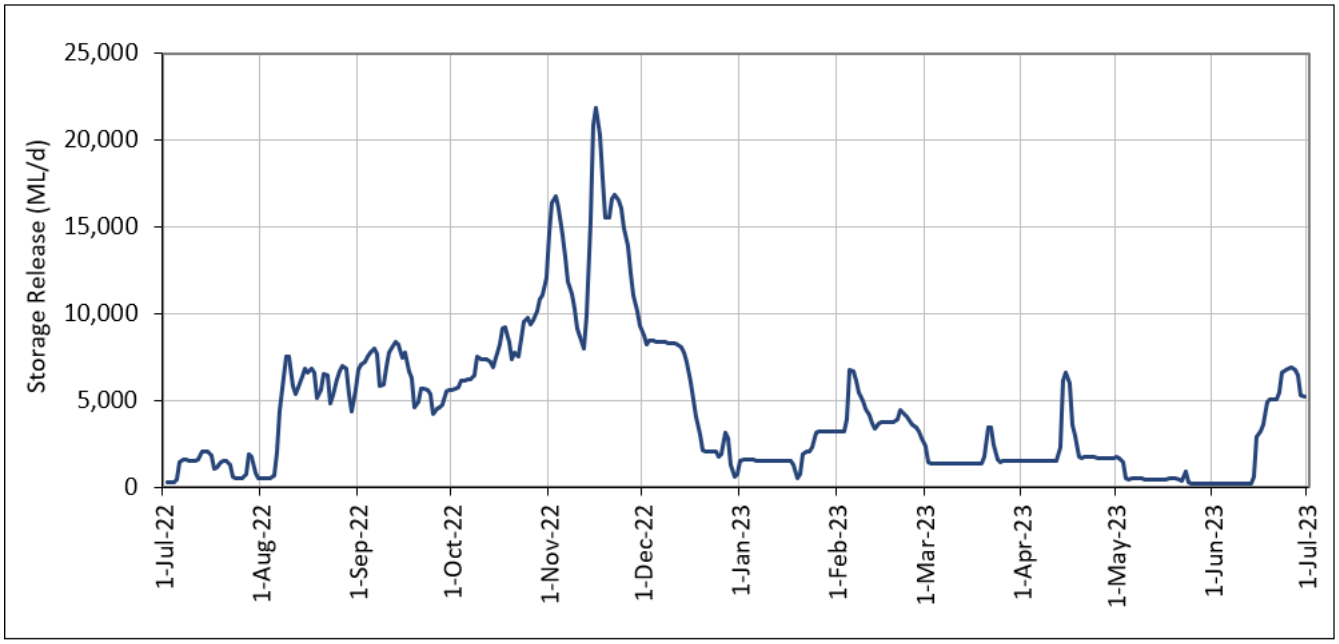
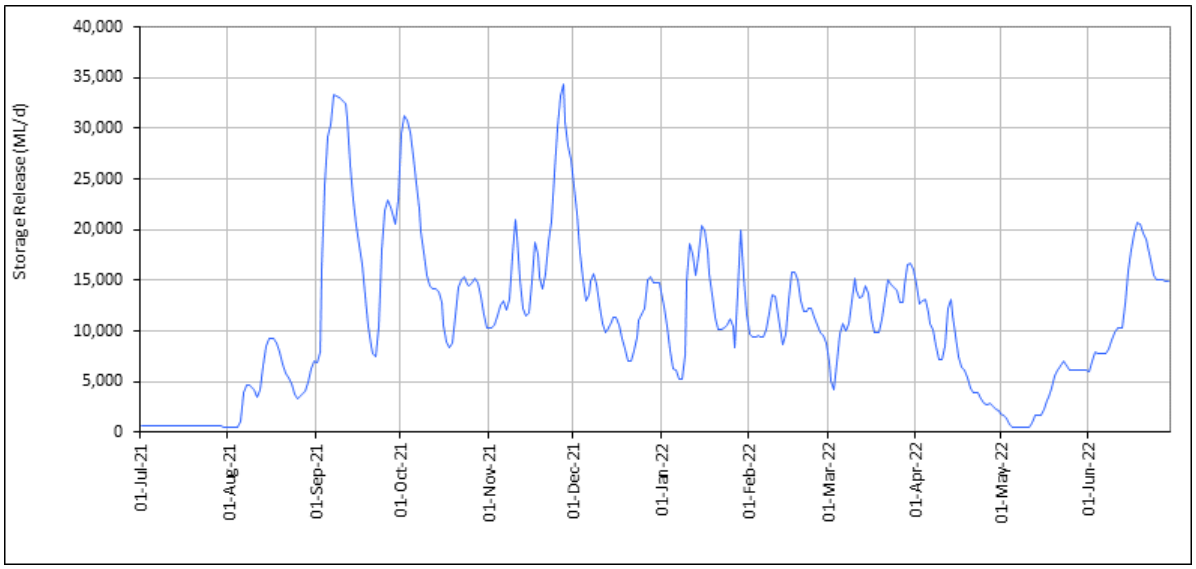


Figure 64: Lake Victoria Dam releases for the reporting period



Note 17 — End of system/flow leaving

This refers to flow that leaves the entity and does not return to the entity. For the NSW Murray the end of system represents the flow to South Australia. Flows leaving are represented by water diverted from the Murray to the Murrumbidgee via Finley Escape.

A minimum flow contribution of 1,850,000 megalitres per year is required to be provided to the South Australian border as per the Murray–Darling Basin Agreement. In addition, when defined storage volume triggers are exceeded, South Australia is entitled to additional dilution flows of 3,000 megalitres per day, 1,500 megalitres of which is from NSW resources. For more details refer to Water Sharing Plan.

Data type

Derived from measured data

Policy

- Water Sharing Plan for the New South Wales Murray and Lower Darling Regulated Rivers Water Sources 2016
  - Appendix 3 — Operational guidelines for delivering flows prescribed by the Murray–Darling Basin Agreement in Schedule 1 of the Water Act 2007 of the commonwealth

Data accuracy

A — Estimated in the range +/- 10%

Providing agency

MDBA

Data source

- MDBA: Murray MDBA Monthly Report
- MDBA: Website

Methodology

Summation of flows at gauging site/s measuring the volume of water that leaves the entity at end-of-system locations or via regulated effluents. For the NSW Murray reporting entity, the end-of-system flow is derived using the following methodology:

- flow at Murray River @ D/S Rufus River (4260200)
- *plus* diversion to Mulleroo Creek D/S offtake (above Lock 7) (414211A)
- *less* Lindsay River allowance (250 ML/day).

The gauges record a time-series of heights that are converted to a volume of water based on a derived 'height-to-flow' relationship (rating table).

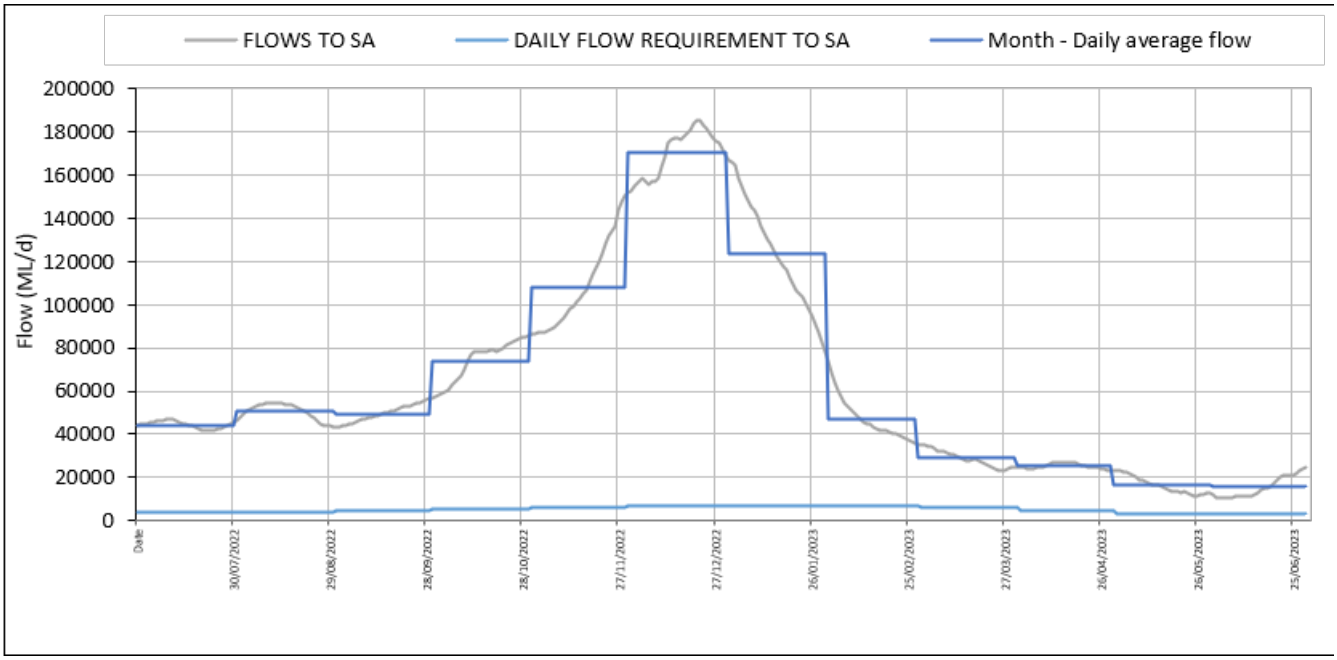
Additional Information

A breakdown of the end-of-system flow components and volumes for the reporting period is presented in Table 33. A daily chart of flow to South Australia for the reporting period is presented in Figure 65.

