GENERAL PURPOSE WATER ACCOUNTING REPORT

NSW Murray Catchment

2019–20

Published by NSW Department of Planning, Industry and Environment

dpie.nsw.gov.au

Title: General Purpose Water Accounting Report | NSW Murray Catchment

Year: 2019–20

ISSN: 2652-4988

Department reference number: PUB20/942

More information

This report may be cited as Burrell M., Petrovic J., Ali A., Nicholls D., Ching M, Ooi X (2020) ***General Purpose Water Accounting Report 2019–20: NSW Murray Catchment***, NSW Department of Planning, Industry and Environment.

Acknowledgements

Produced by the water information team, NSW Department of Planning, Industry and Environment—Water group

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
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 improvements to river operations (CAIRO)	a spreadsheet-based water balance model used for optimising river operations (orders and releases)
carryover	the volume or share component that may be reserved by a licence holder for use in the subsequent year
catchment	the areas of land that collect rainfall and contribute to surface water (streams, rivers, wetlands) or to groundwater A catchment is a natural drainage area, bounded by sloping ground, hills or mountains, from which water flows to a low point.
dead storage	the volume in storage that is generally considered unavailable for use (e.g. water level below release valves) due to access and often poor water quality
effective storage	the total volume of storage minus the dead storage component—the volume generally considered as useable
effluent	flow leaving a place or process Sewage effluent refers to the flow leaving a sewage treatment plant. An effluent stream is one which leaves the main river and does not return.
entity	a defined geographical area or zone within the accounting region Transactions and reports are produced for each entity.

Term	Definition
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 Planning, Industry and Environment to store continuous, time-series data such as river flow, river height, and water quality
inflows	surface water runoff and deep drainage to groundwater (groundwater recharge) and transfers into the water system (both surface and groundwater) for a defined area
inter-valley trade	trade of licence holder allocation account water via allocation assignment from one catchment to another catchment (or state)
intra-valley trade	trade of licence holder allocation account water via allocation assignment within the same catchment
median	the middle point of a distribution, separating the highest half of a sample from the lowest half

Term	Definition
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.
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 eighth 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 2019 to 30 June 2020 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 2019–20
- 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 are 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 Planning, Industry and Environment 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 Planning, Industry and Environment has prepared this GPWAR in accordance with the Australian Water Accounting Standard 1.

Danielle Baker

Director Water Analytics
NSW Department of Planning, Industry and Environment

Contextual statement

The 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 sections combine to form the NSW Murray catchment:

1. Upper Murray
2. Central Murray
3. 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

The 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.

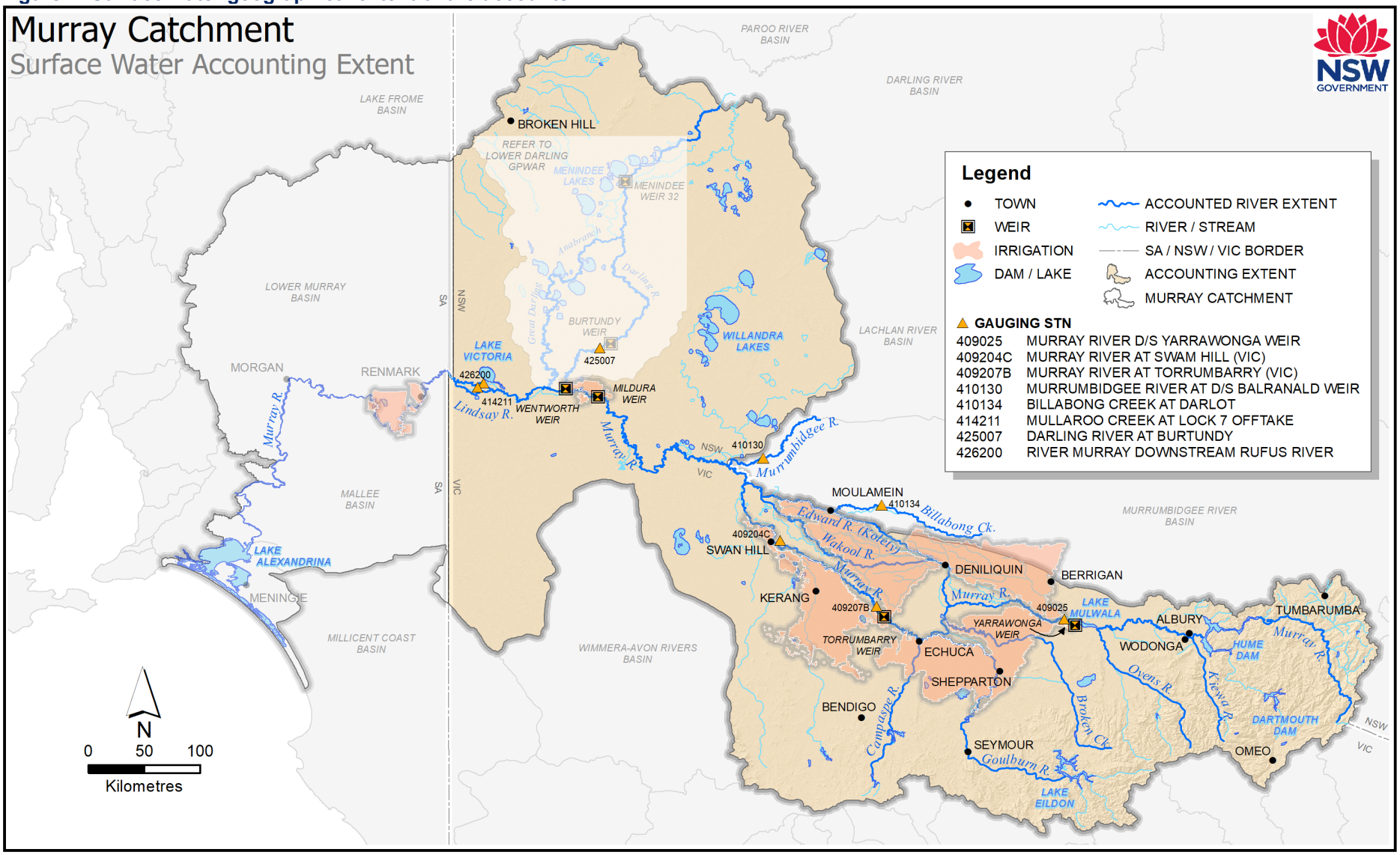
Downstream of Lake Victoria, the Murray River flows into South Australia and turns south for its final 500 kilometres before it reaches Lake Alexandrina, and finally, the Murray Mouth. The main tributary in South Australia that feeds the Murray River is the Marne River.

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 Industry website (www.industry.nsw.gov.au/water).

Figure 1: Surface water geographical extent of the accounts



Snapshot

The key climatic and water resource indicators for 2019–20 relative to historical water years managed under water sharing plan conditions are presented in Figure 2. Storage inflow, account usage, and carryover plus allocation fell in the very low range for the reporting period. Temporary trading activity was high.

Figure 2: 2019–20 summary indicators

Climate

At Tumbarumba (upper catchment), 772 mm of rainfall was recorded in the reporting period (Table 1). Comparatively, this volume of rainfall is:

- 80% of the long-term historical median rainfall for this location
- 46% of the highest volume on record at the location.

The majority of the rainfall occurred in April 2020 (151 mm), and July 2019 (87 mm) (Figure 3 and Figure 4).

At Berrigan (central catchment), 355 mm of rainfall was recorded in the reporting period (Table 2). Comparatively, this volume of rainfall is:

- 84% of the long-term historical median rainfall for this location
- 38% of the highest volume on record at the location.

The majority of the rainfall occurred in April 2020 (84 mm) and March 2020 (75 mm) (Figure 3 and Figure 4).

At Moulamein (lower catchment), 304 mm of rainfall was recorded in the reporting period (Table 3). Comparatively, this volume of rainfall is:

- 89% of the long-term historical median rainfall for this location
- 35% of the highest volume on record at the location.

The majority of the rainfall fell in April 2020 (73 mm) and March 2020 (61 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 below average rainfall across the full extent of the catchment.

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

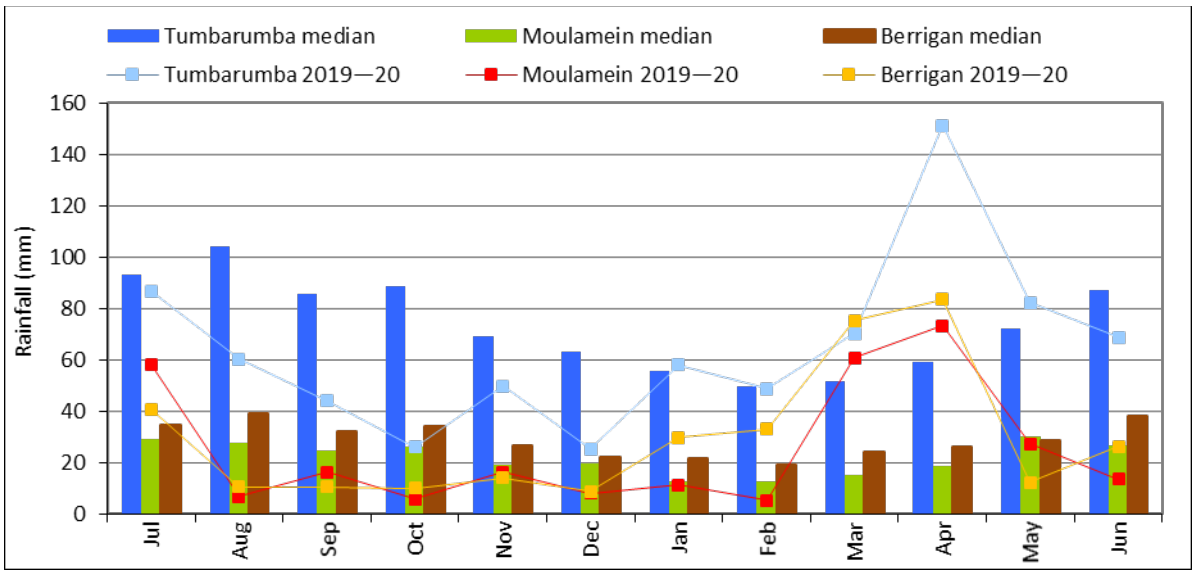


Figure 4: Monthly rainfall deviations from median at Tumbarumba, Moulamein and Berrigan

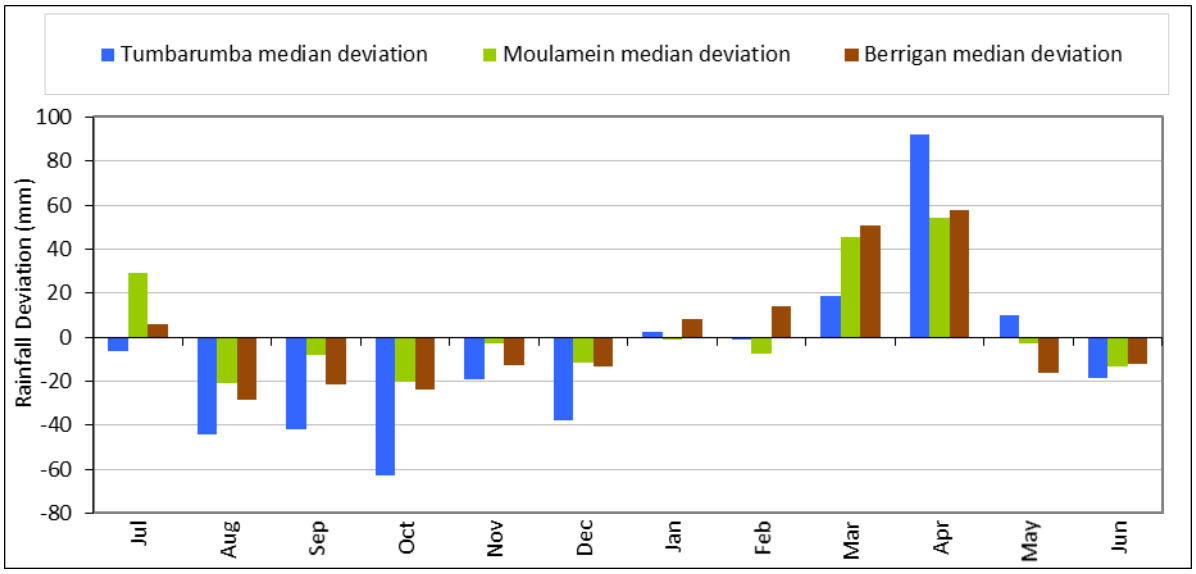


Table 1: 2019–20 monthly rainfall and historic monthly rainfall statistics at Tumbarumba[1]—measurements in millimetres

Tumbarumba	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Annual
2019–20 rainfall	86.8	60.2	44.0	26.0	49.8	25.4	58.0	48.8	70.2	151.2	82.2	68.9	771.5
Historical mean	104.5	106.3	89.7	94.2	75.4	70.8	62.7	54.2	66.6	66.5	82.7	102.0	978.2
Historical median	93.3	104.3	85.9	88.7	69.1	63.3	55.7	49.7	51.6	59.1	72.2	87.4	972.4
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: 2019–20 monthly rainfall and historic monthly rainfall statistics at Berrigan[1]—measurements in millimetres

Berrigan	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Annual
2019–20 rainfall	**40.8**	**10.6**	**10.5**	**10.1**	**14.0**	**8.9**	**29.8**	**33.0**	**75.3**	**83.6**	**12.2**	**26.2**	**355.0**
Historical mean	39.4	42.4	38.8	41.5	32.1	32.8	31.0	30.2	34.3	34.9	40.6	42.0	439.9
Historical median	34.8	39.2	32.0	34.2	26.8	22.2	21.8	19.2	24.4	26.0	28.7	38.1	424.2
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	155.0	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	1974-75	1911-12	1929-30	1973-74	1968-69	1955-56	1938-39	1888-89	1930-31	1973-74

Table 3: 2019–20 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
2019–20 rainfall	**58.2**	**6.8**	**16.4**	**5.9**	**16.4**	**8.2**	**11.3**	**5.4**	**60.8**	**73.2**	**27.3**	**13.6**	**303.5**
Historical mean	31.2	33.6	31.3	33.2	28.2	31.0	23.4	24.2	25.9	25.8	34.3	33.2	354.9
Historical median	29.3	27.8	24.6	26.2	19.4	19.9	12.5	12.7	15.2	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

[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 2020 for Tumbarumba, 1875 to 2020 for Berrigan and 1888 to 2020 for Moulamein.

Figure 5: Murray catchment annual rainfall for 2019–20

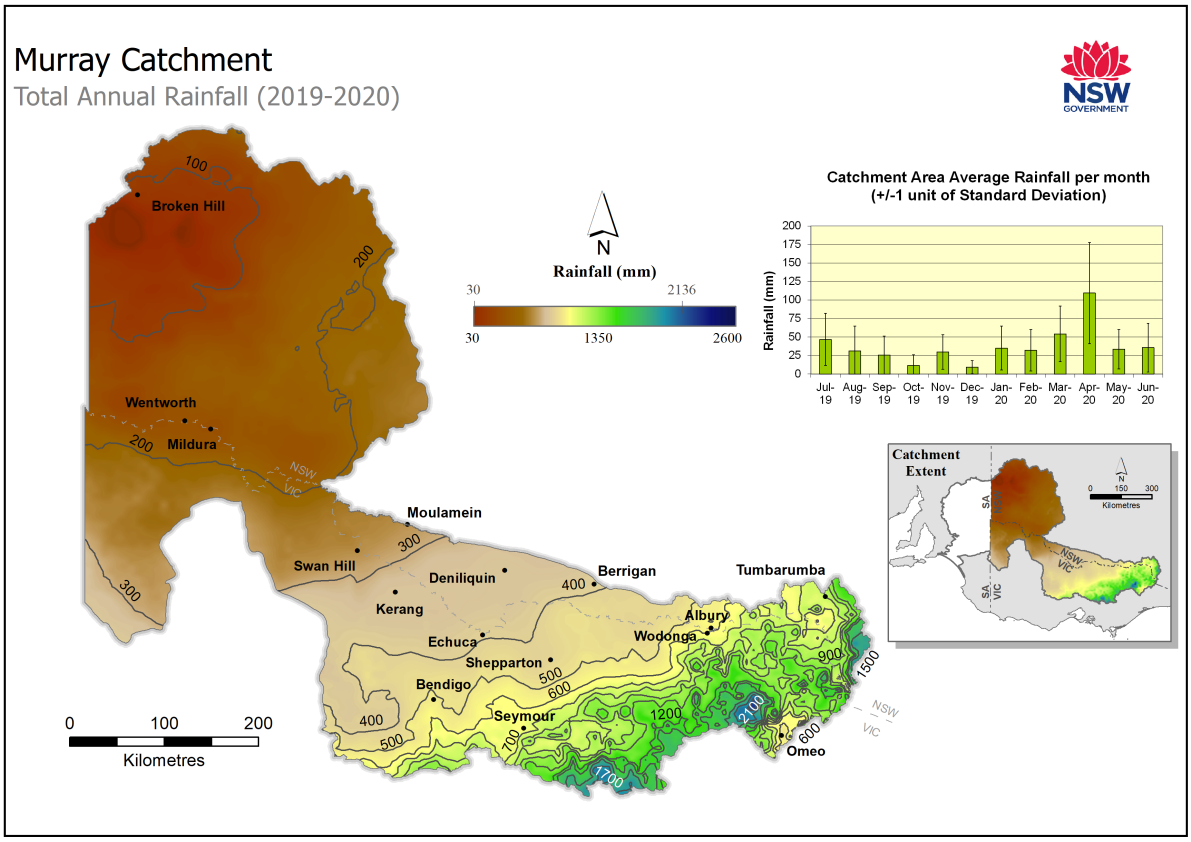
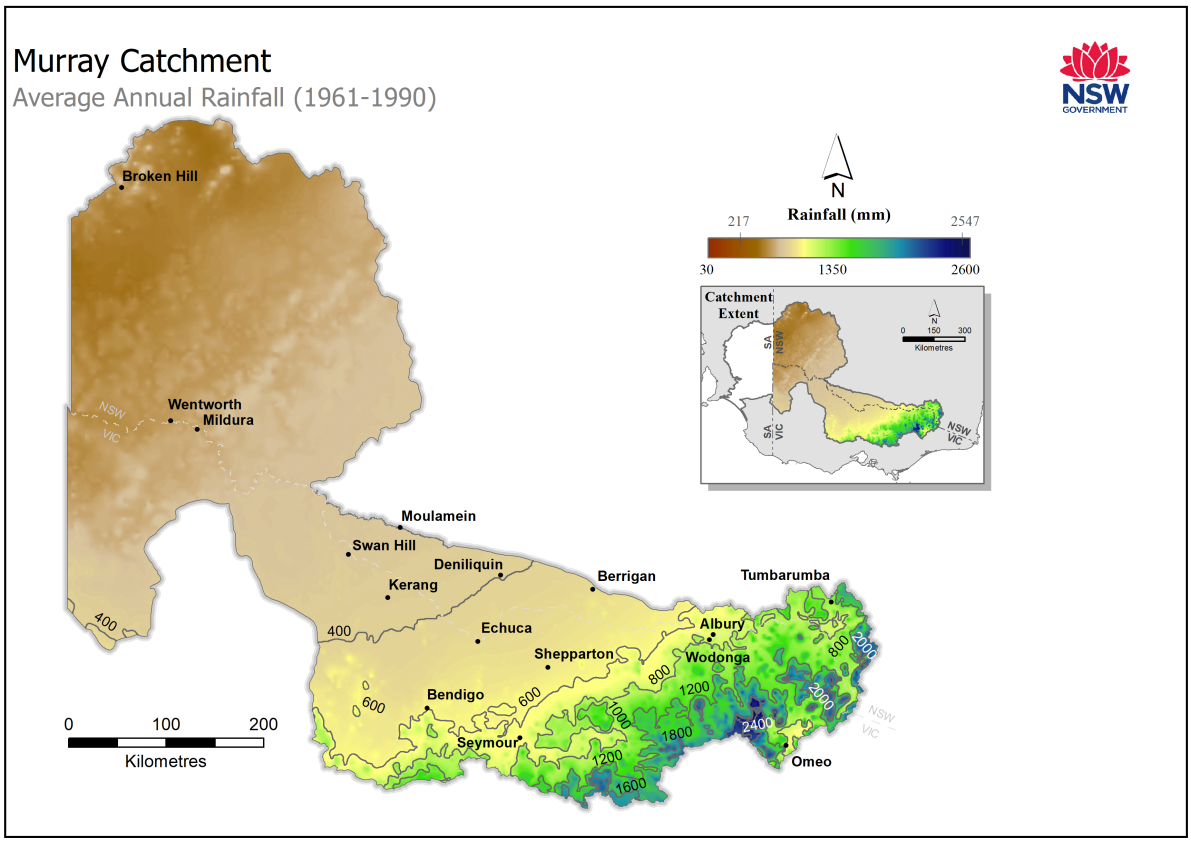


Figure 6: Average annual rainfall in the Murray catchment (1961–90)



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 through the 1920s
- 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 10).