Table 33: End-of-system flows for reporting period

Station name	Outflow (ML)
NSW Murray flow to South Australia	10,427,100
Victoria Murray flow to South Australia	12,591,870
Total Murray River flow to South Australia	23,018,970
Finley Escape (outflow to Murrumbidgee)	10,820
Total	46,048,760

Figure 65: End-of-system flow to South Australia



Note 18 — NSW extractions from river

Actual volume of water directly pumped or diverted from the regulated river by licence holders. Occasionally (generally in the case of environmental water) volumes are ordered against a licence account for in-stream benefits or to pass through end-of-system target points. As such the volume reported to be physically extracted from the accounted river extent will not always be equal to the amount of water debited against accounts for usage, which has been described in Note 3. The volume stated for extractions from river excludes basic rights extractions, which is reported as a separate line item in Note 21.

Data type

Measured data

Policy

Not applicable

Data accuracy

A — Estimated in the range +/- 10%

Providing agency

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

Data source

Water Accounting System (owned by WaterNSW and Department of Climate Change, Energy, the Environment and Water)

Methodology

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

Additional information

Table 34 gives a reconciliation of physical extractions relative to accounted access licences usage.

Table 34: Reconciliation of physical extraction to account usage (ML)

Component	NSW Murray
Licenced extractions from river [22]	671,090
plus Licenced flow leaving system[23]	0
plus In-stream licenced usage [24]	570,102
Total account usage [25]	1,241,193

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

[23] Licenced water ordered to leave accounted NSW Murray extent for environmental benefits, subject to data availability, estimate based on MDBA matter 9.3 reporting

[24] Water ordered and used within accounted system for environmental benefit (not extracted from the river), subject to data availability

[25] The total amount of water accounted for usage against the allocation accounts plus uncontrolled flow use

Note 19 — Victorian extractions

This refers to the volume of water extracted from the accounted river extent by Victorian licence holders. While detailed information is not available within this account, it is necessary to include the bulk figures extracted to maintain the integrity of the river physical mass balance. Total volumes extracted in megalitres have been provided as a total for all licence categories.

Data type

Measured data

Policy

Water Amendment Act 2008

Available from the Australian Government's Federal Register of Legislation website (www.legislation.gov.au)

Data Accuracy

A — Estimated in the range +/- 10%

Providing Agency

MDBA

Data Source

MDBA monthly summary spreadsheet

Methodology

Figures are reported as per the MDBA operational data

Note 20 — Snowy water savings transfer

This represents the water transferred annually to Snowy Hydro for use to improve river health and deliver environmental benefits in the Snowy and Murray Rivers. The licensed entitlement, held by the NSW government, was created as a result of water savings projects (Water for Rivers). These licences are subject to the same rules and regulations as all other access licences within the same category.

Data Type

Administration

Policy

- Snowy Water Inquiry Outcomes Implementation Deed (SWIOID)
- Snowy Water Licence (October 2011)

Available from the NSW Department of Climate Change, Energy, the Environment and Water website at www.dcceew.nsw.gov.au/water/home

Data accuracy

A1 — Nil inaccuracy +/- 0%

Providing agency

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

Data source

Water Accounting System (jointly owned by WaterNSW and NSW Department of Climate Change, Energy, the Environment and Water)

Methodology

The water is transferred to an account that is managed by Snowy Hydro for use in the following season. The volume of account water transferred each year is all the account water in the allocation accounts of the water savings licences as of 31 January each year.

The transfer is not a physical movement of water from the NSW Murray, rather is achieved by an accounting exercise, with an equivalent reduction to the required annual release (defined in note 10) in the following year applied and incorporated to the Snowy annual operating plan. The nominated

volume will then be released into the Snowy River (via a defined watering pattern targeted to environmental outcomes), rather than being passed to Hume.

Any water crediting NSW Murray access licence accounts after 31 January via an AWD or allocation trade must be allowed to be carried over and becomes part of the water that is transferred in the following year. It is important to note that the transfer of water on 31 January should not result in any reduction in the total volume of water that these licenses are entitled to as a result of accounting rules around carryover and limits. Accounting adjustments are required to ensure this.

For this report, figures quoted are the result of detailed reworking of the individual water allocation accounts and therefore may not match those quoted in other sources that do not include future adjustments.

Note 21 — Basic rights extractions

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

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

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

Data Type

Estimated

Policy

Water Sharing Plan for the New South Wales Murray and Lower Darling Regulated Rivers Water Sources 2016

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

Available from the NSW Department of Climate Change, Energy, the Environment and Water website at www.dcceew.nsw.gov.au/water/home

Data accuracy

C — Estimated in the range +/- 50%

Providing agency

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

Data source

Water Sharing Plan for the New South Wales Murray and Lower Darling Regulated Rivers Water Sources 2016

Methodology

The estimation of Domestic and Stock rights uses a series of input components including water usage, stocking rates, population and property shape based on local knowledge to calculate riparian (stock and domestic) requirements in megalitres per year. The annual extraction for Domestic and Stock rights in the water accounts is assumed to be the estimated figure stated in the *Water Sharing Plan for the New South Wales Murray and Lower Darling Regulated Rivers Water Sources 2016* (2,118 megalitres).

Note 22 — Supplementary/uncontrolled-flow extractions

This is the volume of water extracted or diverted under supplementary access licences and uncontrolled-flow rules 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-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-security licence accounts.

Data type

Measured data

Policy

Water Sharing Plan for the New South Wales Murray and Lower Darling Regulated Rivers Water Sources 2016

- Part 7 Limits to the availability of water
  - Division 2 - Available water determinations
    - Clause 49 Available water determinations for supplementary water access licences
- Part 9 Rules for managing access licences
  - Division 2 – Daily access rules
    - Clause 54 Taking of water under supplementary water access licences
    - Clause 55 Taking of uncontrolled flows under regulated river (General Security) access licences.

Refer to the applicable water sharing plan available from the NSW Department of Climate Change, Energy, the Environment and Water website at www.dcceew.nsw.gov.au/water/home

Data accuracy

A — Estimated in the range +/- 10%

Providing agency

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

Data source

Water Accounting System (jointly owned by WaterNSW and NSW Department of Climate Change, Energy, the Environment and Water)

Methodology

Supplementary and uncontrolled flow 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 and uncontrolled flow water being extracted through the same pumps as those extracting water under other categories of access licences, additional information is required to separate out supplementary and uncontrolled flow extraction. Licence holders provide notification of their intention to pump prior to pumping or diverting water during the declared supplementary event and provide meter readings both at the commencement and conclusion of pumping. This enables the supplementary and uncontrolled flow extraction to be assessed independent of other categories of access licences.

Additional information

Supplementary and uncontrolled flow access periods for the reporting period are summarised in Table 35. Figure 66 provides a chart showing daily supplementary and uncontrolled flow usage during the reporting period while Figure 67 shows the reporting period supplementary and uncontrolled usage by river section.