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 1,204,875 megalitres (Figure 8), which is:

- 48% of the long–term average annual inflow (2,526,943 megalitres per year)
- very low relative to the historical record, exceeding 12% of years on record
- the 3rd consecutive year of below average inflow

The highest inflow (considering all sources of inflow) in the reporting period occurred 3 May 2020, with an inflow rate of 26,176 megalitres per day (Figure 9). 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.

Actual storage inflow to Hume including all inflow sources and regulated transfers was 3,059,171 megalitres.

Dartmouth inflow

Dartmouth inflows were 656,704 megalitres (Figure 11), which is:

- 74% of the long-term average annual inflow (883,472 megalitres per year)
- low relative to the historical record, exceeding 29% of years on record
- the 3rd consecutive year of below average inflow.

The highest inflow occurred on 30 April 2020, with inflow rates around 16,000 megalitres per day (Figure 12).

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 670,056 megalitres (Figure 13), which is:

- 36% of the long-term average annual flow at this location (1,849,913 megalitres per year)
- moderate relative to the historical record, exceeding 43% of years on record

[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.

- the 3rd consecutive year of below average inflow.

The highest inflow occurred on 18 March 2020, with a daily inflow of 13,076 megalitres per day (Figure 14).

Lake Victoria inflow

Lake Victoria is primarily utilised as a re-regulating storage for water supply. Inflow totalled 1,339,763 megalitres for the reporting period. Daily inflows and rainfall are illustrated in Figure 15. 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

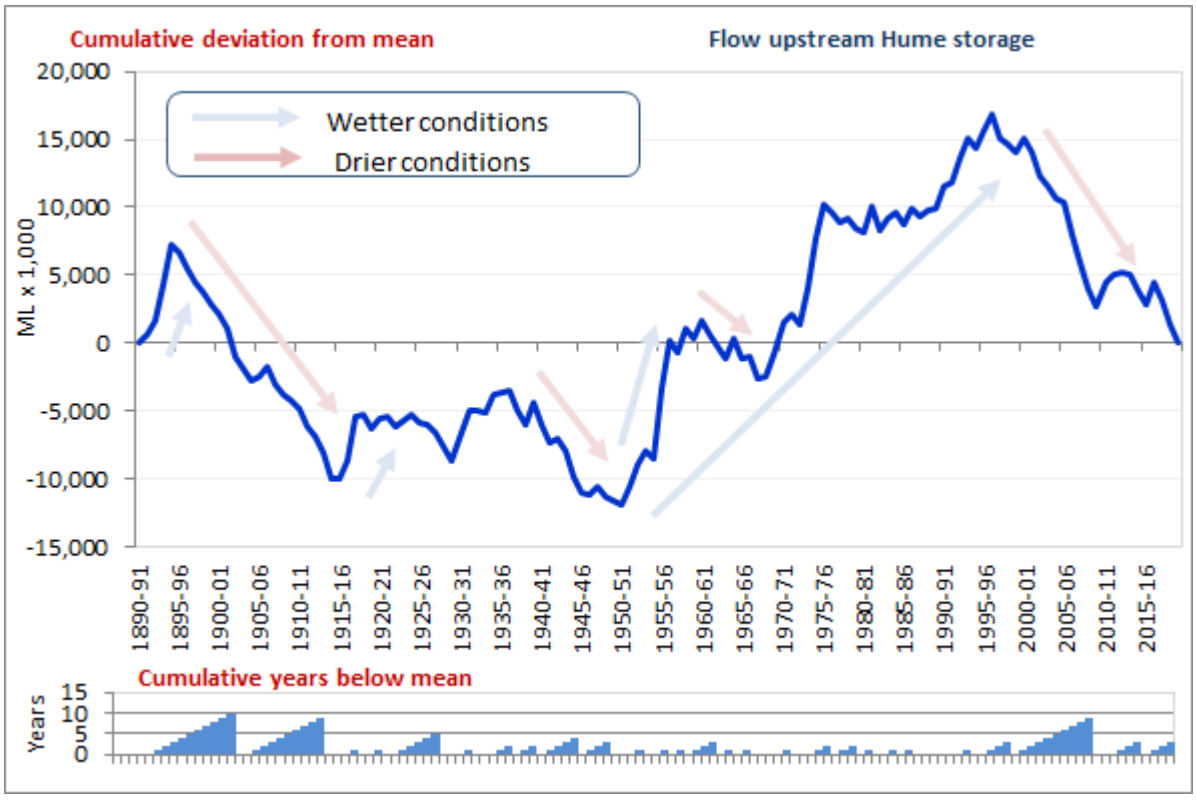


Figure 8: Long-term natural inflows to Hume Dam against mean and reporting year inflow

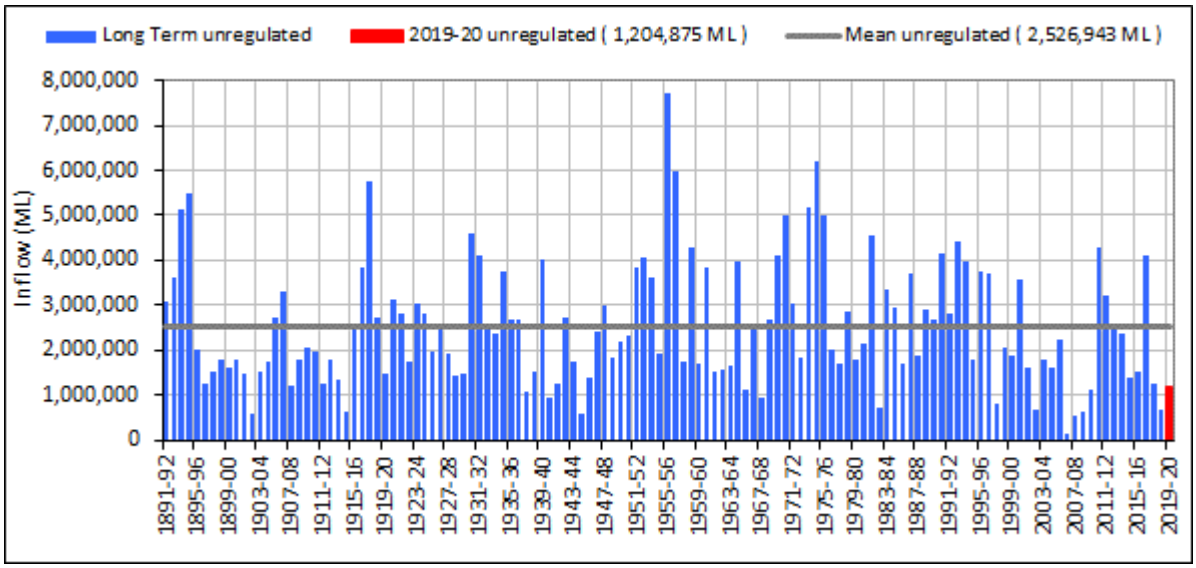


Figure 9: Daily inflows and rainfall at Hume Dam for the reporting period (natural and regulated)

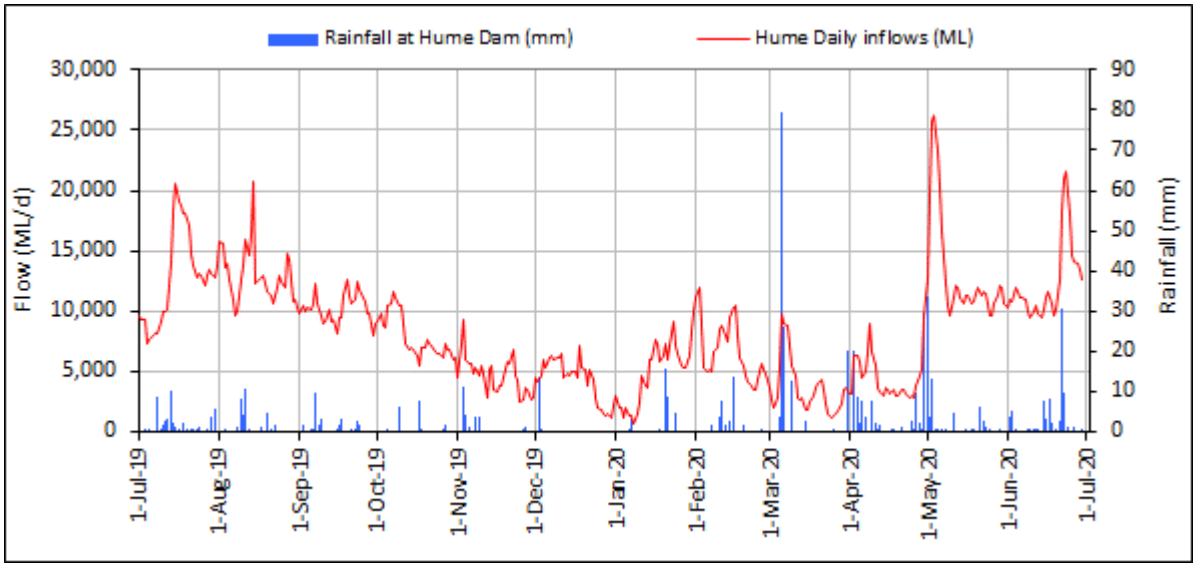


Figure 10: Long-term annual flow upstream of Dartmouth storage and cumulative deviation from mean

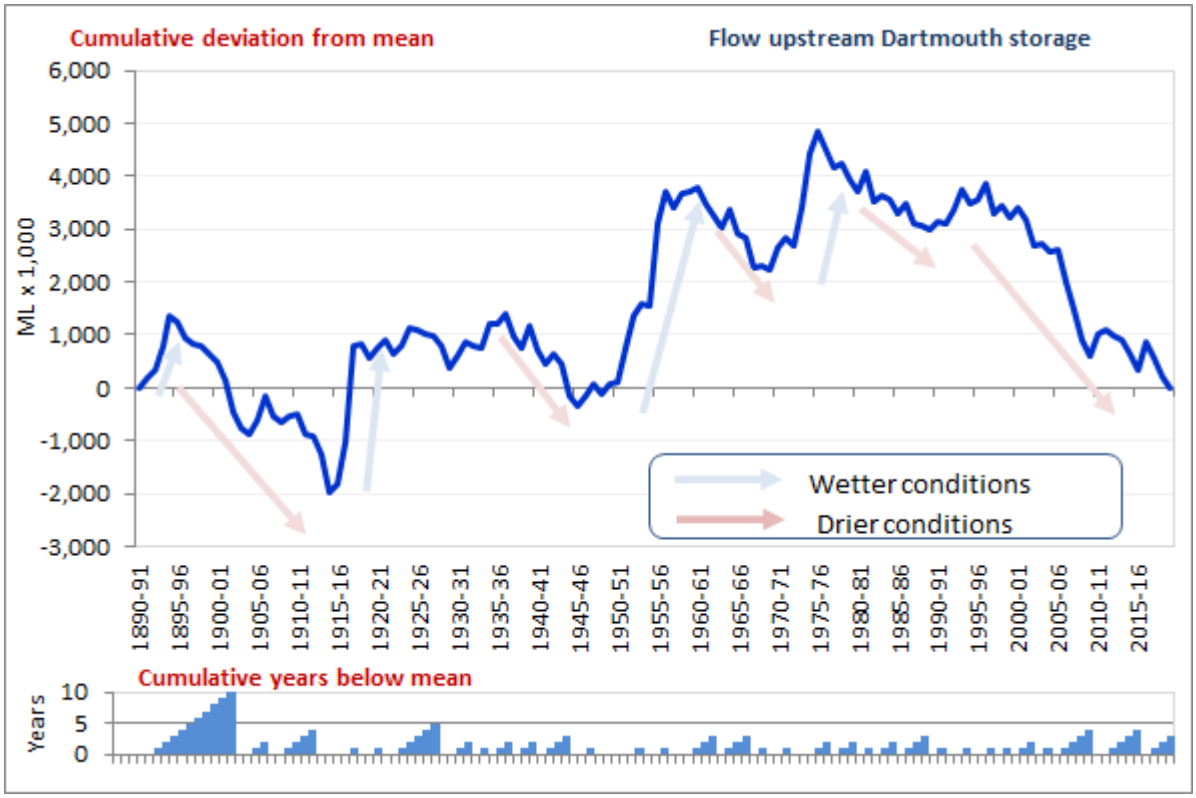


Figure 11: Long-term inflows to Dartmouth Dam against mean and reporting year inflow

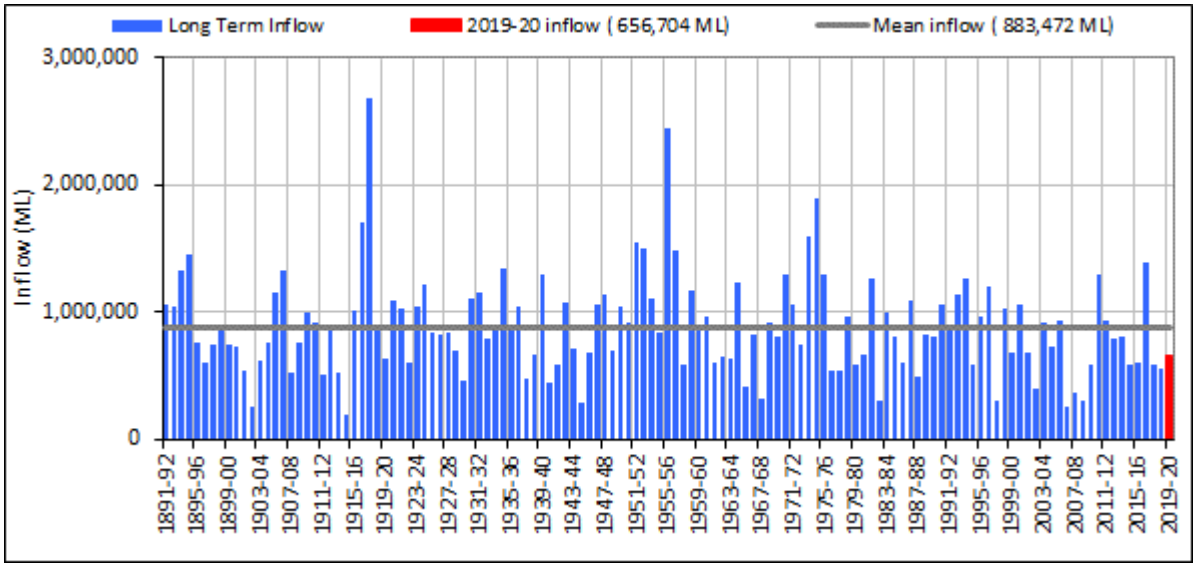


Figure 12: Daily inflows and rainfall at Dartmouth Dam for reporting period

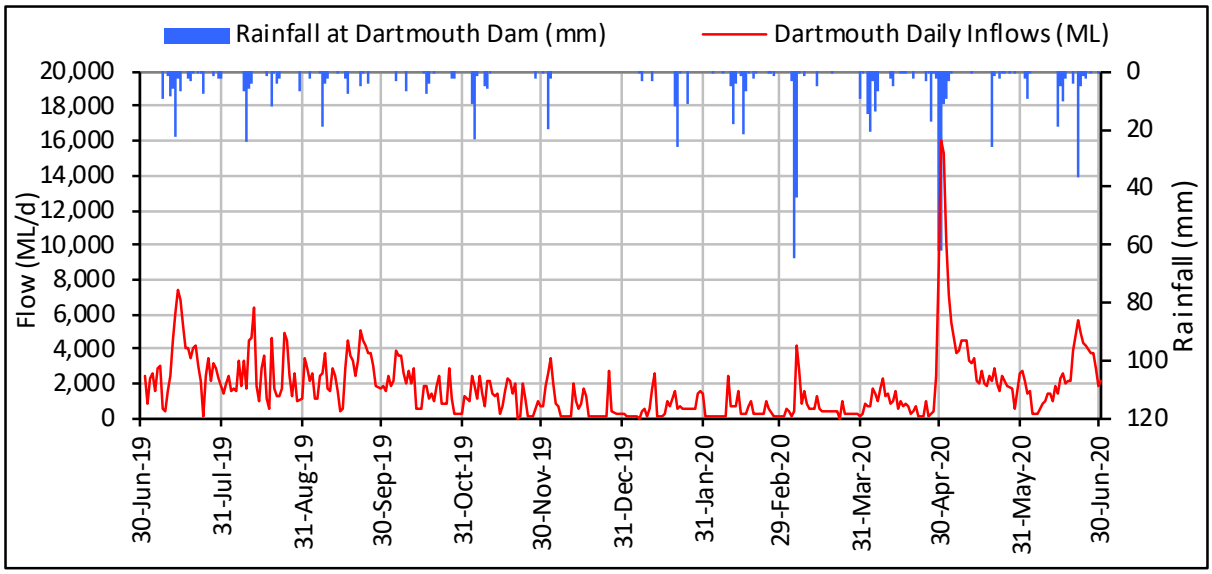


Figure 13: Long-term potential inflow to Menindee Lakes (flow at Wilcannia) against mean and reporting year inflow