Table 35: Supplementary and uncontrolled flow access announcements — Category: General Security, Supplementary

Catchment	River Section	Start Date	End Date	Use limit (%)	Supp Usage	UCF Usage
GREAT DARLING ANABRANCH	Darling Anabranch	01-Jul-22	19-Oct-22	100	-	-
DARLING RIVER WENT. POOL	Murrayg, Wentworth Weir Pool	01-Jul-22	19-Oct-22	100	110	112
BARBERS CREEK	Murrayd, Barbers Creek	01-Jul-22	19-Oct-22	100	-	-
BULLATALE CREEK	Murrayb, Bullatale Creek	01-Jul-22	19-Oct-22	100	-	-
BULLANGINYA LAGOON	Murrayb, Bullanginya Lagoon	01-Jul-22	19-Oct-22	100	-	-

Catchment	River Section	Start Date	End Date	Use limit (%)	Supp Usage	UCF Usage
COLLENDINA LAGOON	Murraya, Collerdina Lagoon	01-Jul-22	19-Oct-22	100	-	-
DAIRY LAGOON	Murraya, Dairy	01-Jul-22	19-Oct-22	100	-	-
DIGHTS CREEK	Murraya, Dights Creek	01-Jul-22	19-Oct-22	100	-	-
EDWARD RIVER	Eedward1, O/T To Toonalook	01-Jul-22	19-Oct-22	100	-	-
EDWARD RIVER	Eedward2, Toonalook To Stevens	01-Jul-22	19-Oct-22	100	-	-
EDWARD RIVER	Eedward3, Stevens To Moulamein	01-Jul-22	19-Oct-22	100	329	54
EDWARD RIVER	Eedward4, Moulamein To Liewah	01-Jul-22	19-Oct-22	100	62	24
EDWARD RIVER	Eedward5, Liewah To Wakool Junction	01-Jul-22	19-Oct-22	100	364	-
COLLIGEN CREEK	Ecolligen, Weir To Werai Station	01-Jul-22	19-Oct-22	100	-	-
COLLIGEN CREEK	Ecolligen, O/T To Weir	01-Jul-22	19-Oct-22	100	17,652	-
NIEMUR RIVER	Eniemur, O/T To Moulamein Rd	01-Jul-22	19-Oct-22	100	-	-
NIEMUR RIVER	Eniemur, Mallan School To Wakool Confluence	01-Jul-22	19-Oct-22	100	-	-
NIEMUR RIVER	Eniemur, Moulamein Rd To Mallan School	01-Jul-22	19-Oct-22	100	264	149
YALLAKOOL CREEK	Eyallakool	01-Jul-22	19-Oct-22	100	75	-
UNNAMED WATERCOURSE	Ecolligen, Unnamed Watercourse	01-Jul-22	19-Oct-22	100	-	-
UNNAMED WATERCOURSE	Eedward6 Unnamedwatercourse	01-Jul-22	19-Oct-22	100	-	19
GULPA CREEK	Eedward1, Gulpa Creek	01-Jul-22	19-Oct-22	100	-	331
JINGERA JINGERA LAGOON	Murraya, Jingera Jingera	01-Jul-22	19-Oct-22	100	-	-
LITTLE MURRAY RIVER	Murrayd, Little Murray	01-Jul-22	19-Oct-22	100	-	-
MERRAN CREEK	Merran Creek, Cuttings To Franklings Bridge	01-Jul-22	19-Oct-22	100	77	-
MERRAN CREEK	Merran Creek, Franklings Bridge To Moulamein Rd	01-Jul-22	19-Oct-22	100	325	265
MERRAN CREEK	Merran Creek, Moulamein Rd To Station 409036	01-Jul-22	19-Oct-22	100	239	28
MERRAN CREEK	Merran Creek, Station 409036 To Wakool Confluence	01-Jul-22	19-Oct-22	100	-	-
MOIRA CREEK	Murrayb, Moira	01-Jul-22	19-Oct-22	100	521	168
LAKE MULWALA	Murraya, Lake Mulwala	01-Jul-22	19-Oct-22	100	68,048	-
PADDOCK LAGOON	Murrayb, Paddock Lagoon	01-Jul-22	19-Oct-22	100	-	-
WAKOOL RIVER	Ewakool, Brassi Rd To Wakool Rd	01-Jul-22	19-Oct-22	100	48	-
WAKOOL RIVER	Ewakool, O/T To Brassi Rd	01-Jul-22	19-Oct-22	100	56	-
WAKOOL RIVER	Ewakool, Stoney Xing To Murray Jn	01-Jul-22	19-Oct-22	100	54	26
WAKOOL RIVER	Ewakool, Wakool Rd To Moulamein Rd	01-Jul-22	19-Oct-22	100	-	16
WAKOOL RIVER	Ewakool, Moulamein Rd To Gee Gee	01-Jul-22	19-Oct-22	100	-	-
WAKOOL RIVER	Ewakool, Gee Gee To Coonamit	01-Jul-22	19-Oct-22	100	-	-
WAKOOL RIVER	Ewakool, Coonamit To Stoney Xing	01-Jul-22	19-Oct-22	100	17	47
BOOKIT CREEK	Ewakool, Bookit Creek	01-Jul-22	19-Oct-22	100	-	-

Catchment	River Section	Start Date	End Date	Use limit (%)	Supp Usage	UCF Usage
COOBOOL CREEK	Murrayd, Coobool Creek	01-Jul-22	19-Oct-22	100	-	-
GUM CREEK	Murrayd, Gum Creek	01-Jul-22	19-Oct-22	100	-	-
LARRYS CREEK	Murrayd, Larrys Creek	01-Jul-22	19-Oct-22	100	-	-
MERANGATUK CREEK	Ewakool, Merangatuk Ck	01-Jul-22	19-Oct-22	100	-	-
MERRIBIT CREEK	Ewakool, Merribit Ck	01-Jul-22	19-Oct-22	100	27	-
MULLIGANS CREEK	Murrayd, Mulligans Creek	01-Jul-22	19-Oct-22	100	-	-
PORTHOLE CREEK	Ewakool , Porthole Creek	01-Jul-22	19-Oct-22	100	-	-
ST HELENA CREEK	Murrayd, St Helena Creek	01-Jul-22	19-Oct-22	100	-	-
TALLYS LAKE	Murrayd, Tally'S Lake	01-Jul-22	19-Oct-22	100	-	-
DEEP CREEK	Murrayc, Deep Creek	01-Jul-22	19-Oct-22	100	-	-
WADDY CREEK	Murrayd, Waddy Creek	01-Jul-22	19-Oct-22	100	179	-
UNNAMED WATERCOURSE	Murraya, 889900 Unnamed Watercourse	01-Jul-22	19-Oct-22	100	2,100	0
LESTERS LAGOON	Murrayb, Lesters Lagoon	01-Jul-22	19-Oct-22	100	-	-
UNNAMED WATERCOURSE	Murraya, 889999 Unnamed Watercourse	01-Jul-22	19-Oct-22	100	-	-
MURRAY RIVER	Murraya, Hume Dam	01-Jul-22	19-Oct-22	100	-	-
MURRAY RIVER	Murraya, Hume To Yarrawonga	01-Jul-22	19-Oct-22	100	-	5
MURRAY RIVER	Murrayb, Yarrawonga To Edward O/T	01-Jul-22	19-Oct-22	100	12	1
MURRAY RIVER	Murrayc, Barmah To Torrumbarry	01-Jul-22	19-Oct-22	100	160	19
MURRAY RIVER	Murrayd, Torrumbarry To Wakool Jn	01-Jul-22	19-Oct-22	100	1,157	746
MURRAY RIVER	Murrayb, Edward O/T Barmah	01-Jul-22	19-Oct-22	100	-	0
DRY LAKE	Murrayf, Dry Lake	01-Jul-22	19-Oct-22	100	-	-
LAKE BENANEE	Murrayf, Lake Benanee	01-Jul-22	19-Oct-22	100	-	-
BURONGA BILLABONG	Murrayh, Buronga Billabong	01-Jul-22	19-Oct-22	100	-	-
FRENCHMANS CREEK	Murrayh, Frenchmans Creek	01-Jul-22	19-Oct-22	100	-	-
LAKE VICTORIA	Murrayh, Lake Victoria	01-Jul-22	19-Oct-22	100	-	-
GOL GOL CREEK	Murrayg, Gol Gol Creek	01-Jul-22	19-Oct-22	100	-	-
GOL GOL NORTH CREEK	Murrayg, Gol Gol North Creek	01-Jul-22	19-Oct-22	100	-	9
LARA CREEK	Murrayf, Lara Creek	01-Jul-22	19-Oct-22	100	-	-
RUEL LAGOON	Murrayf, Ruel Lagoon	01-Jul-22	19-Oct-22	100	-	-
TUCKERS CREEK	Murrayh, Tuckers Creek	01-Jul-22	19-Oct-22	100	-	2
WASHPEN CREEK	Murrayf, Washpen Creek	01-Jul-22	19-Oct-22	100	-	-
UNNAMED WATERCOURSE	Murrayh, Unnamed Watercourse	01-Jul-22	19-Oct-22	100	-	-
MURRAY RIVER	Murrayf, Wakool To Euston Weir	01-Jul-22	19-Oct-22	100	114	-
MURRAY RIVER	Murrayg, Euston Weir To Mildura	01-Jul-22	19-Oct-22	100	52	1
MURRAY RIVER	Murrayh, Mildura To S.A.	01-Jul-22	19-Oct-22	100	3	66

Catchment	River Section	Start Date	End Date	Use limit (%)	Supp Usage	UCF Usage
SALT CREEK	Murrayh, Salt Creek	01-Jul-22	19-Oct-22	100	-	-
GREAT DARLING ANABRANCH	Darling Anabranch	20-Oct-22	18-Apr-23	110	-	-
DARLING RIVER WENT. POOL	Murrayg, Wentworth Weir Pool	20-Oct-22	30-Jun-23	110	374	-
BARBERS CREEK	Murrayd, Barbers Creek	20-Oct-22	23-Jan-23	110	-	-
BULLATALE CREEK	Murrayb, Bullatale Creek	20-Oct-22	06-Jan-23	110	-	-
BULLANGINYA LAGOON	Murrayb, Bullanginya Lagoon	20-Oct-22	06-Jan-23	110	-	-
COLLENDINA LAGOON	Murraya, Collerdina Lagoon	20-Oct-22	31-Dec-22	110	-	-
DAIRY LAGOON	Murraya, Dairy	20-Oct-22	31-Dec-22	110	-	-
DIGHTS CREEK	Murraya, Dights Creek	20-Oct-22	31-Dec-22	110	-	-
EDWARD RIVER	Eedward1, O/T To Toonalook	20-Oct-22	06-Jan-23	110	-	-
EDWARD RIVER	Eedward2, Toonalook To Stevens	20-Oct-22	06-Jan-23	110	-	-
EDWARD RIVER	Eedward3, Stevens To Moulamein	20-Oct-22	23-Jan-23	110	896	-
EDWARD RIVER	Eedward4, Moulamein To Liewah	20-Oct-22	23-Jan-23	110	739	-
EDWARD RIVER	Eedward5, Liewah To Wakool Junction	20-Oct-22	23-Jan-23	110	-	-
COLLIGEN CREEK	Ecolligen, Weir To Werai Station	20-Oct-22	23-Jan-23	110	-	-
COLLIGEN CREEK	Ecolligen, O/T To Weir	20-Oct-22	09-Jan-23	110	10,830	-
NIEMUR RIVER	Eniemur, O/T To Moulamein Rd	20-Oct-22	23-Jan-23	110	-	-
NIEMUR RIVER	Eniemur, Mallan School To Wakool Confluence	20-Oct-22	23-Jan-23	110	-	-
NIEMUR RIVER	Eniemur, Moulamein Rd To Mallan School	20-Oct-22	23-Jan-23	110	521	-
YALLAKOOL CREEK	Eyallakool	20-Oct-22	23-Jan-23	110	-	-
UNNAMED WATERCOURSE	Ecolligen, Unnamed Watercourse	20-Oct-22	23-Jan-23	110	-	-
UNNAMED WATERCOURSE	Eedward6 Unnamedwatercourse	20-Oct-22	23-Jan-23	110	-	-
GULPA CREEK	Eedward1, Gulpa Creek	20-Oct-22	06-Jan-23	110	-	-
JINGERA JINGERA LAGOON	Murraya, Jingera Jingera	20-Oct-22	31-Dec-22	110	-	-
MERRAN CREEK	Merran Creek, Cuttings To Franklings Bridge	20-Oct-22	23-Jan-23	110	-	-
MERRAN CREEK	Merran Creek, Franklings Bridge To Moulamein Rd	20-Oct-22	23-Jan-23	110	-	-
MERRAN CREEK	Merran Creek, Moulamein Rd To Station 409036	20-Oct-22	23-Jan-23	110	-	-
MERRAN CREEK	Merran Creek, Station 409036 To Wakool Confluence	20-Oct-22	23-Jan-23	110	-	-
MOIRA CREEK	Murrayb, Moira	20-Oct-22	06-Jan-23	110	52	-
LAKE MULWALA	Murraya, Lake Mulwala	20-Oct-22	31-Dec-22	110	37,639	-
PADDOCK LAGOON	Murrayb, Paddock Lagoon	20-Oct-22	06-Jan-23	110	-	-
WAKOOL RIVER	Ewakool, Brassi Rd To Wakool Rd	20-Oct-22	23-Jan-23	110	-	-
WAKOOL RIVER	Ewakool, O/T To Brassi Rd	20-Oct-22	23-Jan-23	110	380	-

Catchment	River Section	Start Date	End Date	Use limit (%)	Supp Usage	UCF Usage
WAKOOL RIVER	Ewakool, Stoney Xing To Murray Jn	20-Oct-22	23-Jan-23	110	114	-
WAKOOL RIVER	Ewakool, Wakool Rd To Moulamein Rd	20-Oct-22	23-Jan-23	110	-	-
WAKOOL RIVER	Ewakool, Moulamein Rd To Gee Gee	20-Oct-22	23-Jan-23	110	-	-
WAKOOL RIVER	Ewakool, Gee Gee To Coonamit	20-Oct-22	23-Jan-23	110	-	-
WAKOOL RIVER	Ewakool, Coonamit To Stoney Xing	20-Oct-22	23-Jan-23	110	212	-
BOOKIT CREEK	Ewakool, Bookit Creek	20-Oct-22	23-Jan-23	110	-	-
COOBOOL CREEK	Murrayd, Coobool Creek	20-Oct-22	23-Jan-23	110	25	-
GUM CREEK	Murrayd, Gum Creek	20-Oct-22	23-Jan-23	110	-	-
LARRYS CREEK	Murrayd, Larrys Creek	20-Oct-22	23-Jan-23	110	-	-
MERANGATUK CREEK	Ewakool, Merangatuk Ck	20-Oct-22	23-Jan-23	110	-	-
MERRIBIT CREEK	Ewakool, Merribit Ck	20-Oct-22	23-Jan-23	110	197	-
MULLIGANS CREEK	Murrayd, Mulligans Creek	20-Oct-22	23-Jan-23	110	-	-
PORTHOLE CREEK	Ewakool , Porthole Creek	20-Oct-22	23-Jan-23	110	-	-
ST HELENA CREEK	Murrayd, St Helena Creek	20-Oct-22	23-Jan-23	110	-	-
TALLYS LAKE	Murrayd, Tally'S Lake	20-Oct-22	23-Jan-23	110	-	-
DEEP CREEK	Murrayc, Deep Creek	20-Oct-22	16-Jan-23	110	-	-
WADDY CREEK	Murrayd, Waddy Creek	20-Oct-22	23-Jan-23	110	-	-
UNNAMED WATERCOURSE	Murraya, 889900 Unnamed Watercourse	20-Oct-22	31-Dec-22	110	3,466	-
LESTERS LAGOON	Murrayb, Lesters Lagoon	20-Oct-22	06-Jan-23	110	-	-
UNNAMED WATERCOURSE	Murraya, 889999 Unnamed Watercourse	20-Oct-22	31-Dec-22	110	-	-
MURRAY RIVER	Murraya, Hume Dam	20-Oct-22	31-Dec-22	110	-	-
MURRAY RIVER	Murraya, Hume To Yarrawonga	20-Oct-22	31-Dec-22	110	-	-
MURRAY RIVER	Murrayb, Yarrawonga To Edward O/T	20-Oct-22	06-Jan-23	110	117	-
MURRAY RIVER	Murrayc, Barmah To Torrumbarry	20-Oct-22	20-Jan-23	110	50	-
MURRAY RIVER	Murrayd, Torrumbarry To Wakool Jn	20-Oct-22	23-Jan-23	110	1,303	-
MURRAY RIVER	Murrayb, Edward O/T Barmah	20-Oct-22	09-Jan-23	110	-	-
DRY LAKE	Murrayf, Dry Lake	20-Oct-22	30-Jun-23	110	-	-
LAKE BENANEE	Murrayf, Lake Benanee	20-Oct-22	30-Jun-23	110	-	-
BURONGA BILLABONG	Murrayh, Buronga Billabong	20-Oct-22	30-Jun-23	110	-	-
FRENCHMANS CREEK	Murrayh, Frenchmans Creek	20-Oct-22	30-Jun-23	110	-	-
LAKE VICTORIA	Murrayh, Lake Victoria	20-Oct-22	30-Jun-23	110	-	-
GOL GOL CREEK	Murrayg, Gol Gol Creek	20-Oct-22	30-Jun-23	110	-	-
GOL GOL NORTH CREEK	Murrayg, Gol Gol North Creek	20-Oct-22	30-Jun-23	110	-	-
LARA CREEK	Murrayf, Lara Creek	20-Oct-22	30-Jun-23	110	-	-
RUEL LAGOON	Murrayf, Ruel Lagoon	20-Oct-22	30-Jun-23	110	-	-
TUCKERS CREEK	Murrayh, Tuckers Creek	20-Oct-22	30-Jun-23	110	-	-