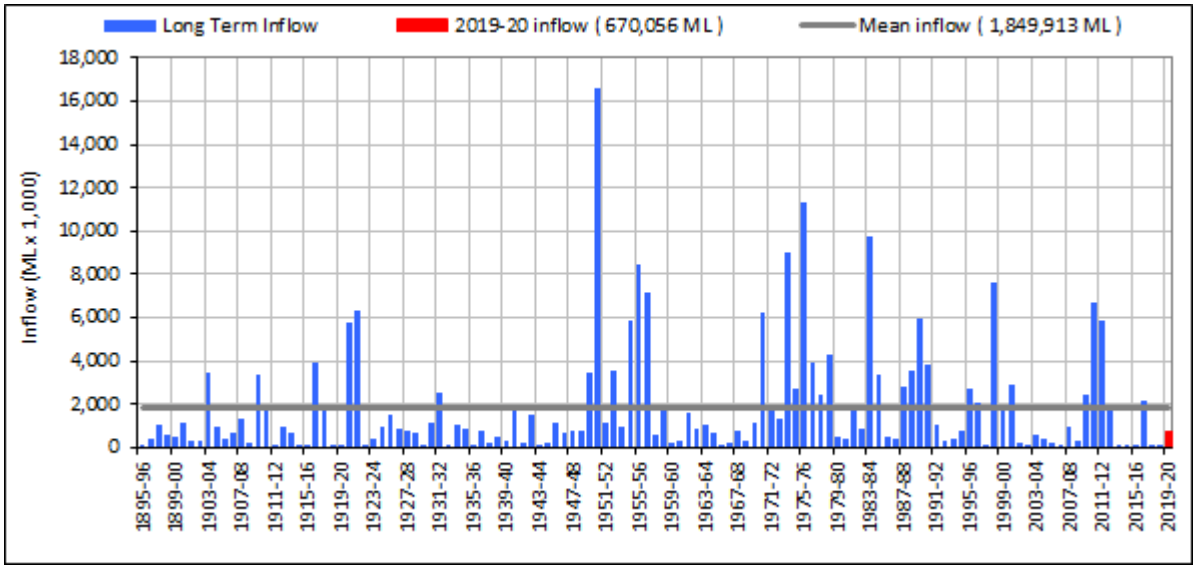


Figure 14: Daily flow at Wilcannia for reporting period

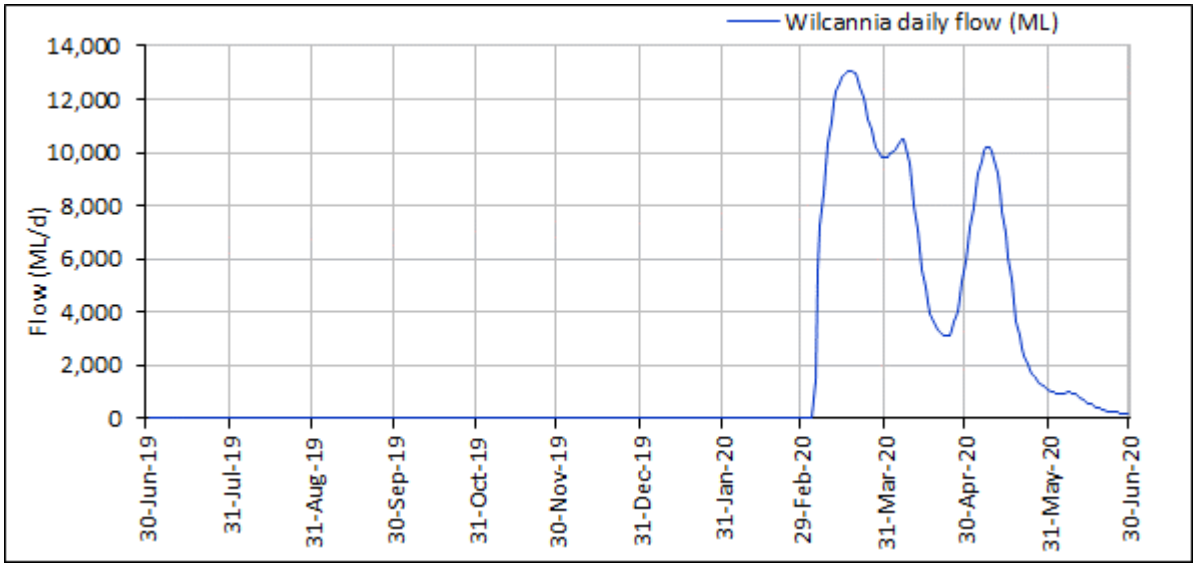
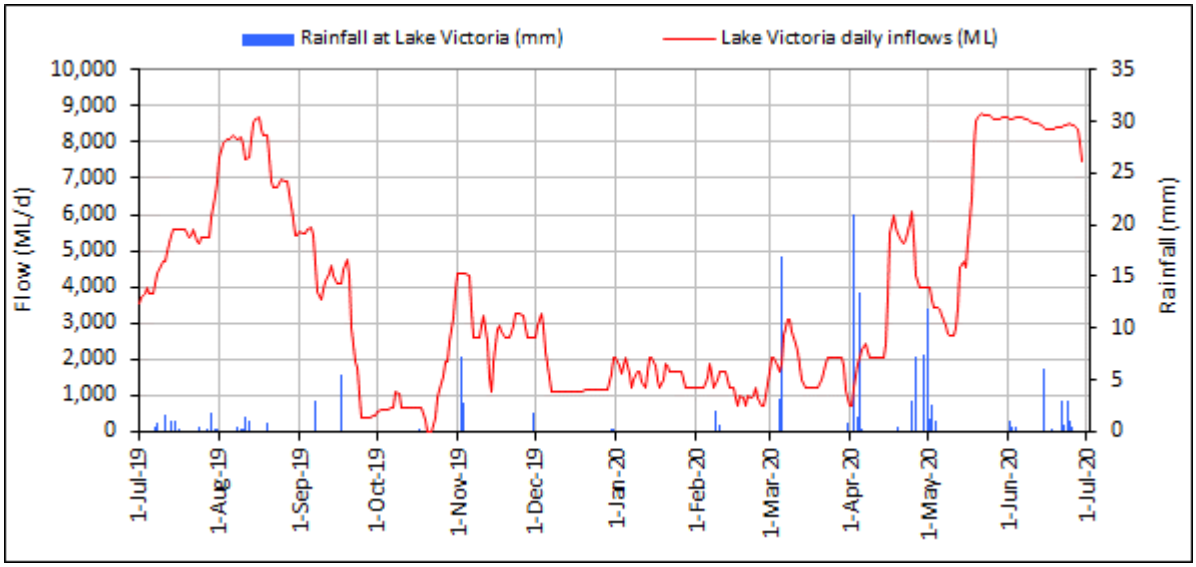


Figure 15: Daily inflows and rainfall at Lake Victoria for reporting period



Storage volume

Hume

- At the commencement of the reporting period, the volume held in Hume dam was 728,043 megalitres or 24% of full supply capacity (Figure 16).
- At the end of the reporting period, the volume held in Hume dam was 1,152,773 megalitres or 38% of full supply capacity, an increase of 14% for the water year.
- The maximum volume held during the reporting period was 1,310,487 megalitres on 29 August 2019.

Dartmouth

- At the commencement of the reporting period, the volume held in Dartmouth dam was 2,459,942 megalitres or 61% of full supply capacity (Figure 17).
- At the end of the reporting period, the volume held in Dartmouth dam was 2,004,778 megalitres or 49% of full supply capacity, a reduction of 12% for the water year.
- The maximum volume held during the reporting period was 2,459,942 megalitres on 30 June 2019.

Menindee Lakes

- At the commencement of the reporting period, the volume held in Menindee Lakes was 11,413 megalitres or 1% of full supply capacity (Figure 18).
- At the end of the reporting period, the volume held in Menindee Lakes was 479,090 megalitres or 28% of full supply capacity an increase of 27% for the year.
- The maximum volume held in storage during the reporting period was 482,632 megalitres on 19 June 2020.
- The total combined storage volume in the Menindee Lakes System remained below 640,000 megalitres for the entirety of the water year leaving operational responsibility of the lakes with NSW (WaterNSW).

Lake Victoria

- At the commencement of the reporting period, the volume held in Lake Victoria was 279,001 megalitres or 41% of full supply capacity (Figure 19).
- At the end of the reporting period, the volume held in Lake Victoria was 597,975 megalitres or 88% of full supply capacity.
- The maximum volume held during the reporting period was 597,975 megalitres or 88% of full supply capacity on 30 June 2020

Figure 16: Hume Dam volume and percentage of full supply volume 2019–20

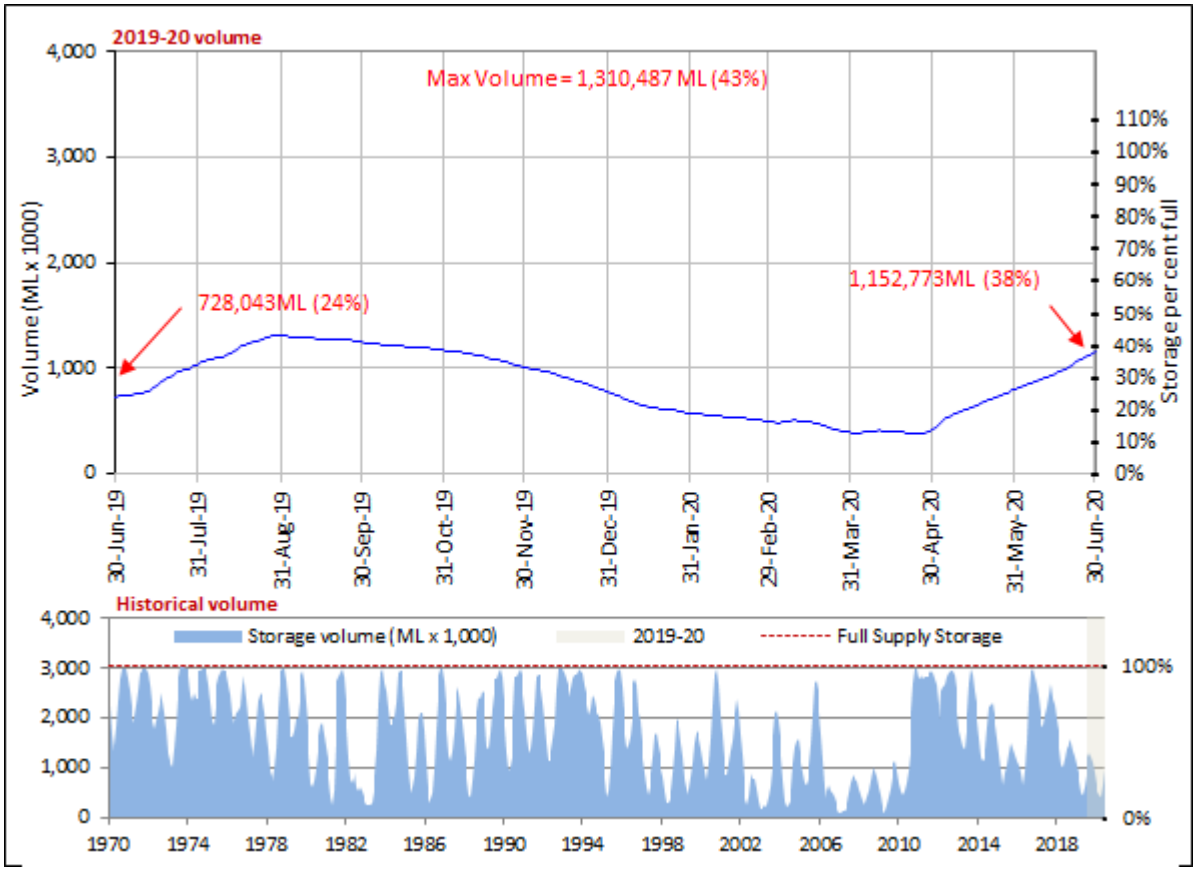


Figure 17: Dartmouth Dam volume and percentage of full supply volume

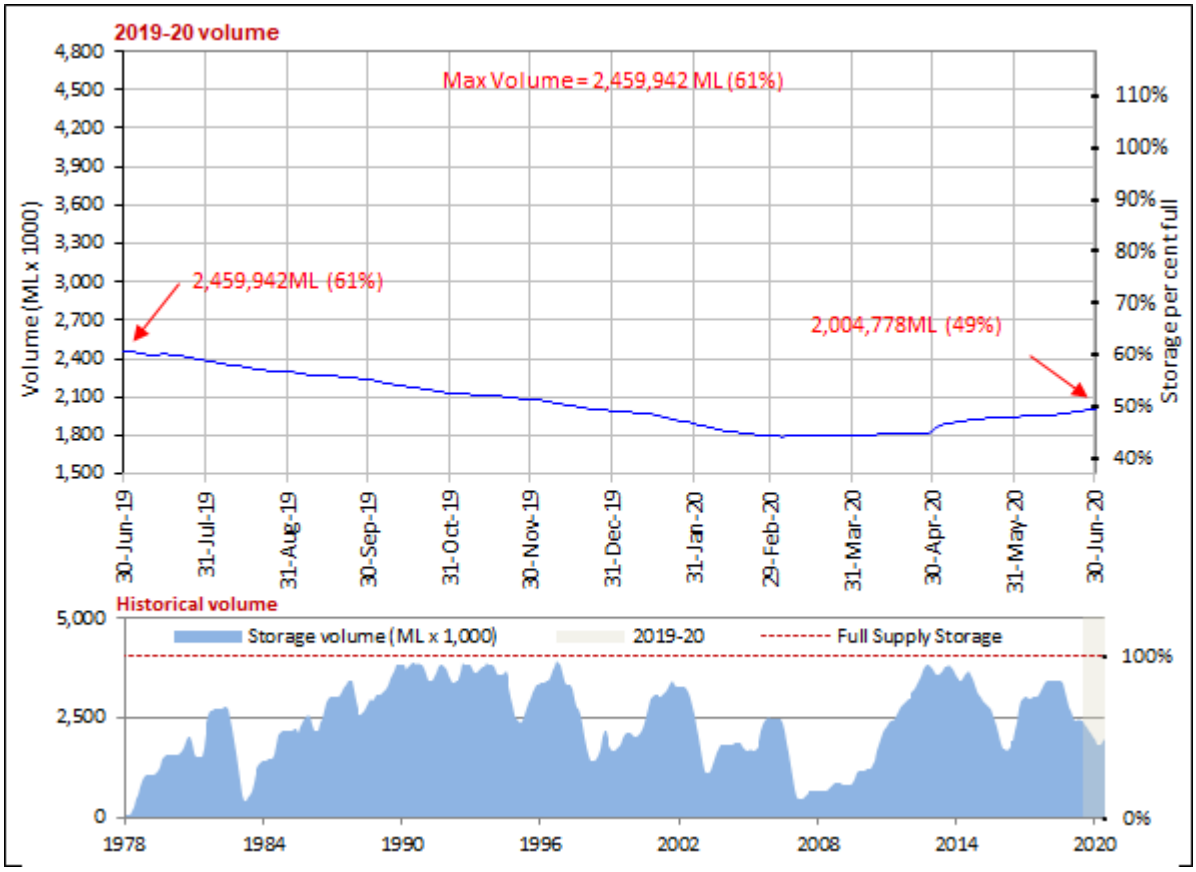


Figure 18: Combined Menindee Lakes volume and percentage of full supply volume 2019–20

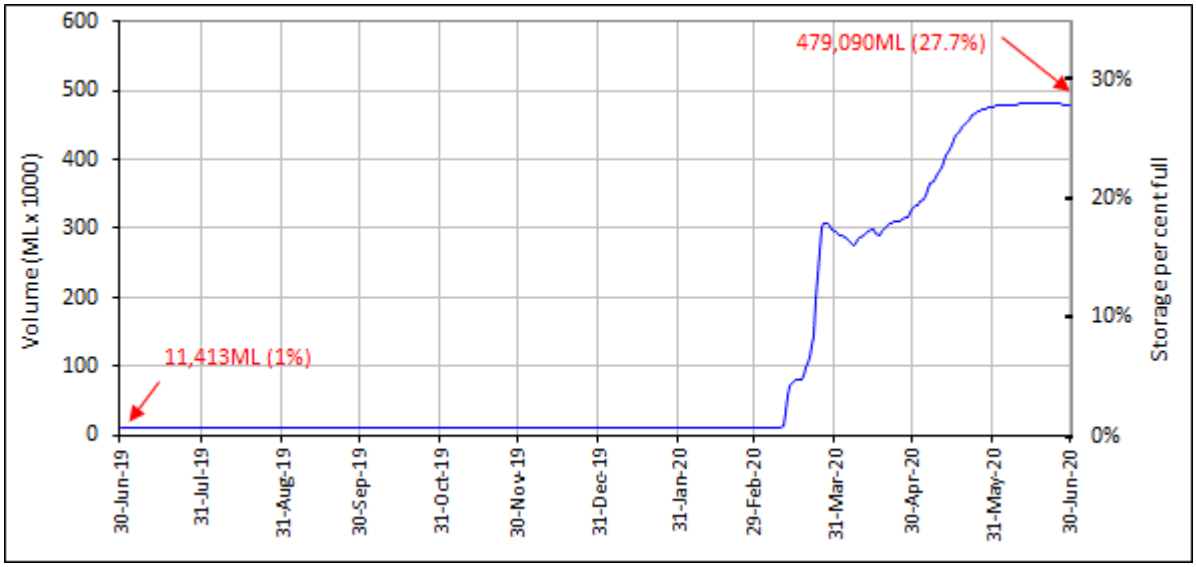
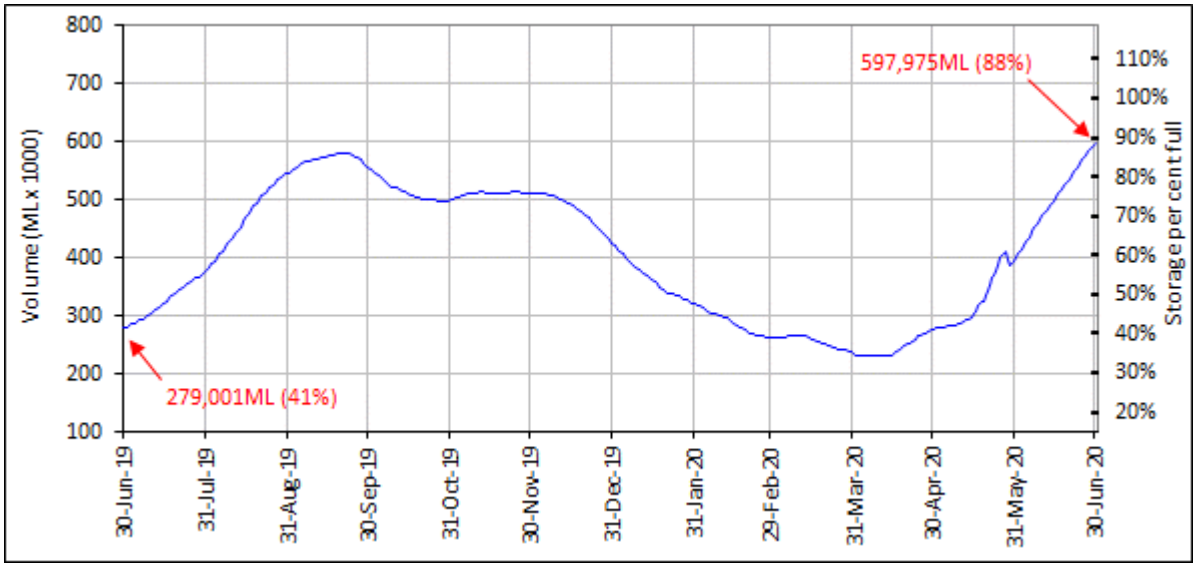


Figure 19: Lake Victoria volume and percentage of full supply volume 2019–20



Major flow events

No major flow events occurred during the reporting period (Figure 20). A peak average daily flow rate of approximately 22,600 megalitres per day occurred in May 2020 at Yarrawonga Weir (downstream) (Figure 21).

Figure 20: River height of Murray River downstream of Yarrawonga Weir

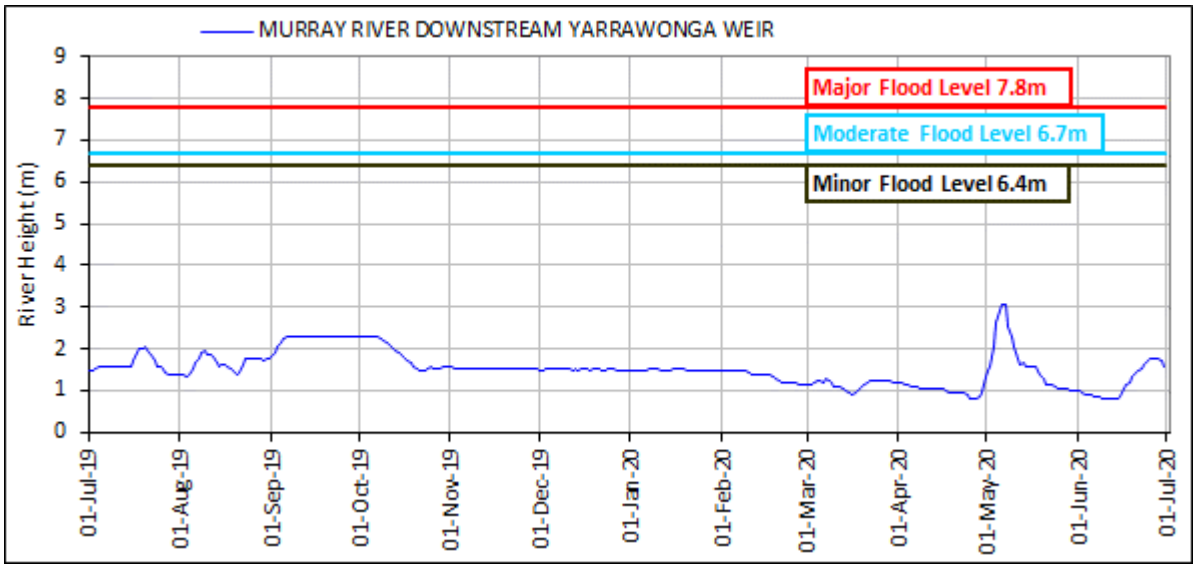
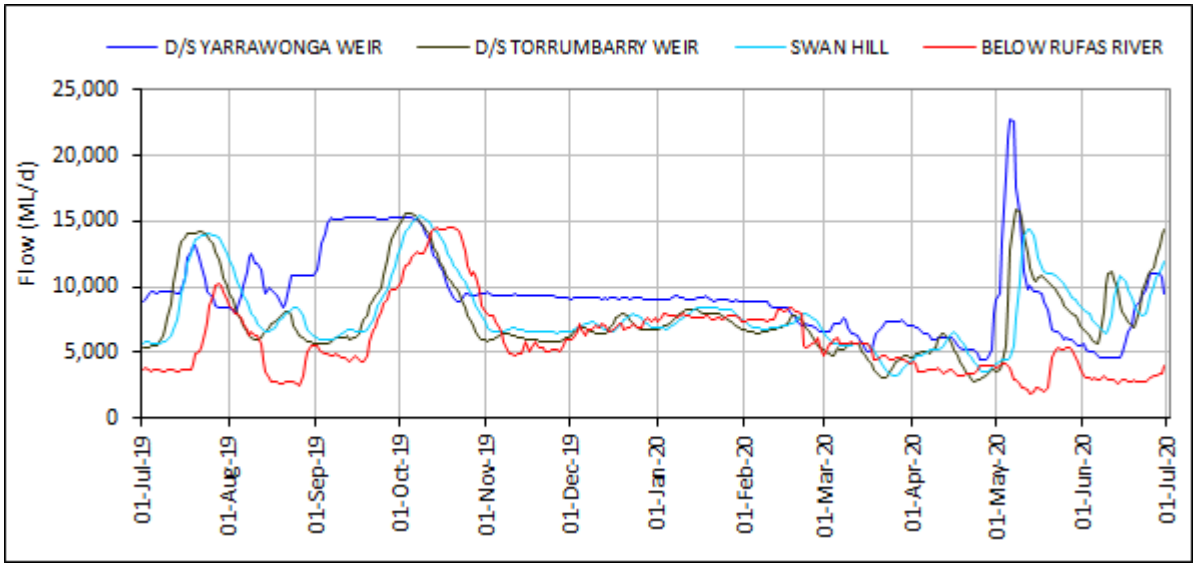


Figure 21: Flows in the Murray River for the reporting period



Surface water resources and management

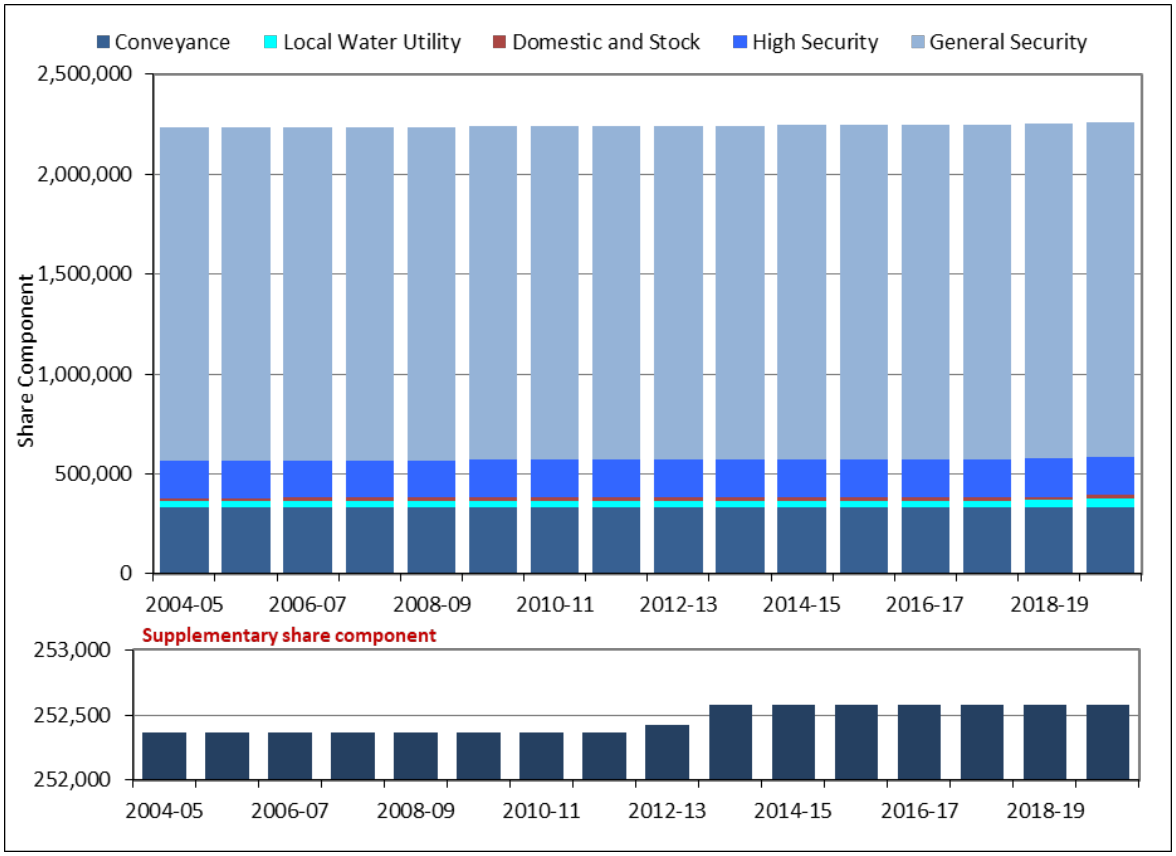
Legislation

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 9,421 in the reporting period. Changes were primarily due to the issue of a specific purpose licence for supply to the following licence categories; (i) Eagle Creek Temporary Critical Conveyance [Critical Conveyance], 800 ; (ii) Mathoura Temporary Critical Conveyance[Critical Conveyance], 150 ; (iii) Moira Temporary Critical Conveyance[Critical Conveyance], 1500 ; (iv) West Corurgan Temporary Critical Conveyance[Critical Conveyance], 3000. 800 shares of High Security [Research] was surrendered.
- Total issued share component on 30 June 2020 was 2,514,321, including 252,579 supplementary shares (Figure 22).

Figure 22: Issued share component since the introduction of the water sharing plan



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 4 and the rules for access to uncontrolled flow are summarised in Table 5.

Table 4: 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
Supplementary Water	0 ML/share	1 ML/share	N/A	N/A

Table 5: 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 6 outlines the conditions that may be associated with different stages of criticality for surface water quality. Further information is available at www.industry.nsw.gov.au/water/what-we-do/legislation-policies/eep

Table 6: Determination of stages of criticality for surface water quantity

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

Temporary water restrictions for the reporting period

No temporary water restrictions were in place throughout the reporting period for regulated river licence holders. Temporary restrictions were implemented in a number of unregulated systems to protect deliveries of environmental water. This applied to Tuppal and Tule Creeks between September 2019 and May 2020 and Buccaneit and Cunnunyeuk Creeks from April to June 2020.

Extreme events stage

- The Murray catchment was classified as being in Stage 2 for the entirety of the reporting period. Its drought stage remained as Stage 2 in June 2020.
- Major storage inflow (Hume natural[3] plus Dartmouth) was below average for all months excepting April, May and June of 2020. (Figure 23).
- Looking at 2-year storage inflow sequences between 1891 and current, as an indicator of drought severity illustrates that the current period (1 July 2018 to 30 June 2020), was dry, however well above the lowest sequence in the record which occurred between 1 July 2006 to 30 June 2008 (Figure 24). The total inflow deficit was 2,872,657 megalitres relative to the median inflow sequence (47% lower than median conditions).

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

Figure 23: Drought stage for the reporting period referenced with monthly headwater storage inflows and monthly storage inflow variance from mean

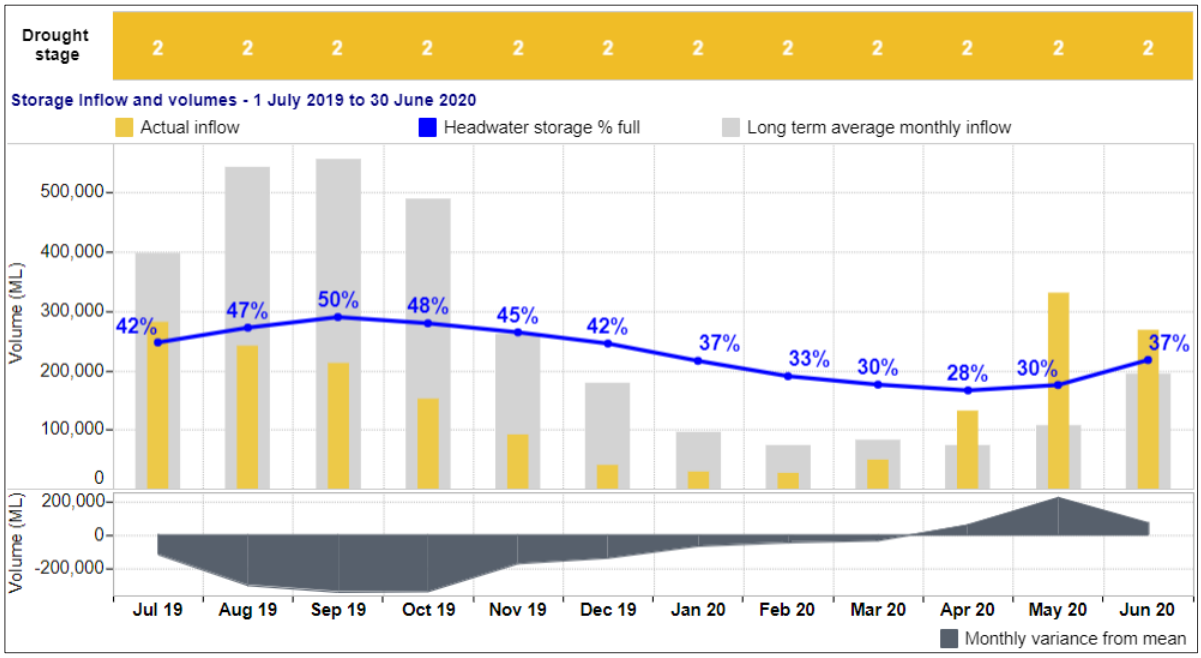
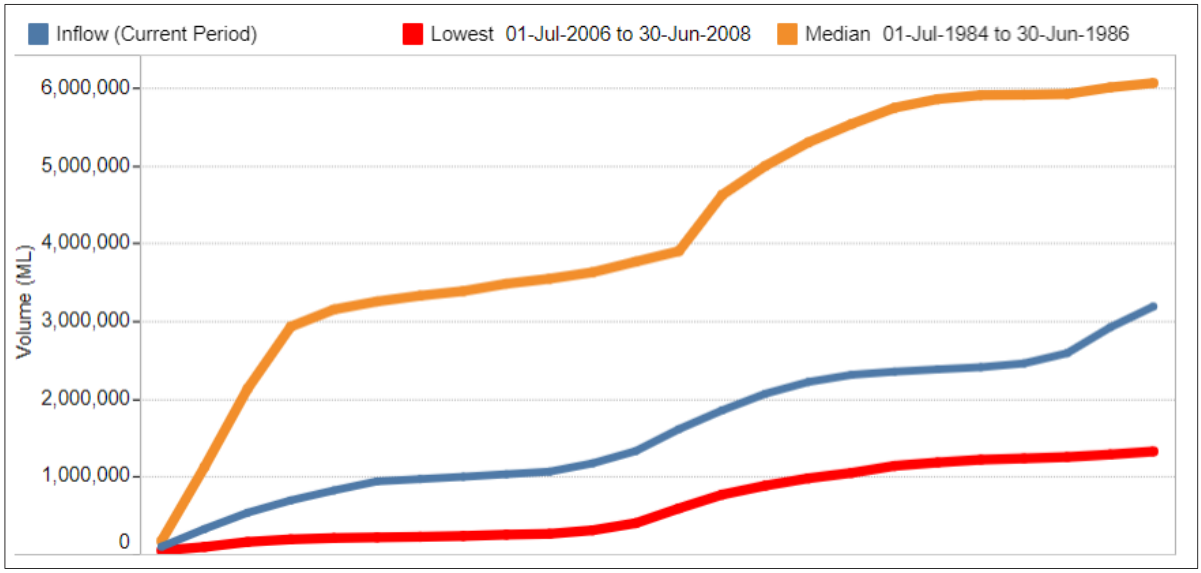


Figure 24: 2-year inflow sequence, current (1 July 2018 to 30 June 2020) compared to median and lowest



Water availability

- ‘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.
- Supplementary access licences received an opening AWD of one megalitre per share, the maximum allowable under the water sharing plan.