Catchment	River Section	Start Date	End Date	Use limit (%)	Supp Usage	UCF Usage
WASHPEN CREEK	Murrayf, Washpen Creek	20-Oct-22	30-Jun-23	110	-	-
UNNAMED WATERCOURSE	Murrayh, Unnamed Watercourse	20-Oct-22	30-Jun-23	110	-	-
MURRAY RIVER	Murrayf, Wakool To Euston Weir	20-Oct-22	08-Feb-23	110	11	-
MURRAY RIVER	Murrayg, Euston Weir To Mildura	20-Oct-22	30-Jun-23	110	160	-
MURRAY RIVER	Murrayh, Mildura To S.A.	20-Oct-22	30-Jun-23	110	-	-
SALT CREEK	Murrayh, Salt Creek	20-Oct-22	30-Jun-23	110	-	-
BULLATALE CREEK	Murrayb, Bullatale Creek	10-Jan-23	13-Jan-23	110	-	-
BULLANGINYA LAGOON	Murrayb, Bullanginya Lagoon	10-Jan-23	13-Jan-23	110	-	-
EDWARD RIVER	Eedward1, O/T To Toonalook	10-Jan-23	16-Jan-23	110	-	-
EDWARD RIVER	Eedward2, Toonalook To Stevens	10-Jan-23	16-Jan-23	110	-	-
COLLIGEN CREEK	Ecolligen, O/T To Weir	10-Jan-23	16-Jan-23	110	-	-
GULPA CREEK	Eedward1, Gulpa Creek	10-Jan-23	16-Jan-23	110	-	-
MOIRA CREEK	Murrayb, Moira	10-Jan-23	13-Jan-23	110	-	-
PADDOCK LAGOON	Murrayb, Paddock Lagoon	10-Jan-23	13-Jan-23	110	-	-
LESTERS LAGOON	Murrayb, Lesters Lagoon	10-Jan-23	13-Jan-23	110	-	-
MURRAY RIVER	Murrayb, Yarrawonga To Edward O/T	10-Jan-23	13-Jan-23	110	4	-
MURRAY RIVER	Murrayb, Edward O/T Barmah	10-Jan-23	13-Jan-23	110	-	-
COLLENDINA LAGOON	Murraya, Collerdina Lagoon	31-Jan-23	06-Feb-23	110	-	-
DAIRY LAGOON	Murraya, Dairy	31-Jan-23	06-Feb-23	110	-	-
DIGHTS CREEK	Murraya, Dights Creek	31-Jan-23	06-Feb-23	110	-	-
JINGERA JINGERA LAGOON	Murraya, Jingera Jingera	31-Jan-23	06-Feb-23	110	-	-
LAKE MULWALA	Murraya, Lake Mulwala	31-Jan-23	06-Feb-23	110	-	-
UNNAMED WATERCOURSE	Murraya, 889900 Unnamed Watercourse	31-Jan-23	06-Feb-23	110	-	-
UNNAMED WATERCOURSE	Murraya, 889999 Unnamed Watercourse	31-Jan-23	06-Feb-23	110	-	-
MURRAY RIVER	Murraya, Hume Dam	31-Jan-23	06-Feb-23	110	-	-
MURRAY RIVER	Murraya, Hume To Yarrawonga	31-Jan-23	06-Feb-23	110	-	-
BARBERS CREEK	Murrayd, Barbers Creek	09-Feb-23	16-Feb-23	110	-	-
BULLATALE CREEK	Murrayb, Bullatale Creek	02-Feb-23	09-Feb-23	110	-	-
BULLANGINYA LAGOON	Murrayb, Bullanginya Lagoon	02-Feb-23	09-Feb-23	110	-	-
EDWARD RIVER	Eedward2, Toonalook To Stevens	02-Feb-23	09-Feb-23	110	-	-
EDWARD RIVER	Eedward3, Stevens To Moulamein	09-Feb-23	16-Feb-23	110	-	-
EDWARD RIVER	Eedward4, Moulamein To Liewah	09-Feb-23	16-Feb-23	110	20	-
EDWARD RIVER	Eedward5, Liewah To Wakool Junction	02-Feb-23	16-Feb-23	110	-	-
COLLIGEN CREEK	Ecolligen, Weir To Werai Station	09-Feb-23	16-Feb-23	110	-	-
COLLIGEN CREEK	Ecolligen, O/T To Weir	02-Feb-23	09-Feb-23	110	-	-

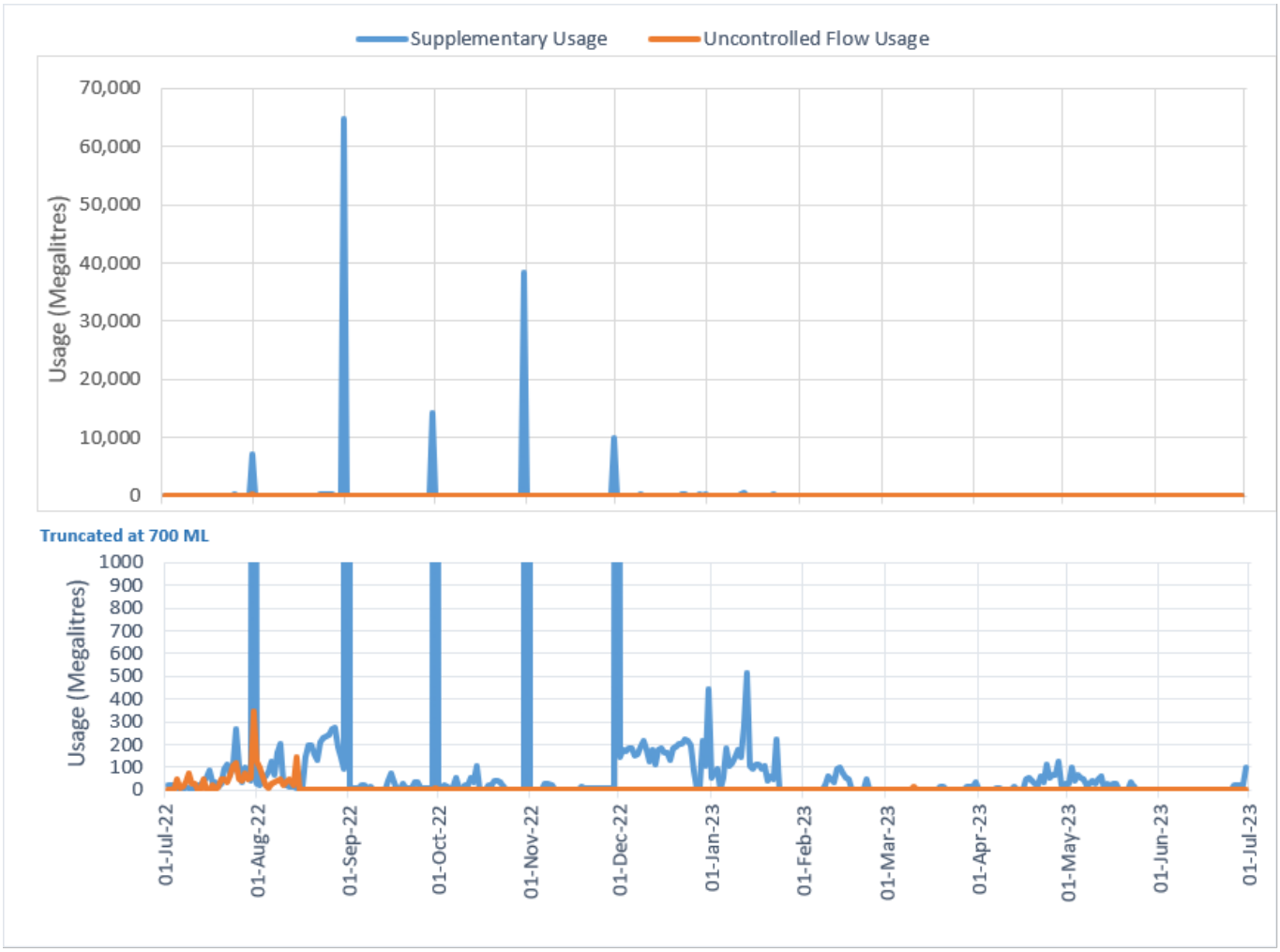
Catchment	River Section	Start Date	End Date	Use limit (%)	Supp Usage	UCF Usage
NIEMUR RIVER	Eniemur, O/T To Moulamein Rd	09-Feb-23	16-Feb-23	110	-	-
NIEMUR RIVER	Eniemur, Mallan School To Wakool Confluence	09-Feb-23	16-Feb-23	110	-	-
NIEMUR RIVER	Eniemur, Moulamein Rd To Mallan School	09-Feb-23	16-Feb-23	110	105	-
YALLAKOOL CREEK	Eyallakool	09-Feb-23	16-Feb-23	110	-	-
UNNAMED WATERCOURSE	Eedward6 Unnamedwatercourse	09-Feb-23	16-Feb-23	110	-	-
GULPA CREEK	Eedward1, Gulpa Creek	02-Feb-23	09-Feb-23	110	-	-
LITTLE MURRAY RIVER	Murrayd, Little Murray	09-Feb-23	16-Feb-23	110	-	-
MERRAN CREEK	Merran Creek, Cuttings To Franklings Bridge	09-Feb-23	16-Feb-23	110	-	-
MERRAN CREEK	Merran Creek, Franklings Bridge To Moulamein Rd	09-Feb-23	16-Feb-23	110	8	-
MERRAN CREEK	Merran Creek, Moulamein Rd To Station 409036	09-Feb-23	16-Feb-23	110	-	-
MERRAN CREEK	Merran Creek, Station 409036 To Wakool Confluence	09-Feb-23	16-Feb-23	110	-	-
MOIRA CREEK	Murrayb, Moira	02-Feb-23	09-Feb-23	110	-	-
PADDOCK LAGOON	Murrayb, Paddock Lagoon	02-Feb-23	09-Feb-23	110	-	-
WAKOOL RIVER	Ewakool, Brassi Rd To Wakool Rd	09-Feb-23	16-Feb-23	110	-	-
WAKOOL RIVER	Ewakool, O/T To Brassi Rd	09-Feb-23	16-Feb-23	110	175	-
WAKOOL RIVER	Ewakool, Stoney Xing To Murray Jn	09-Feb-23	16-Feb-23	110	58	-
WAKOOL RIVER	Ewakool, Wakool Rd To Moulamein Rd	09-Feb-23	16-Feb-23	110	-	-
WAKOOL RIVER	Ewakool, Moulamein Rd To Gee Gee	09-Feb-23	16-Feb-23	110	-	-
WAKOOL RIVER	Ewakool, Gee Gee To Coonamit	09-Feb-23	16-Feb-23	110	-	-
WAKOOL RIVER	Ewakool, Coonamit To Stoney Xing	09-Feb-23	16-Feb-23	110	12	-
BOOKIT CREEK	Ewakool, Bookit Creek	09-Feb-23	16-Feb-23	110	-	-
COOBOOL CREEK	Murrayd, Coobool Creek	09-Feb-23	16-Feb-23	110	28	-
GUM CREEK	Murrayd, Gum Creek	09-Feb-23	16-Feb-23	110	-	-
LARRYS CREEK	Murrayd, Larrys Creek	09-Feb-23	16-Feb-23	110	-	-
MERANGATUK CREEK	Ewakool, Merangatuk Ck	09-Feb-23	16-Feb-23	110	-	-
MERRIBIT CREEK	Ewakool, Merribit Ck	09-Feb-23	16-Feb-23	110	-	-
MULLIGANS CREEK	Murrayd, Mulligans Creek	09-Feb-23	16-Feb-23	110	-	-
PORTHOLE CREEK	Ewakool , Porthole Creek	02-Feb-23	16-Feb-23	110	-	-
ST HELENA CREEK	Murrayd, St Helena Creek	09-Feb-23	16-Feb-23	110	-	-
TALLYS LAKE	Murrayd, Tally'S Lake	09-Feb-23	16-Feb-23	110	-	-
WADDY CREEK	Murrayd, Waddy Creek	09-Feb-23	16-Feb-23	110	-	-
LESTERS LAGOON	Murrayb, Lesters Lagoon	02-Feb-23	09-Feb-23	110	-	-
MURRAY RIVER	Murrayb, Yarrawonga To Edward O/T	02-Feb-23	09-Feb-23	110	-	-
MURRAY RIVER	Murrayd, Torrumbarry To Wakool Jn	07-Feb-23	16-Feb-23	110	72	-
MURRAY RIVER	Murrayf, Wakool To Euston Weir	09-Feb-23	30-Jun-23	110	-	13

Catchment	River Section	Start Date	End Date	Use limit (%)	Supp Usage	UCF Usage
DEEP CREEK	Murrayc, Deep Creek	05-Feb-23	12-Feb-23	110	-	-
MURRAY RIVER	Murrayc, Barmah To Torrumbarry	05-Feb-23	12-Feb-23	110	50	-
BARBERS CREEK	Murrayd, Barbers Creek	13-Apr-23	25-May-23	110	-	-
MERRAN CREEK	Merran Creek, Cuttings To Franklings Bridge	13-Apr-23	25-May-23	110	174	-
MERRAN CREEK	Merran Creek, Franklings Bridge To Moulamein Rd	13-Apr-23	25-May-23	110	226	-
MERRAN CREEK	Merran Creek, Moulamein Rd To Station 409036	13-Apr-23	25-May-23	110	25	-
MERRAN CREEK	Merran Creek, Station 409036 To Wakool Confluence	13-Apr-23	25-May-23	110	-	-
COOBOOL CREEK	Murrayd, Coobool Creek	13-Apr-23	25-May-23	110	-	-
GUM CREEK	Murrayd, Gum Creek	13-Apr-23	25-May-23	110	-	-
LARRYS CREEK	Murrayd, Larrys Creek	13-Apr-23	25-May-23	110	-	-
MULLIGANS CREEK	Murrayd, Mulligans Creek	13-Apr-23	25-May-23	110	-	-
ST HELENA CREEK	Murrayd, St Helena Creek	13-Apr-23	25-May-23	110	125	-
TALLYS LAKE	Murrayd, Tally'S Lake	13-Apr-23	25-May-23	110	-	-
DEEP CREEK	Murrayc, Deep Creek	13-Apr-23	20-May-23	110	-	-
WADDY CREEK	Murrayd, Waddy Creek	13-Apr-23	25-May-23	110	-	-
MURRAY RIVER	Murrayc, Barmah To Torrumbarry	13-Apr-23	20-May-23	110	147	-
BULLANGINYA LAGOON	Murrayb, Bullanginya Lagoon	18-Apr-23	18-May-23	110	-	-
EDWARD RIVER	Eedward3, Stevens To Moulamein	18-Apr-23	12-May-23	110	74	-
EDWARD RIVER	Eedward4, Moulamein To Liewah	18-Apr-23	12-May-23	110	-	-
EDWARD RIVER	Eedward5, Liewah To Wakool Junction	18-Apr-23	12-May-23	110	98	-
COLLIGEN CREEK	Ecolligen, Weir To Werai Station	18-Apr-23	12-May-23	110	-	-
NIEMUR RIVER	Eniemur, O/T To Moulamein Rd	18-Apr-23	12-May-23	110	-	-
NIEMUR RIVER	Eniemur, Mallan School To Wakool Confluence	18-Apr-23	12-May-23	110	-	-
NIEMUR RIVER	Eniemur, Moulamein Rd To Mallan School	18-Apr-23	12-May-23	110	174	-
YALLAKOOL CREEK	Eyallakool	18-Apr-23	12-May-23	110	-	-
UNNAMED WATERCOURSE	Eedward6 Unnamedwatercourse	18-Apr-23	12-May-23	110	-	-
MOIRA CREEK	Murrayb, Moira	18-Apr-23	18-May-23	110	-	-
PADDOCK LAGOON	Murrayb, Paddock Lagoon	18-Apr-23	18-May-23	110	-	-
WAKOOL RIVER	Ewakool, Brassi Rd To Wakool Rd	18-Apr-23	12-May-23	110	30	-
WAKOOL RIVER	Ewakool, O/T To Brassi Rd	18-Apr-23	12-May-23	110	90	-
WAKOOL RIVER	Ewakool, Stoney Xing To Murray Jn	18-Apr-23	12-May-23	110	72	-
WAKOOL RIVER	Ewakool, Wakool Rd To Moulamein Rd	18-Apr-23	12-May-23	110	-	-
WAKOOL RIVER	Ewakool, Moulamein Rd To Gee Gee	18-Apr-23	12-May-23	110	-	-
WAKOOL RIVER	Ewakool, Gee Gee To Coonamit	18-Apr-23	12-May-23	110	-	-
WAKOOL RIVER	Ewakool, Coonamit To Stoney Xing	18-Apr-23	12-May-23	110	-	-
BOOKIT CREEK	Ewakool, Bookit Creek	18-Apr-23	12-May-23	110	-	-