- ‘General Security’ access licences received zero megalitres per share on 1 July 2019, however had access to 313,978 megalitres of carryover water[4] (19% of issued share for this category).
- A subsequent announcement of 0.03 megalitre per share occurred on 15 May 2020 (Figure 25), taking total general security effective allocation for the reporting period to 22%
- Total water availability under water sharing plan management conditions by category of access licence is presented in Figure 26 and indicate the lowest levels since 2008–09

Figure 25: Incremental available water determination and carryover volumes for ‘General Security’ as a proportion of share component

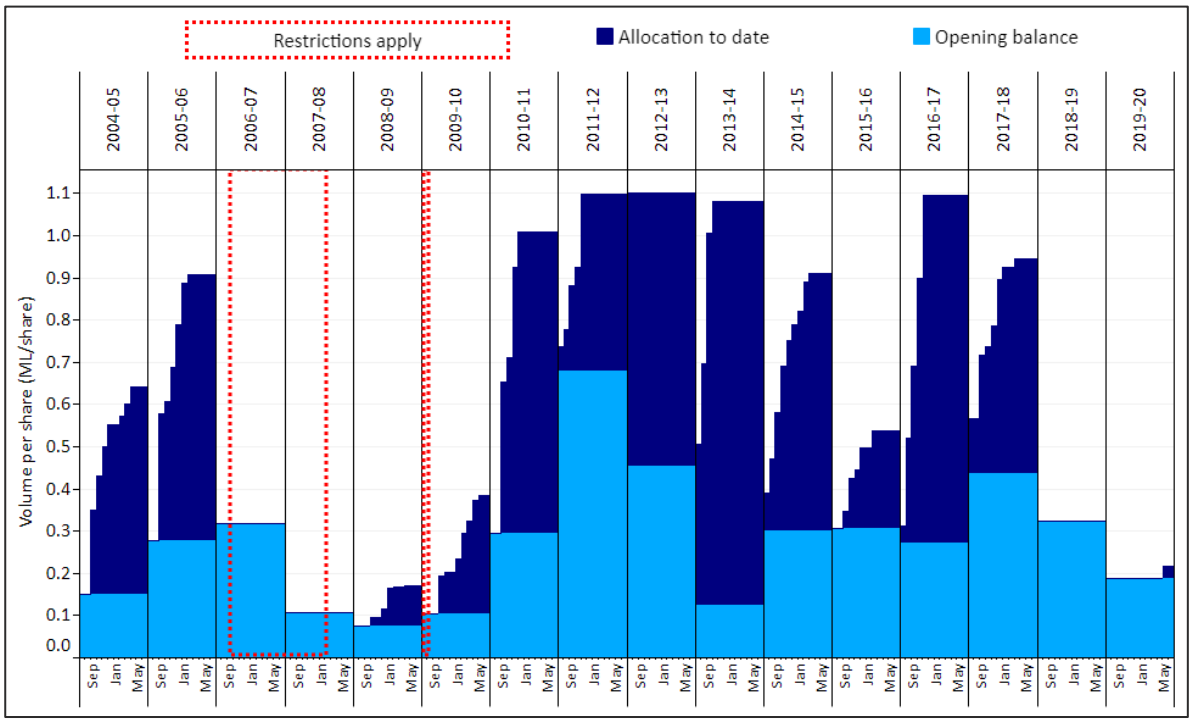
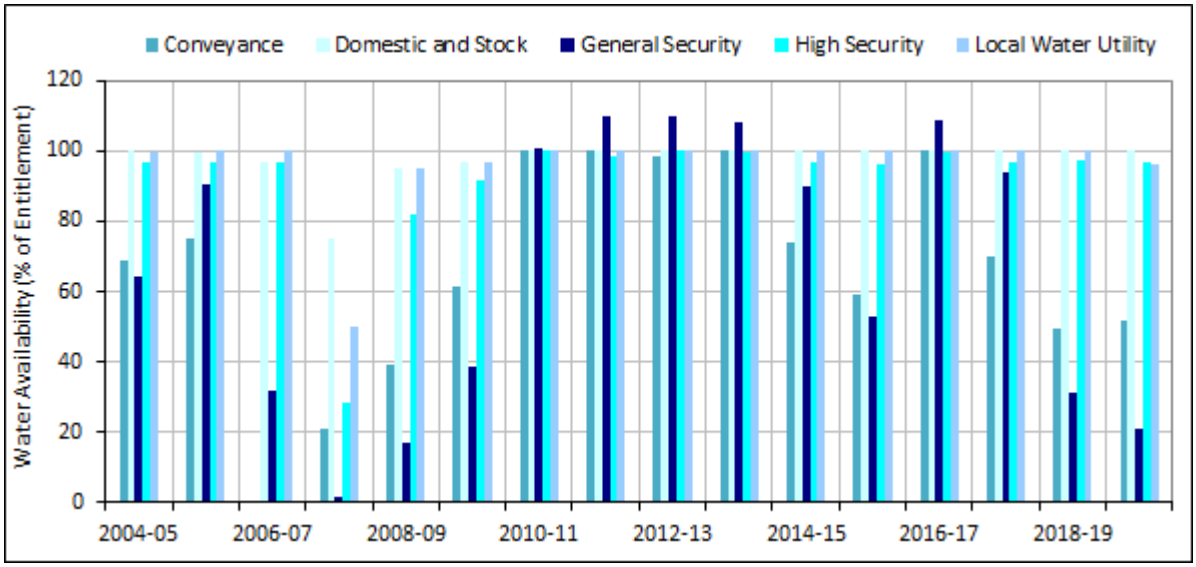


Figure 26: Water availability (carryover + available water determinations)



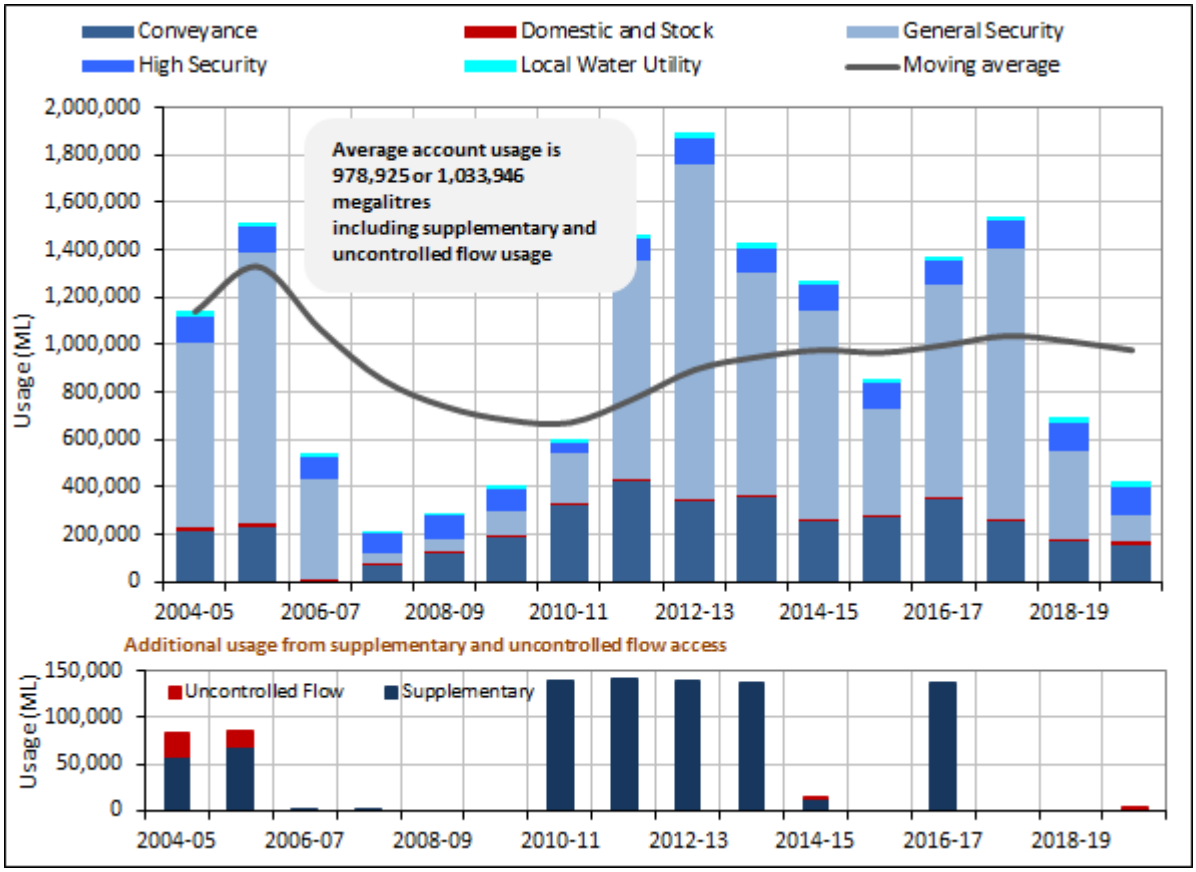
[4] Carryover figure is presented pre snowy transfer adjustments

Account usage

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

- Account usage from the regulated supply totalled 427,333 megalitres for the reporting period (Figure 27).
- Additionally, 4,632 megalitres was accessed from uncontrolled and supplementary flow event.
- This was the lowest usage since 2010–11.
- The average usage (all categories of licence) is 1,033,946 megalitres (2004–05 to 2019–20).
- Refer to Note 3 in this GPWAR for further usage details.

Figure 27: Total usage since commencement of the water sharing plan



Utilisation and inactive share

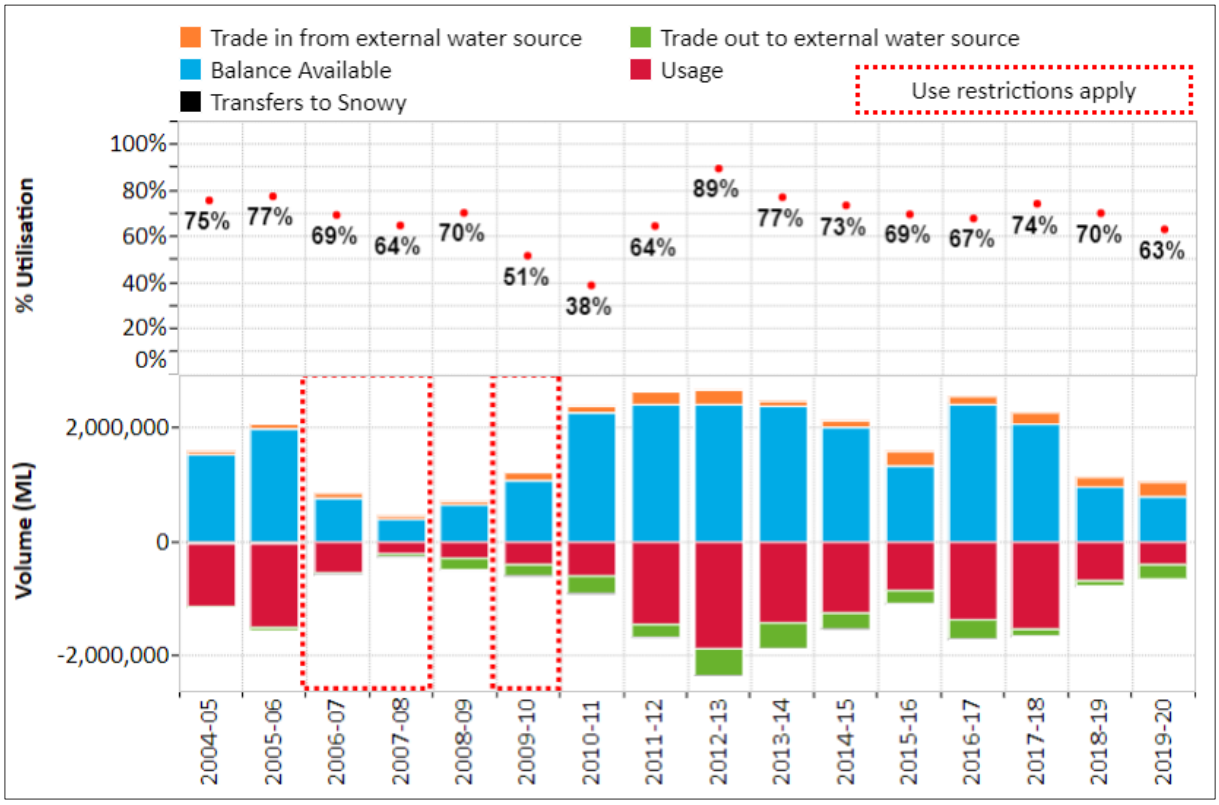
An access licence entitlement is considered to be inactive if the holding does not use water or access the temporary trade market for the reporting period. Utilisation reflects the amount of water used from regulated supplies (excludes supplementary water), relative to the maximum amount available for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

- 13% of general-security share component was inactive for the reporting period, an increase of 8% on the previous year (Table 7).
- considering all categories of access licence for regulated supply, 10% were inactive.
- 96% of supplementary water was inactive due to limited high-flow access opportunities.
- utilisation of available water from regulated supplies (excludes supplementary) decreased by 7% to 63% (Figure 28).

Table 7: Inactive licence summary for the reporting period

Licence category	Inactive licences [5](number)	Inactive share component	Inactive share % of total share	Previous year comparison
Domestic and Stock	305	2,849	21%	18%
Domestic and Stock [Domestic]	119	681	33%	29%
Domestic and Stock [Stock]	98	314	25%	21%
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)	800	220,423	13%	5%
Regulated River (High Security)	197	4,417	2%	2%
Regulated River (High Security) [Community and Education]	0	0	0%	0%
Regulated River (High Security) [Research]	1	1	100%	100%
Regulated River (High Security) [Town Water Supply]	0	0	0%	0%
Total regulated supply	**1,520**	**228,685**	**10%**	**4%**
Supplementary Water	157	242,868	96%	100%

Figure 28: Access licence account utilisation



[5] Licences are considered inactive when no usage or trade activity is associated with the holding for the water year

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*.

- In the reporting there was a net movement of water into the Murray (negative 'net trade out') (Figure 29).
- A total of 475,055 megalitres was traded out of NSW Murray access licences.
- A total of 511,625 megalitres was traded into NSW Murray access licences (including internal trading).
- A net trade of 36,570 megalitres was traded into the water source, a decrease on the past two reporting periods.
- The majority of water moved into the NSW Murray was from a Victorian water source (Figure 30).
- The balance of the Murrumbidgee inter-valley trade account (IVT) was 6,244 megalitres on 30 June 2020 (balance owed to the Murray). Detailed information on the IVT account is provided in note 5 of this GPWAR.

Figure 29: Allocation assignments (trade) out of the NSW Murray

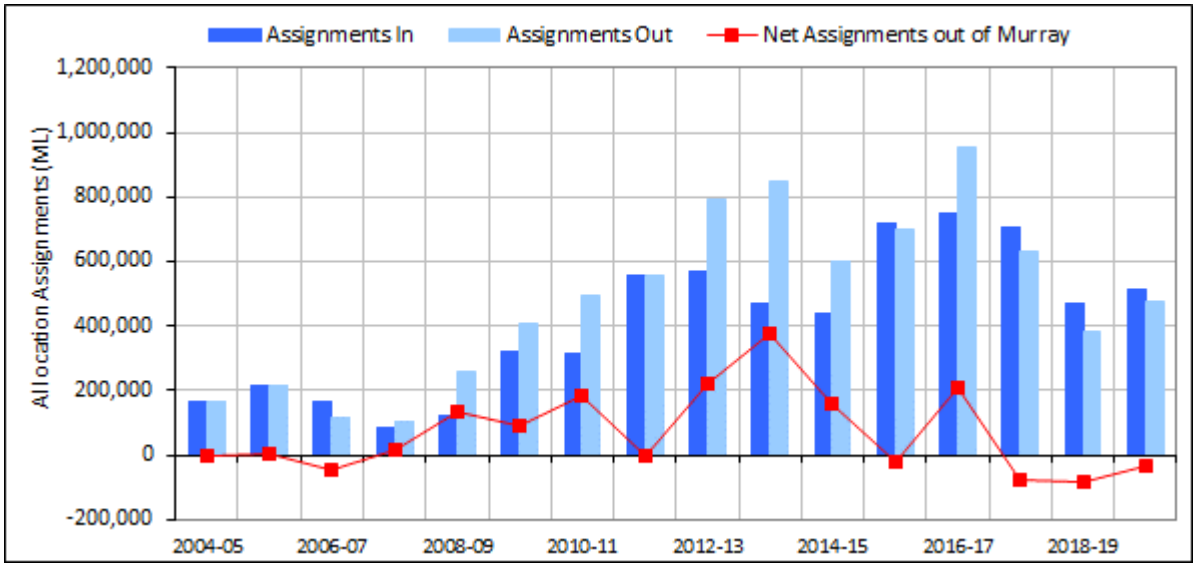
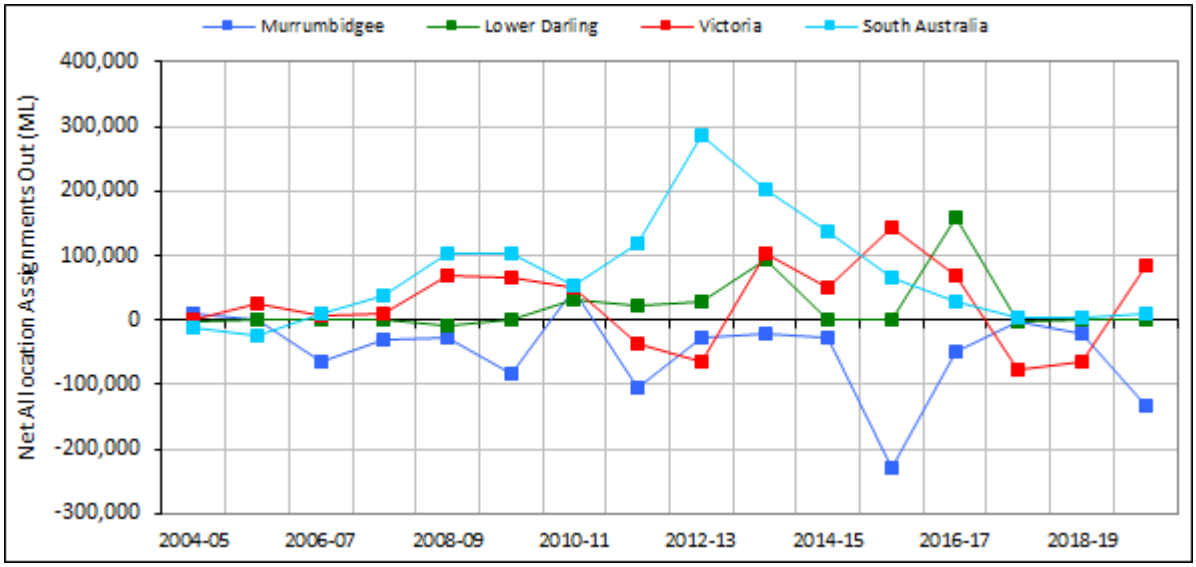


Figure 30: Net volume of allocation assignment (trade) out of NSW Murray by water source

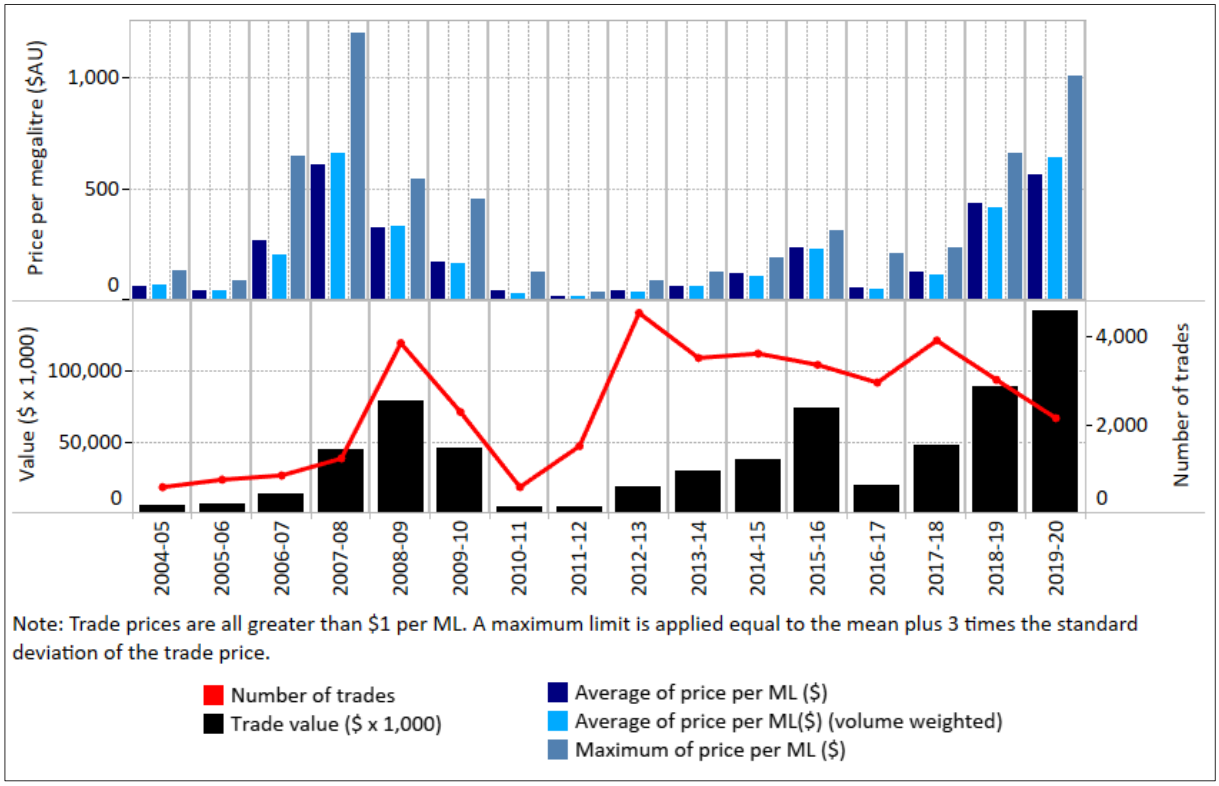


Commercial statistics

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.

- Total commercial transactions totalled 2,154 transactions in the reporting period, a decrease on the prior reporting period (Figure 31), however total market value increased significantly to over $140M.
- The average price was $566 per megalitre (or volume weighted average $640), a 30% increase on the prior reporting period.
- The maximum price for temporary water was $1,008 per megalitre.

Figure 31: NSW Murray allocation assignments summary statistics



Permanent trading (share assignments and licence transfers)

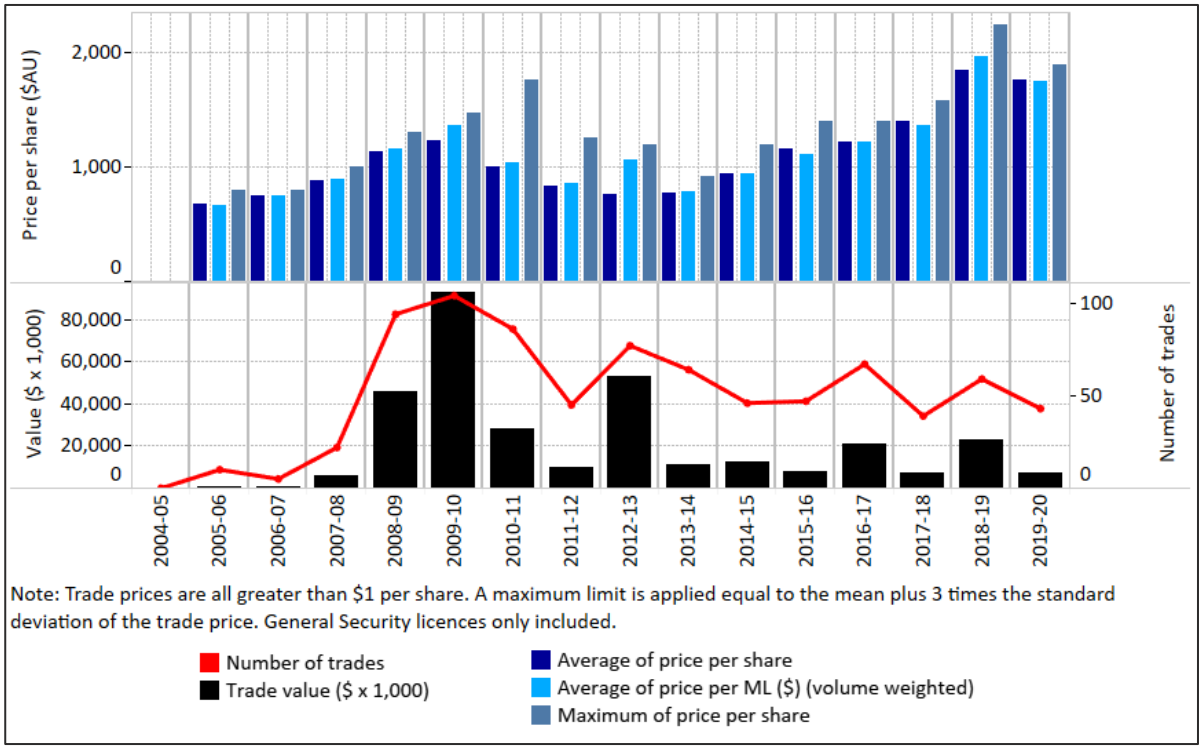
Division 4 (dealings with access licences) of the *Water Management Act 2000* allows for a range of dealing options that permanently effect the title of the water access licence. Two of the more common dealing practises under this division are assignments of rights under access licences (clause 71Q)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

- The average price per share (volume weighted) for 'General Security' share component has ranged from a low of $662 to a high of $1,962 (between 2004–05 and 2019–20). The highest average price per share occurred in 2018–19 (Figure 32).
- For the reporting period the average price per share (volume weighted) was $1,747 a decrease of 5% on the prior period.
- The maximum price per share for 'General Security' share component has ranged from $800 to $2,240 (2004–05 to 2019–20) and was $1,890 for the reporting period.
- The average of price per share (volume weighted) for 'High Security' share component has ranged from $1,315 to $7,600 (2004–05 to 2019–2020). For the reporting period the volume weighted average price was $7,600 (which is also the maximum amount on record) (Figure 33). This was an increase of 51% on the prior reporting period.
- The maximum price per share for 'High Security' share component has ranged from $1,450 to $10,050 (2004–05 to 2019–20). For the reporting period the maximum amount exchanged was $10,050 (which is also the maximum amount on record).

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

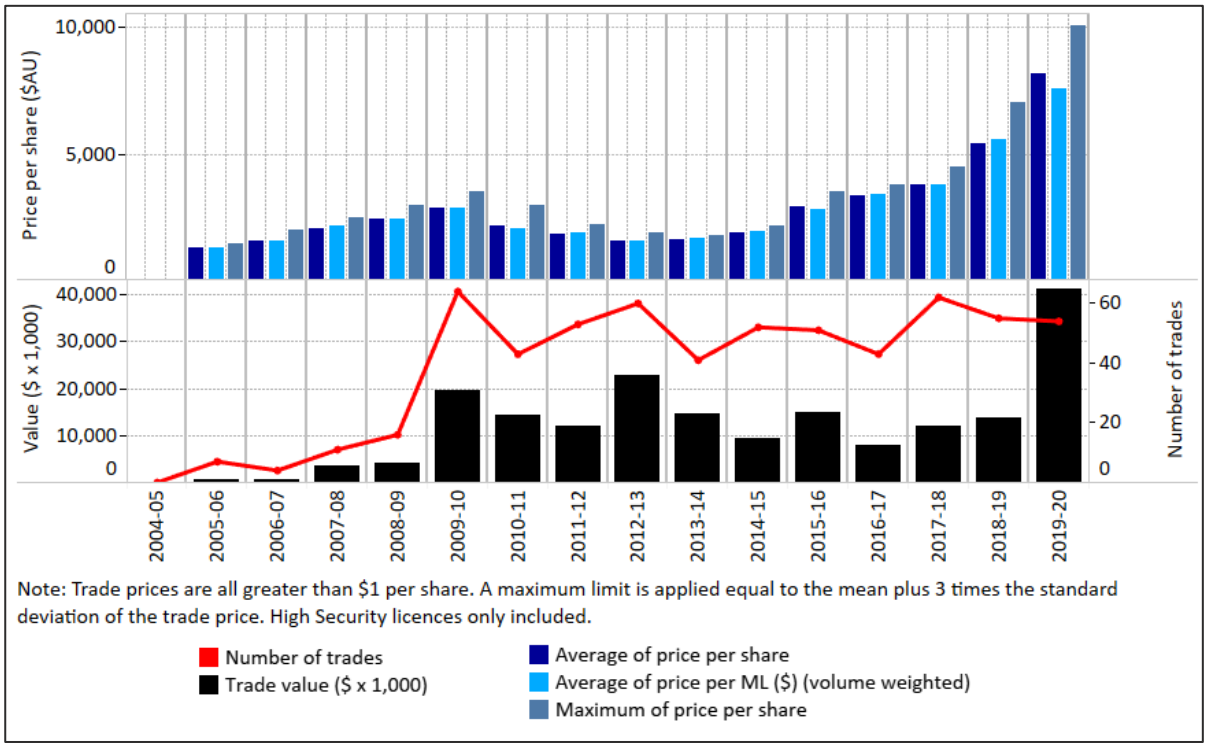
- The volume weighted average price for 'Conveyance' share component has ranged from $1,120 per share to $3,301, however no trades were processed in the reporting period for this category of licence.
- The volume weighted average price for 'Supplementary' share component has ranged from $100 per share to $450 (2004–05 to 2019–20). No transaction was processed in 2019–20.
- Commercial trade activity via a change of licence holder dealing (71M) remained the same in the reporting period relative to the prior year. 35 transactions were processed moving a total number of 6,700[7] shares to a new holder (Figure 34).

Figure 32: NSW Murray commercial share assignments—General Security share



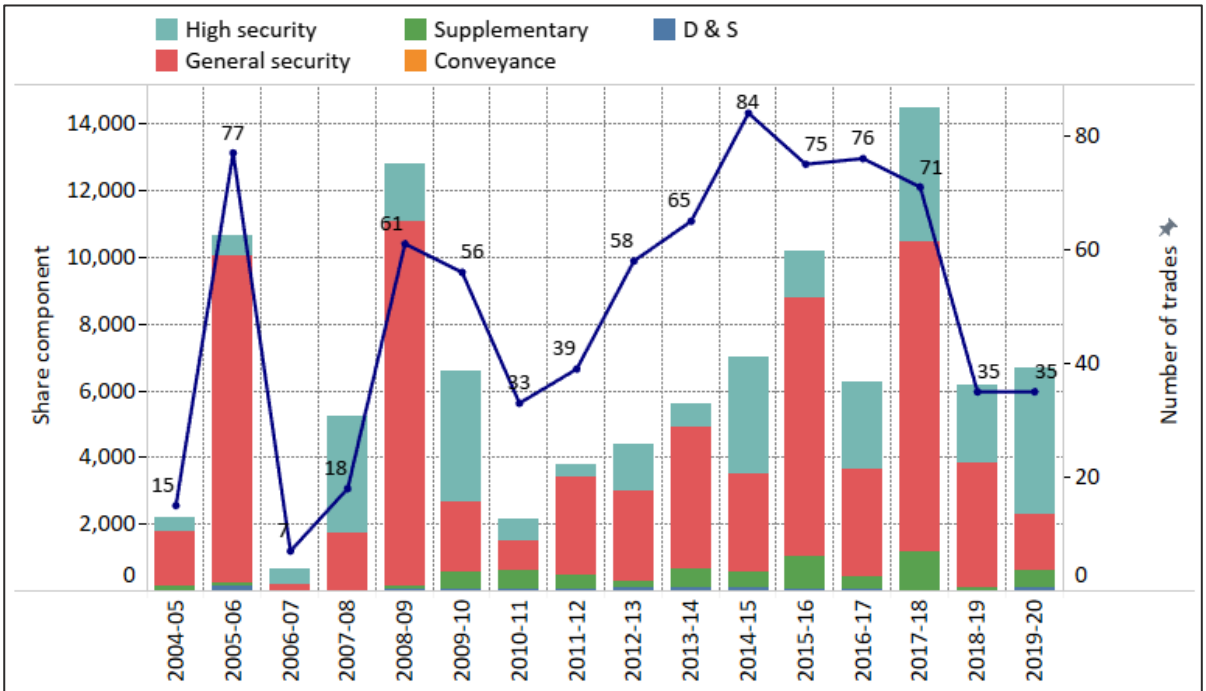
[7] Considers all categories of licence

Figure 33: NSW Murray commercial share assignments—High Security share



Note: Trade prices are all greater than $1 per share. A maximum limit is applied equal to the mean plus 3 times the standard deviation of the trade price. High Security licences only included.

Figure 34: Transfer of licence (change of holder 71M dealing)



Note: Only includes transactions where the total consideration of the dealing exceeds $1. All licence categories have been included.

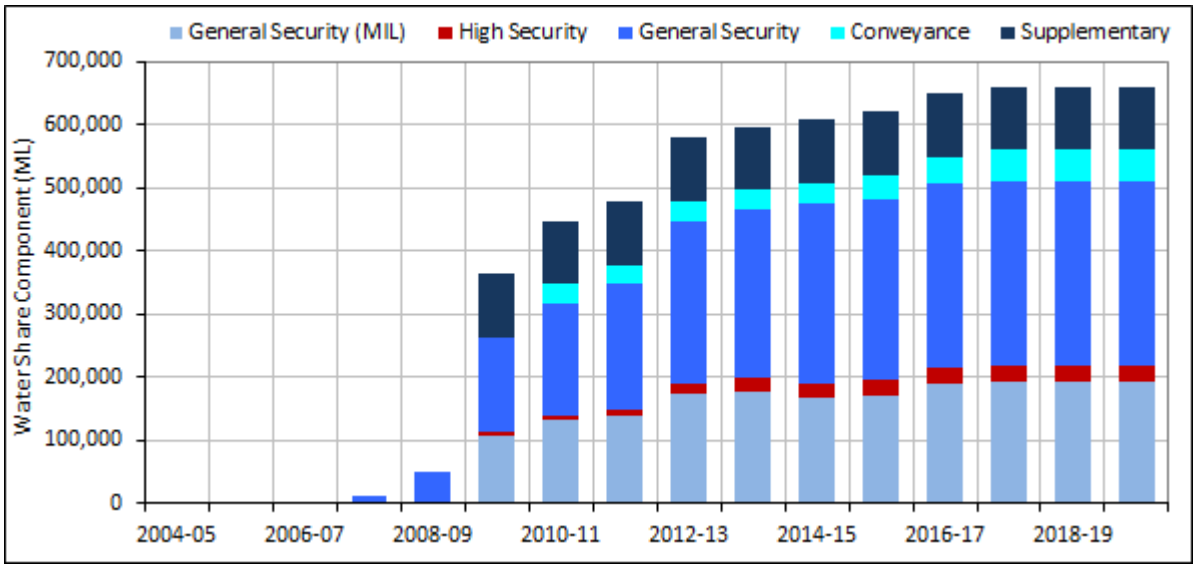
Environmental water

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 2020, the total held environmental water portfolio totalled 660,107 shares (Figure 35) consisting of:
  - 50,214 'Conveyance'
  - 484,673 'General Security' (including 193,983 within the Murray Irrigation holding)
  - 25,009 'High Security'
  - 100,211 'Supplementary'.
- Total held environmental water account usage was 76,005 megalitres (Figure 36), the lowest since 2012-13.
- Zero megalitres of held environmental account water was transferred for release in the Snowy River (and River Murray increased flow contributions) (Figure 37).
- Held environmental utilisation[8] was 49% for the reporting period, decreasing for the fourth consecutive year (Figure 38). This analysis excludes environmental water delivered via private landholders through internal trading mechanisms (4,637 megalitres for the reporting period).
- Additional information on held environmental water is available in Note 6 of this GPWAR.

Figure 35: 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 36: Held environmental usage by licence category since the commencement of the water sharing plan

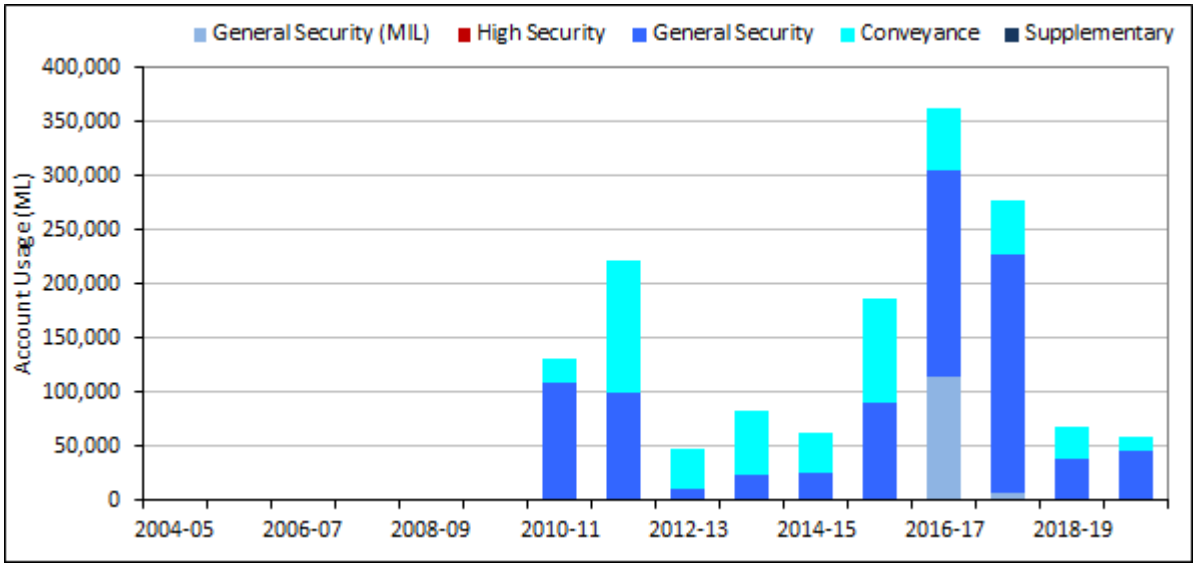


Figure 37: Held environmental water transferred to the snowy savings program since the commencement of the water sharing plan