Catchment	River Section	Start Date	End Date	Use limit (%)	Supp Usage	UCF Usage
MERANGATUK CREEK	Ewakool, Merangatuk Ck	18-Apr-23	12-May-23	110	-	-
MERRIBIT CREEK	Ewakool, Merribit Ck	18-Apr-23	12-May-23	110	-	-
PORTHOLE CREEK	Ewakool , Porthole Creek	18-Apr-23	12-May-23	110	-	-
LESTERS LAGOON	Murrayb, Lesters Lagoon	18-Apr-23	18-May-23	110	-	-
MURRAY RIVER	Murrayb, Yarrawonga To Edward O/T	18-Apr-23	18-May-23	110	-	-
MURRAY RIVER	Murrayb, Edward O/T Barmah	18-Apr-23	18-May-23	110	-	-
COLLENDINA LAGOON	Murraya, Collerdina Lagoon	15-Mar-23	18-May-23	110	-	-
DAIRY LAGOON	Murraya, Dairy	25-Apr-23	18-May-23	110	-	-
DIGHTS CREEK	Murraya, Dights Creek	25-Apr-23	18-May-23	110	-	-
JINGERA JINGERA LAGOON	Murraya, Jingera Jingera	25-Apr-23	18-May-23	110	-	-
LAKE MULWALA	Murraya, Lake Mulwala	25-Apr-23	18-May-23	110	-	-
UNNAMED WATERCOURSE	Murraya, 889900 Unnamed Watercourse	25-Apr-23	18-May-23	110	-	-
UNNAMED WATERCOURSE	Murraya, 889999 Unnamed Watercourse	25-Apr-23	18-May-23	110	-	-
MURRAY RIVER	Murraya, Hume Dam	25-Apr-23	18-May-23	110	-	-
MURRAY RIVER	Murraya, Hume To Yarrawonga	25-Apr-23	18-May-23	110	-	-
MURRAY RIVER	Murrayd, Torrumbarry To Wakool Jn	15-Mar-23	25-May-23	110	301	-
BARBERS CREEK	Murrayd, Barbers Creek	06-Jun-23	30-Jun-23	110	-	-
MERRAN CREEK	Merran Creek, Cuttings To Franklings Bridge	06-Jun-23	30-Jun-23	110	-	-
MERRAN CREEK	Merran Creek, Franklings Bridge To Moulamein Rd	06-Jun-23	30-Jun-23	110	-	-
MERRAN CREEK	Merran Creek, Moulamein Rd To Station 409036	06-Jun-23	30-Jun-23	110	100	-
MERRAN CREEK	Merran Creek, Station 409036 To Wakool Confluence	06-Jun-23	30-Jun-23	110	-	-
COOBOOL CREEK	Murrayd, Coobool Creek	06-Jun-23	30-Jun-23	110	-	-
GUM CREEK	Murrayd, Gum Creek	06-Jun-23	30-Jun-23	110	-	-
LARRYS CREEK	Murrayd, Larrys Creek	06-Jun-23	30-Jun-23	110	-	-
MULLIGANS CREEK	Murrayd, Mulligans Creek	06-Jun-23	30-Jun-23	110	-	-
ST HELENA CREEK	Murrayd, St Helena Creek	06-Jun-23	30-Jun-23	110	-	-
TALLYS LAKE	Murrayd, Tally'S Lake	06-Jun-23	30-Jun-23	110	-	-
WADDY CREEK	Murrayd, Waddy Creek	06-Jun-23	30-Jun-23	110	-	-
MURRAY RIVER	Murrayd, Torrumbarry To Wakool Jn	06-Jun-23	30-Jun-23	110	0	-
EDWARD RIVER	Eedward1, O/T To Toonalook	10-Jun-23	30-Jun-23	110	-	-
EDWARD RIVER	Eedward2, Toonalook To Stevens	10-Jun-23	30-Jun-23	110	-	-
EDWARD RIVER	Eedward3, Stevens To Moulamein	10-Jun-23	30-Jun-23	110	-	-
EDWARD RIVER	Eedward4, Moulamein To Liewah	10-Jun-23	30-Jun-23	110	-	-
EDWARD RIVER	Eedward5, Liewah To Wakool Junction	10-Jun-23	30-Jun-23	110	-	-
COLLIGEN CREEK	Ecolligen, Weir To Werai Station	10-Jun-23	30-Jun-23	110	-	-

Catchment	River Section	Start Date	End Date	Use limit (%)	Supp Usage	UCF Usage
NIEMUR RIVER	Eniemur, Mallan School To Wakool Confluence	10-Jun-23	30-Jun-23	110	-	-
NIEMUR RIVER	Eniemur, Moulamein Rd To Mallan School	10-Jun-23	30-Jun-23	110	-	-
WAKOOL RIVER	Ewakool, Stoney Xing To Murray Jn	10-Jun-23	30-Jun-23	110	-	-
WAKOOL RIVER	Ewakool, Gee Gee To Coonamit	10-Jun-23	30-Jun-23	110	-	-
WAKOOL RIVER	Ewakool, Coonamit To Stoney Xing	10-Jun-23	30-Jun-23	110	-	-
MURRAY RIVER	Murraya, Hume To Yarrawonga	10-Jun-23	30-Jun-23	110	-	-
MURRAY RIVER	Murrayb, Yarrawonga To Edward O/T	10-Jun-23	30-Jun-23	110	-	-
MURRAY RIVER	Murrayc, Barmah To Torrumbarry	10-Jun-23	30-Jun-23	110	76	-
MURRAY RIVER	Murrayb, Edward O/T Barmah	10-Jun-23	30-Jun-23	110	-	-
COLLIGEN CREEK	Ecolligen, O/T To Weir	24-Jun-23	30-Jun-23	110	-	-
YALLAKOOL CREEK	Eyallakool	24-Jun-23	30-Jun-23	110	-	-
WAKOOL RIVER	Ewakool, Brassi Rd To Wakool Rd	24-Jun-23	30-Jun-23	110	-	-
WAKOOL RIVER	Ewakool, O/T To Brassi Rd	24-Jun-23	30-Jun-23	110	-	-
WAKOOL RIVER	Ewakool, Wakool Rd To Moulamein Rd	24-Jun-23	30-Jun-23	110	-	-
WAKOOL RIVER	Ewakool, Moulamein Rd To Gee Gee	24-Jun-23	30-Jun-23	110	-	-

Figure 66: Uncontrolled Flow Usage



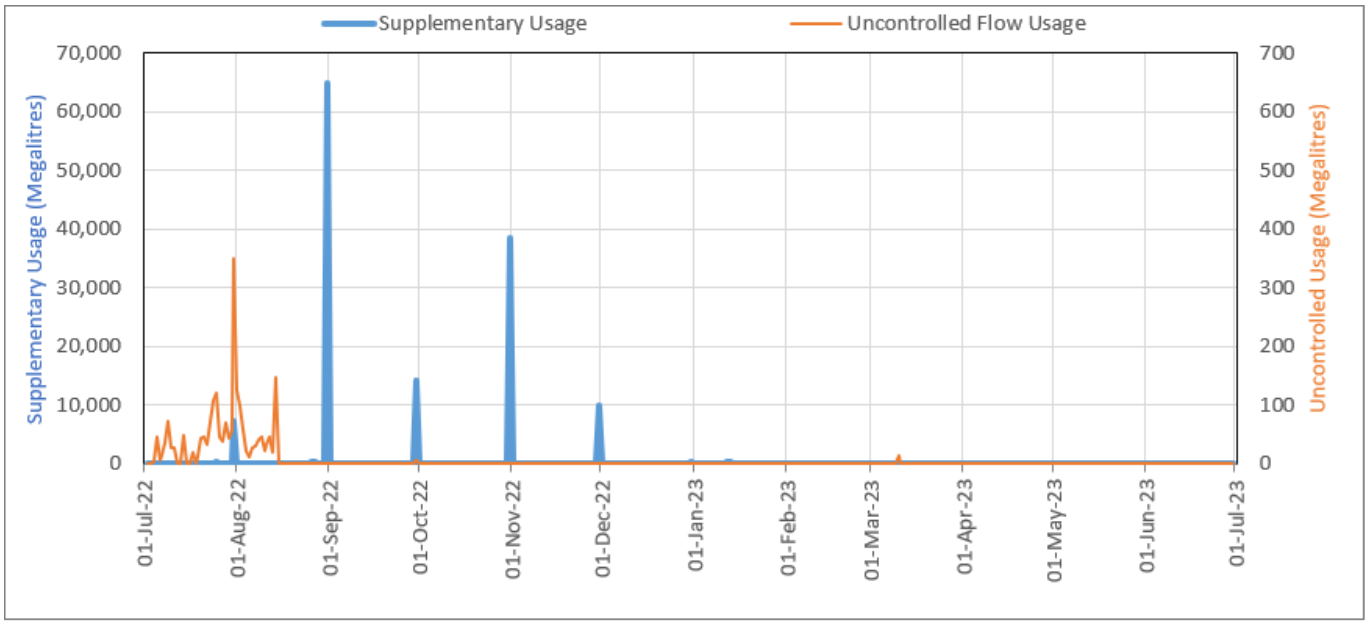
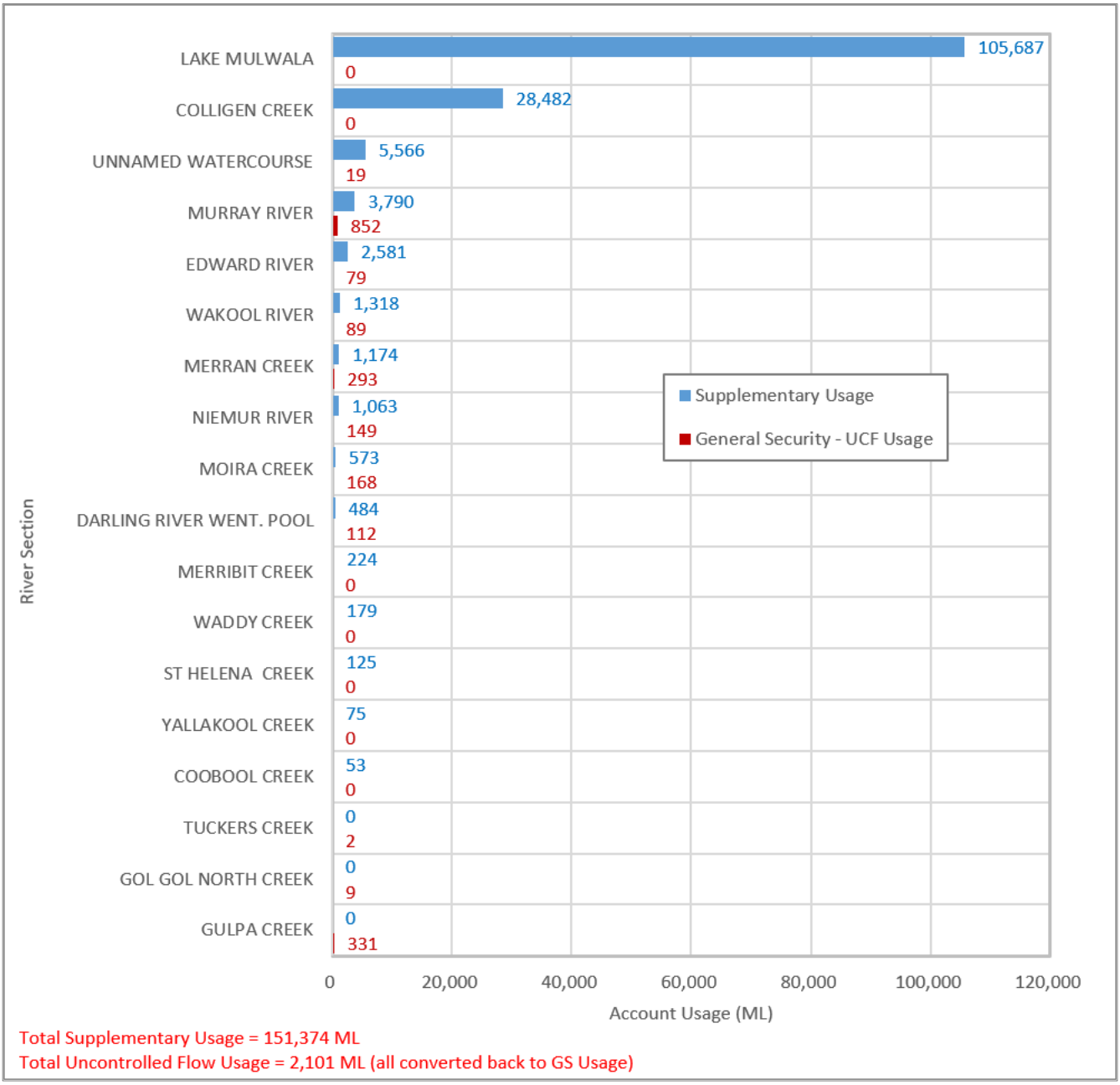

Supplementary Usage
Uncontrolled Flow Usage
Supplementary Usage (Megalitres)
Uncontrolled Usage (Megalitres)
70,000
60,000
50,000
40,000
30,000
20,000
10,000
0
700
600
500
400
300
200
100
0
01-Jul-22
01-Aug-22
01-Sep-22
01-Oct-22
01-Nov-22
01-Dec-22
01-Jan-23
01-Feb-23
01-Mar-23
01-Apr-23
01-May-23
01-Jun-23
01-Jul-23

Figure 67: Supplementary water usage by river section



Total Supplementary Usage = 151,374 ML

Total Uncontrolled Flow Usage = 2,101 ML (all converted back to GS Usage)

Note 23 — Unaccounted difference

In theory, if all the processes of a water balance could be accurately accounted for, the unaccounted difference would be zero. Due to the large uncertainties in many of the volumes presented in the accounts, the various sources from which the data has been obtained, and the fact that not all processes of the water cycle have been accounted (for example ungauged inflow), 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 this figure should reduce in future accounts.

Data type

Not applicable

Policy

Not applicable

Data accuracy

D — Estimated in the range +/- 100%

Providing agency

Not applicable

Data source

Not applicable

Methodology

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

Surface water unaccounted difference

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

Where:

- **UVSW** = Unaccounted difference for surface water
- **Rs** = Opening river volume estimate
- **Rc** = Closing river volume estimate
- **Ro** = Physical outflows from the river (e.g. extractions)
- **RI** = Physical inflows to the river (e.g. runoff, return flows, dam releases)

Additional information

The unaccounted difference as a percentage of total accounted inflow to the water source is presented in Table 36.

Table 36: Unaccounted difference percentage of inflow

Water year	Accounted river inflow[26] (ML)	Unaccounted difference (ML)	% of inflow
2015–16	1,292,190	1,292,190	17
2016–17	15,984,889	2,938,301	18
2017–18	7,481,336	742,963	10
2018–19	6,763,501	953,063	14
2019–20	6,629,037	1,085,562	16
2020–21	7,378,443	906,569	12
2021-22	15,043,316	1,478,962	10
2022-23	29,687,720	4,771,347	16

[26] Gauged tributary inflow, plus rainfall on river plus inflow from storage releases.

Note 24 — Prior year account adjustments

This is a line item that is used to correct balances opening balances for the reporting period of water assets or water liabilities. The double-entry accounting being applied is a continuous process whereby the closing balance of one year is the opening balance for the following year.

Occasionally corrections will be required for a variety of reasons including:

- errors identified in prior-year reporting
- data changes since prior-year reporting
- better estimates at hand since prior-year reporting.

An account correction is different to the unaccounted difference transaction, which is a physical volume added or subtracted from the river asset balance to successfully achieve mass balance after all the known processes have been accounted for.

Data type

Calculated

Accuracy

A1 — Nil inaccuracy +/- 0%

Providing agency

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

Data source

Not applicable

Methodology

A journal entry is placed in the reporting year to ensure the correct adjustment is made to the comparative year closing balances in order to ensure the accounts balance for the reporting year.

Additional information

There were no Prior reporting year adjustments made in 2022-2023.

References

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