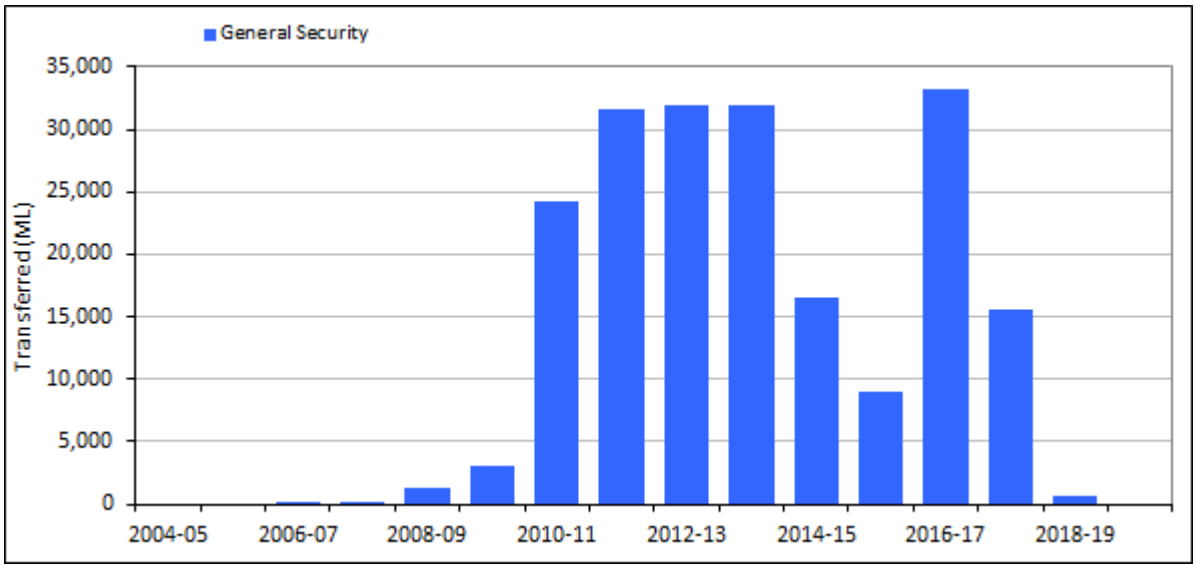
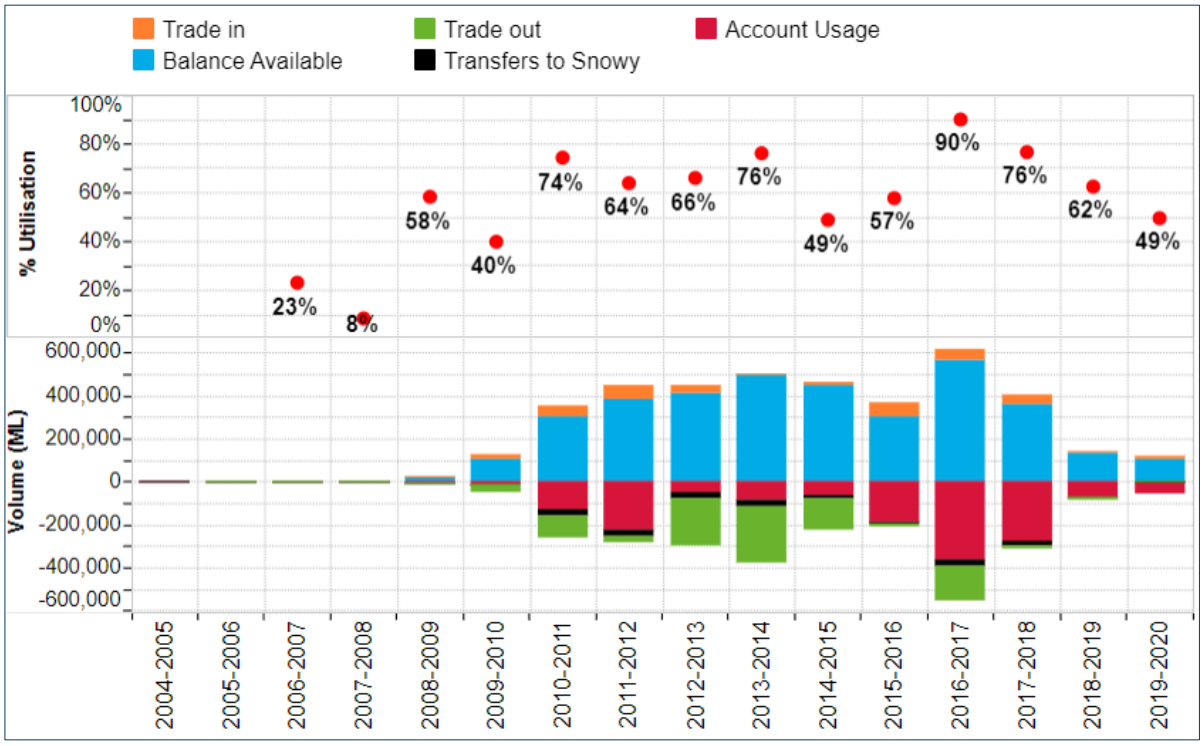


Figure 38: Held environmental utilisation of available water since the commencement of the water sharing plan[10]



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 a total of 49,040 megalitres RMIF was released from Hume Dam, targeting multiple environmental outcomes between Yarrawonga and the Murray River mouth, and also providing critical habitat for native fish within the Millewa National Park.

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.

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

During the reporting period the B-M EWA received:

- an opening balance (carryover) of 260,560 megalitres (unavailable)
- a credit (allocation) of 33,000 megalitres (withdrawn and moved to borrow account)
- a Hume Dam spill (forfeit) of zero megalitres
- an evaporation forfeit of zero megalitres.

The B-M EWA account usage was zero megalitres for the reporting period resulting in a carry-forward volume of 293,650 megalitres.

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

[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/

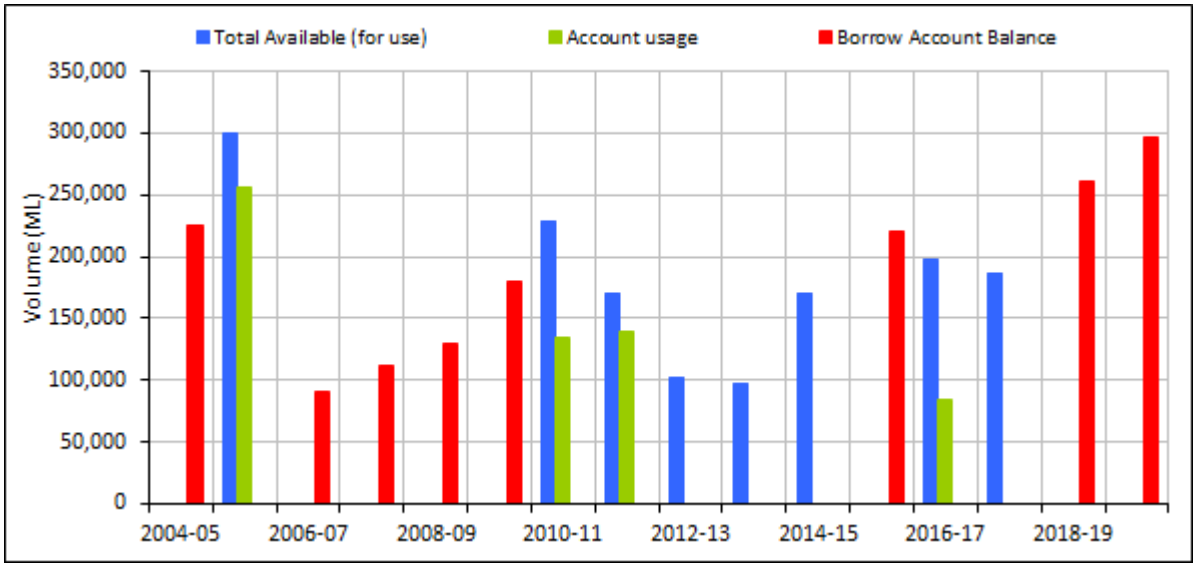
B-M EWA borrow

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'.

- The B-M EWA borrow account commenced with a volume of 260,650 megalitres.
- The B-M EWA borrow account received all B-M EWA account water resulting in a total account borrow of 296,090 megalitres in the reporting period.
- No repayments occurred in the reporting period with the balance of the borrow account remaining at 296,090 megalitres.

Figure 39 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 39: B-M EWA summary since commencement of the water sharing plan



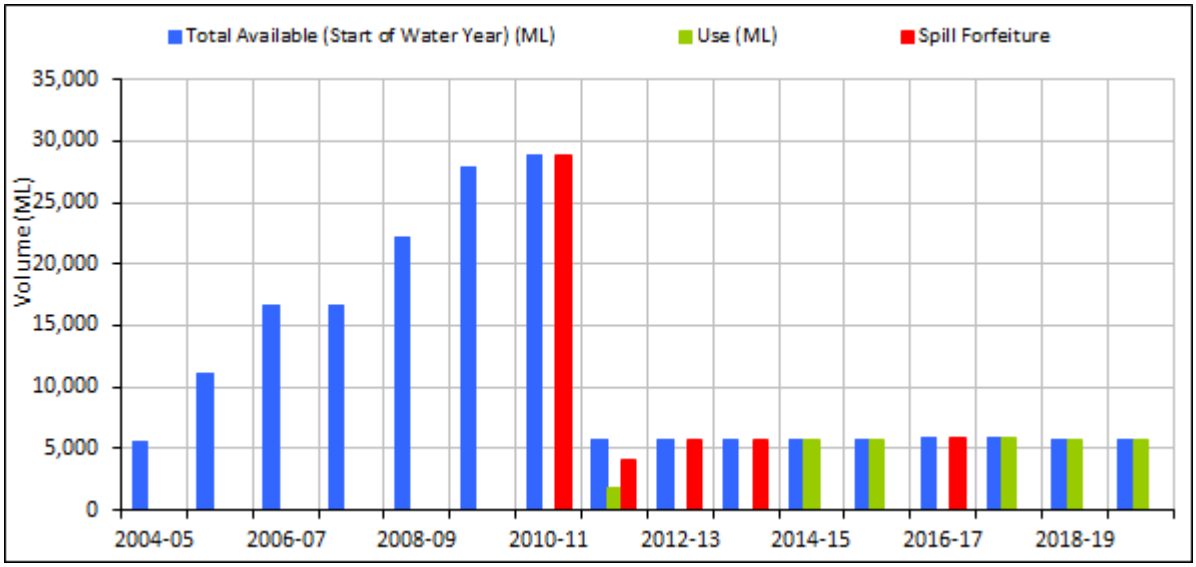
Murray additional allowance (MAA)

For the reporting period:

- the MAA carried forward a volume of zero megalitres.
- a total of 5,691 megalitres was credited to the account for the reporting period.
- zero megalitres of water was spilled or forfeited.
- there was 5,691 megalitres of account usage.
- zero megalitres was carried forward to the 2020–21 water year.

Figure 40 provides a graphical representation of the behaviour of the AEA since the commencement of the water sharing plan.

Figure 40: 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 Planning, Industry and Environment 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 Planning, Industry and Environment website (www.industry.nsw.gov.au/water).

Quantification of data

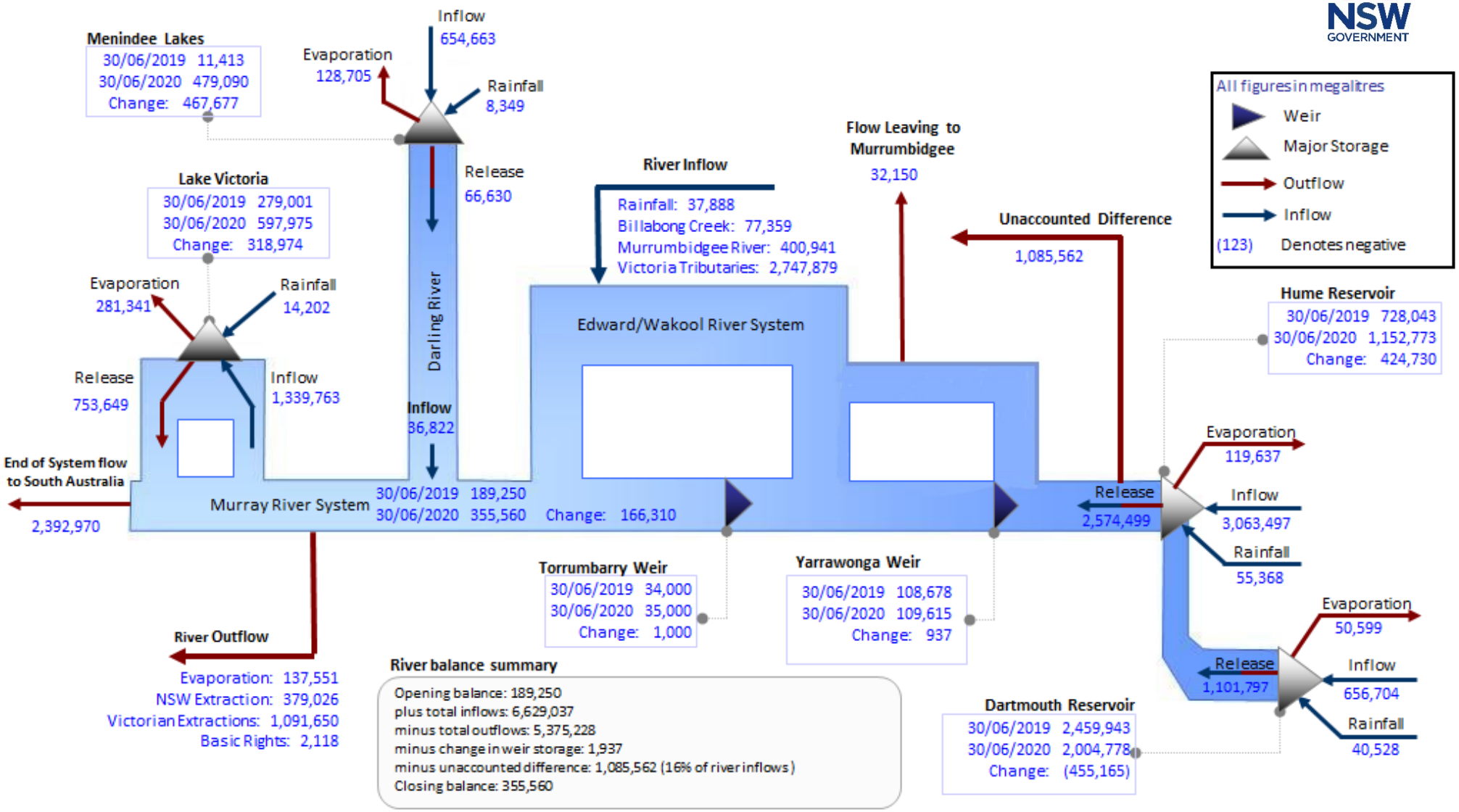
Data accuracy

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 8).

Table 8: 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%

2019–20 Physical flows mass balance diagram



Statement of water assets and liabilities

For the year ended 30 June 2020

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

Surface water assets

1. Surface water assets	Accuracy	Notes	30-Jun-20	30-Jun-19
Hume Dam	A	8	1,152,773	728,043
Dartmouth Dam	A	8	2,004,778	2,459,943
Menindee Lakes	A	8	479,090	11,413
Lake Victoria	A	8	597,975	279,001
Lake Mulwala (Yarrawonga Weir)	A	8	109,615	108,678
Torrumbarry Weir	A	8	35,000	34,000
River (Murray)	B	9	355,560	189,250
Total surface water storage (Asws)			4,734,791	3,810,328
Change in surface water storage			924,463	(1,683,333)

2. Claims to water	Accuracy	Notes	30-Jun-20	30-Jun-19
Inter-valley trade account (IVT)	A1	5	6,244	18,745
Total surface water storage (Acl)			6,244	18,745
Change in total claims to water			(12,501)	32,533

Surface water liabilities

3. Allocation Account Balance	Accuracy	Notes	30-Jun-20	30-Jun-19
Domestic and Stock	A1	1	(18)	0
Domestic and Stock (D&S)	A1	1	(2)	(13)
General Security	A1	1	351,570	298,037
High Security (HS)	A1	1	(531)	(1,080)
Local Water Utility	A1	1	0	(2)
Reg River (Main) Conveyance	A1	1	0	0
Moira Temporary Critical Conveyance[Critical Conveyance]	A1	1	119	NA
Total allocation accounts (Lsws)			351,139	296,943
Change in allocation account balance			54,195	(228,591)

4. Planned environmental provisions	Accuracy	Notes	30-Jun-20	30-Jun-19
Barmah-Millewa Allowance (BMA)	A1	7	0	0
Total environmental provisions (Lep)			0	0
Change in environmental provisions			0	(185,650)

Surface water net changes

5. Net changes	30-Jun-20	30-Jun-19
Net surface water assets (Asws + Acl – Lsws – Lep)	4,389,896	3,532,130
Change in net surface water assets	*857,766*	*(1,236,559)*

Statement of changes in water assets and liabilities

1 July 2019 to 30 June 2020 (1 of 3)

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

Surface water storage increases	Accuracy	Notes	2019-20	2018–19
Hume Dam				
Hume Dam—Murray RAR	A	11	752,500	765,500
Hume Dam—Natural	A	11	1,209,200	693,006
Hume Dam—Dartmouth Release	A	11	1,101,797	1,503,988
Rainfall	B	12	55,368	52,662
Dartmouth Dam				
Inflow	A	11	656,704	556,082
Rainfall	B	12	40,528	44,961
Menindee Lakes				
Inflow	A	11	654,663	6,315
Rainfall	B	12	8,349	14,926
Lake Victoria				
Inflow	A	11	1,339,763	942,989
Rainfall	B	12	14,202	14,255
Murray River				
Rainfall	C	13	37,888	55,681
Gauged tributary inflow	A	14	3,226,180	2,464,650
Inflow from storage releases	A	16	3,328,148	4,238,355
Inflow from Darling River	A	14	36,822	4,815
Total surface water storage increases (Isws)			12,478,388	11,358,185

Surface water storage decreases	Accuracy	Notes	2019-20	2018–19
Hume Dam				
Evaporation	B	12	119,637	143,471
Storage release	A	16	2,574,499	3,441,366
Dartmouth Dam				
Evaporation	B	12	50,599	63,780
Storage release	A	16	1,101,797	1,503,988
Menindee Lakes				
Evaporation	B	12	128,705	178,272
Storage releases	A	16	66,630	53,780
Lake Victoria				
Evaporation	B	12	281,341	245,319
Storage releases	A	16	753,649	796,989
Murray River				
Evaporation	C	13	137,551	173,598
Diversions to Lake Victoria	A	11	1,339,763	942,989
Diversions to Murrumbidgee	A	17	32,150	38,248
End of system flow	A	17	2,392,970	2,473,640
Basic rights extraction	C	21	2,118	2,118
Victoria licenced extractions	A	19	1,091,650	1,408,400
Licenced extractions from river	A	18	379,026	693,555
Total surface water storage decreases (Dsws)			10,475,302	12,159,513
Unaccounted volume (balancing item) (Usws)	D	23	1,085,562	882,005

Net surface water storage changes	2019-20	2018–19
Net surface water storage inflow (Isws – Dsws – Usws)	924,465	(1,683,333)

Statement of changes in water assets and liabilities

1 July 2019 to 30 June 2020 (2 of 3)

2. Changes in claims to water

Claims to water increases	Accuracy	Notes	2019-20	2018–19
IVT account	A1	5		
Allocation account trade into Murray from Murrumbidgee			197,072	54,985
Net diversion to Murrumbidgee (via Finley Escape)			2,563	583
Prior year adjustment			0	337
Total claims to water increases (Ictw)			199,635	55,905

Claims to water decreases	Accuracy	Notes	2019-20	2018–19
IVT account	A1	5		
Trade to Murrumbidgee from Murray			63,386	18,091
Clearance (via Balranald)			156,726	0
Net tagged trade			(7,976)	5,281
Total claims to water decreases (Dctw)			212,136	23,372

Net change to claims	2019-20	2018–19
Net claims to water balance increase (Ictw – Dctw)	(12,501)	32,533

3. Changes in allocation accounts

Allocation account increases	Accuracy	Notes	2019-20	2018–19
Available water determinations (AWDS)	A1	2		
Domestic and Stock			17,069	17,058
General Security			50,231	0
High Security			184,017	184,017
High Security (Community and Education)			47	47
High Security (Research)			1	801
High Security (Town Water Supply)			3,195	3,195
Local Water Utility			40,486	38,217
Conveyance (main river)			168,828	165,033
Conveyance (Combined Critical Conveyance)			5,450	NA
Internal trading – buyers	A1	4	240,778	296,259
Trade in from external water sources	A1	4	270,683	172,679
Supplementary water orders	A	22	2,491	0
Uncontrolled flow orders	A	22	2,142	0
Total allocation increases (Iaa)			985,417	877,306

Statement of changes in water assets and liabilities

1 July 2019 to 30 June 2020 (3 of 3)

3. Changes in allocation accounts (continued)

Allocation account decreases	Accuracy	Notes	2019-20	2018–19
Account forfeiture	A1	1		
Domestic and Stock			6,708	5,857
General Security			961	277
High Security			3,671	5,356
High Security (Community and Education)			26	24
High Security (Research)			1	1
Regulated River (High Security)(Town Water Supply)			701	0
Local Water Utility			11,938	14,339
Conveyance (main river)			388	0
Conveyance (Combined Critical Conveyance)			0	NA
Account usage	A	1,3		
Domestic and Stock			10,356	11,234
General Security			116,525	367,019
High Security			113,163	118,643
High Security (Community and Education)			21	24
High Security (Town Water Supply)			3,195	3,195
Local Water Utility			26,744	23,219
Conveyance (main river)			151,999	170,222
Conveyance (Combined Critical Conveyance)			5,331	NA
Supplementary water usage	A	22	2,491	0
Uncontrolled flow usage			2,142	0
Internal Trading – Sellers	A1	4	234,112	296,259
Trade out to external water sources	A1	4	240,778	88,792
Transfer to Snowy—water savings	A1	20	0	638
Licenced cancelled	A	1	(28)	875
Prior year account adjustments	A1	24	0	(77)
Total allocation decreases (Daa)			931,221	1,105,897

Net change in allocation accounts	2019-20	2018–19
Net allocation account balance increase (Iaa – Daa)	54,196	(228,591)

4. Changes in environmental provisions

Environmental provisions increases	Accuracy	Notes	2019-20	2018–19
Planned environmental water balance total increases (Iep)	A1	7	38,691	80,691

Environmental provisions decreases	Accuracy	Notes	2019-20	2018–19
Planned environmental water balance total decreases (Dep)	A1	7	38,691	266,341

Net environmental provisions changes	2019-20	2018–19
Net environmental provisions balance increase (Iep – Dep)	0	(185,650)

5. Overall changes

Surface water assets	2019-20	2018–19
Change in net surface water assets (Isws – Dsws – Usws + Ictw – Dctw – Iaa + Daa – Iep + Dep)	857,768	(1,236,558)

Note Disclosures

Reconciliation and future prospect descriptions

Reconciliation of change in net water asset to net change in physical water storage	2019–20 ML	2018–19 ML
Change in net surface water assets	**857,766**	(1,236,559)
Non-physical adjustments		
Net change in allocation accounts (water liability)	**54,195**	(228,591)
Net change in environmental provisions (water liability)	**0**	(185,650)
Net change in claims for water: inter-valley (water asset)	**12,501**	(32,533)
Net change in physical surface water storage	**924,463**	(1,683,333)

Reconciliation of closing water storage to total surface water assets	30 June 2020 ML	30 June 2019 ML
Closing water storage		
Surface water storage		
Hume Dam	**1,152,773**	**728,043**
Dartmouth Dam	**2,004,778**	**2,459,943**
Menindee Lakes	**479,090**	**11,413**
Lake Victoria	**597,975**	**279,002**
Less Victorian storage share	**(1,796,510)**[11]	**(1,837,580)**
Less South Australian storage share	**(354,900)**	**(341,600)**
Total surface water assets (NSW)	**2,083,206**	**1,299,221**

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

[11] Excludes 192,520 ML Victoria balance accumulated in Menindee Lakes which is only activated when the total Lakes volume exceed 640,000 ML

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

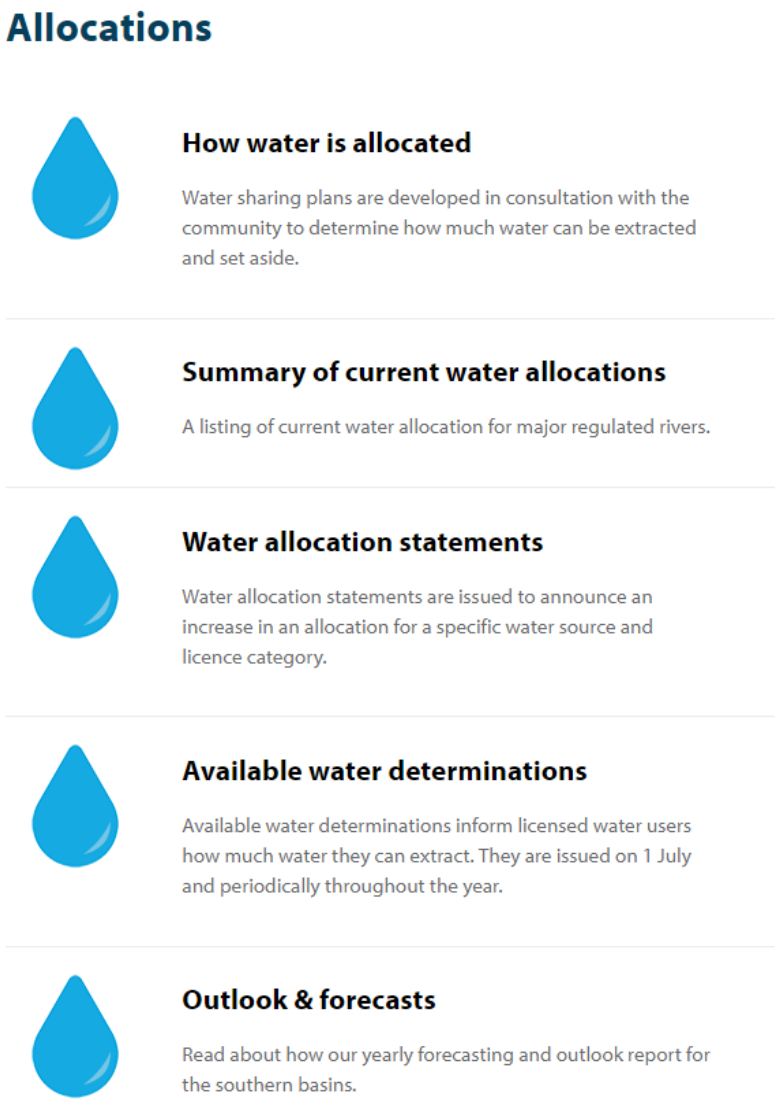
Final datasets for reporting in the GPWAR, including meter readings by field staff, were not available in time to produce an informative 12-month forecast for report users.

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 Planning, Industry and Environment webpage at www.industry.nsw.gov.au/water/allocations-availability/allocations

You can also subscribe to receive the latest updates.



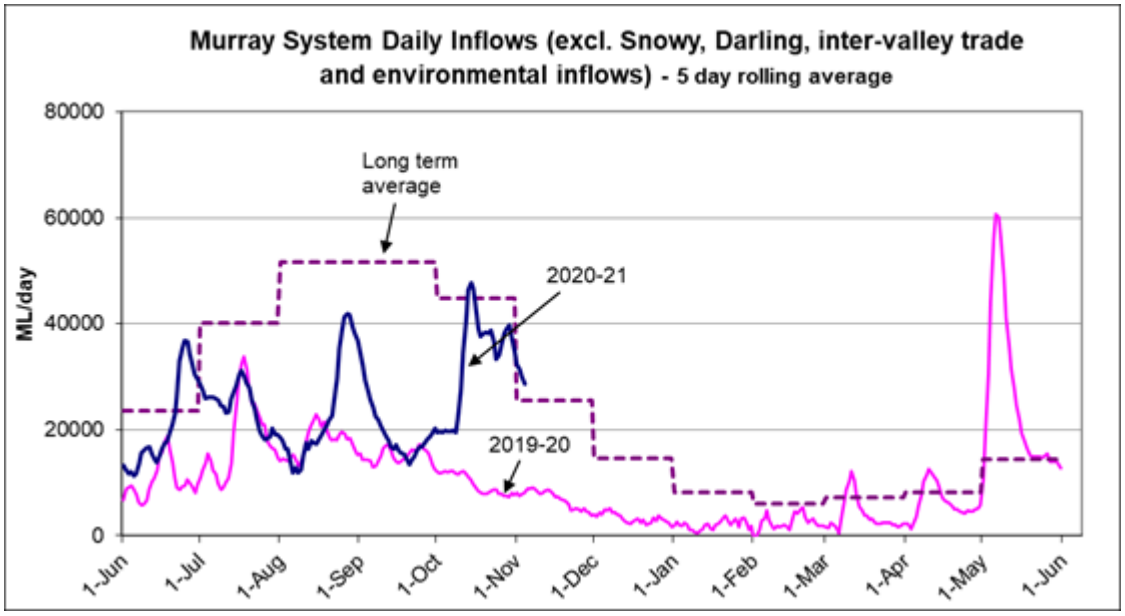
Latest storage volumes

See real-time information on storage volumes for the NSW Murray at realtimedata.waternsw.com.au

Significant events since 2019–20

Since August, Murray System inflows have increased relative to the prior two reporting periods and have trended towards long term average inflows in both June 2020 and October 2020 (Figure 41).

Figure 41: Murray system inflows, week ending Wednesday 4 November 2020



Source: River Murray weekly Report for week ending 4 November 2020

System reliability

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 42). 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 43).

For general-security holders, long-term opening allocations reach 100% effective allocation just 4% of the time (Figure 44). However, by the end of the water year this significantly increases with 100% of effective allocation achieved 71% of the time (Figure 45).

Figure 42: Start of water year simulated availability for 'High Security' licences

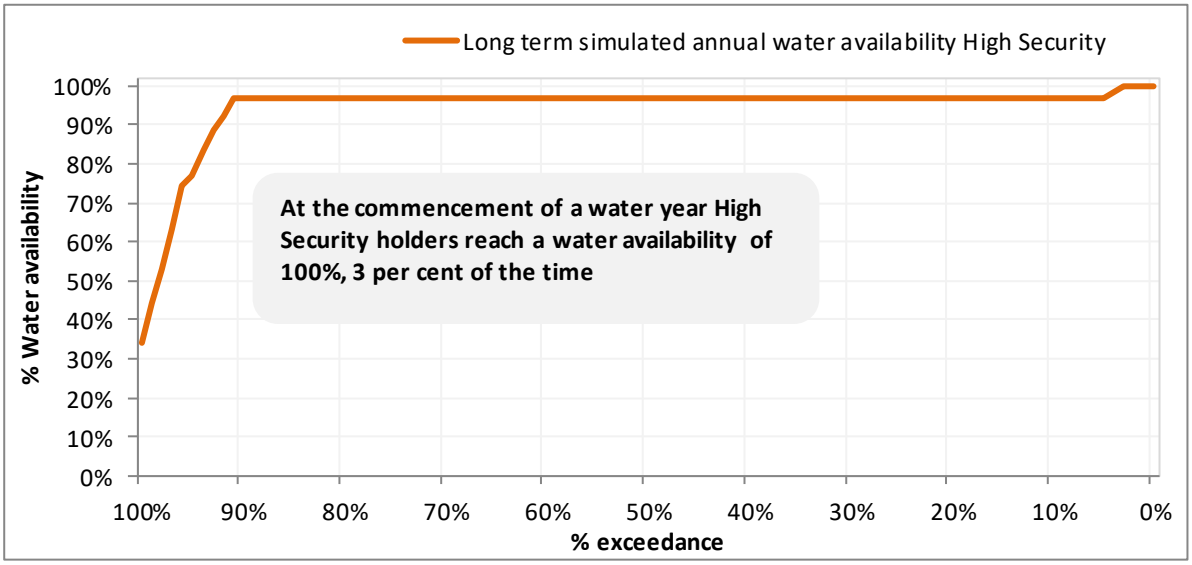


Figure 43: End of water year simulated availability for 'High Security' licences

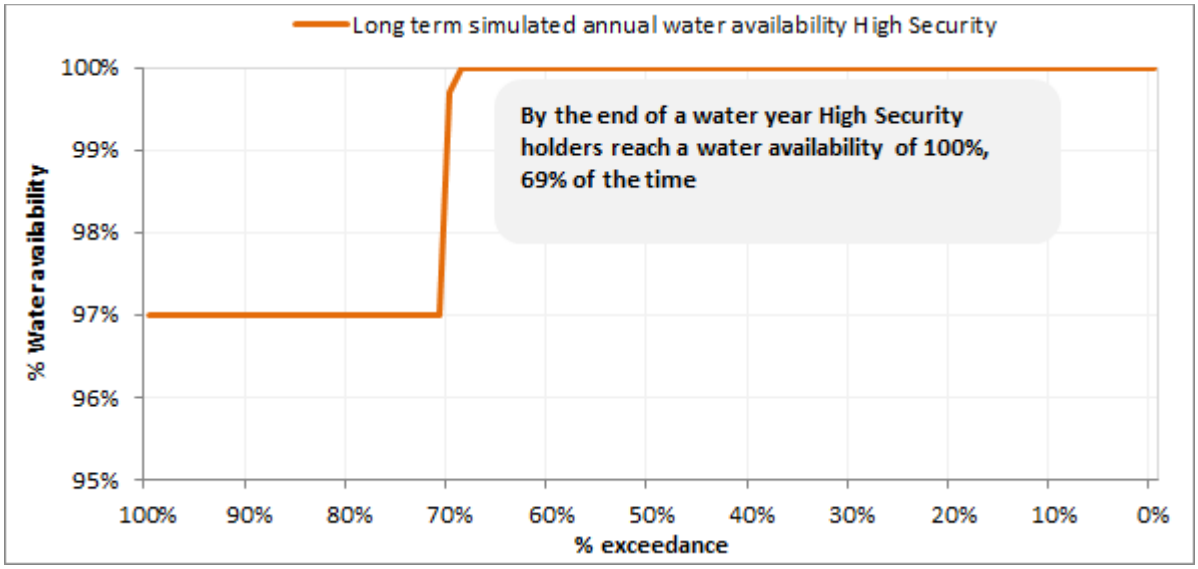


Figure 44: Start of water year availability for 'General Security' licences

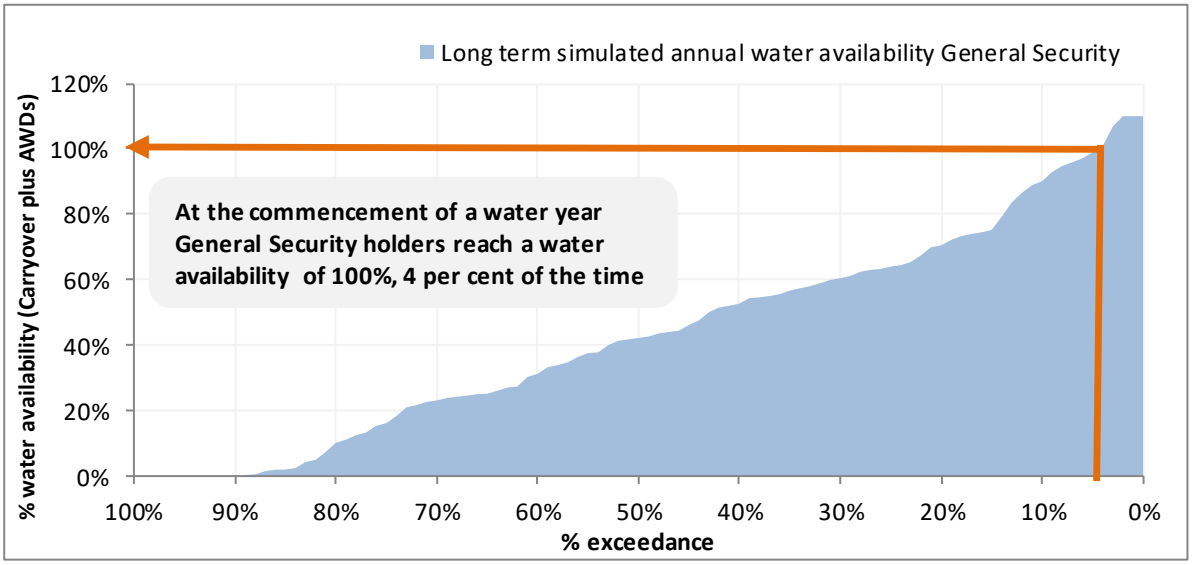
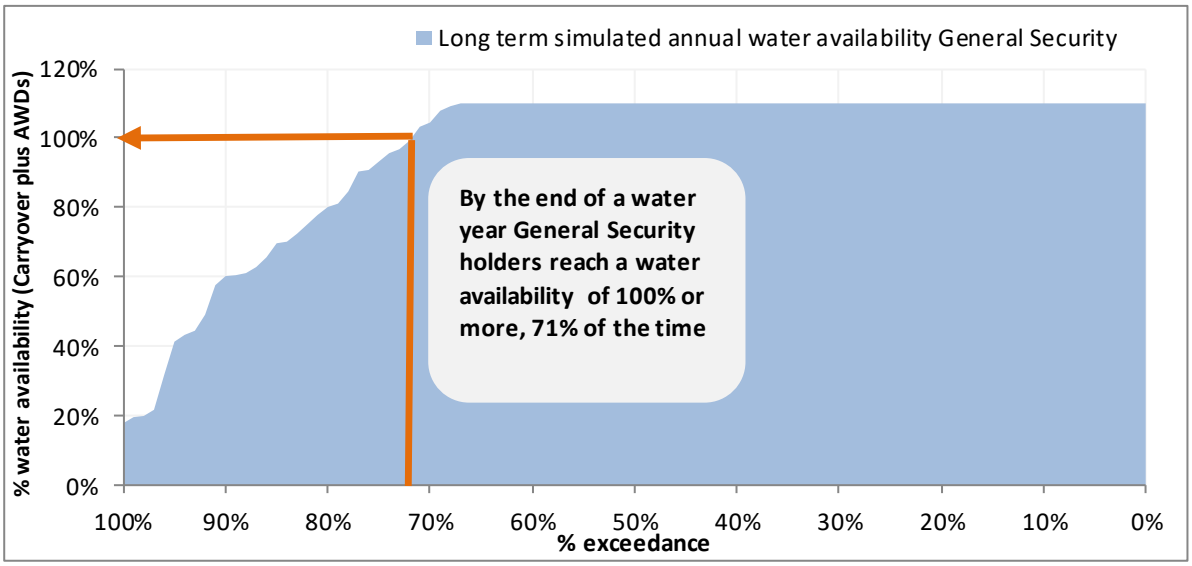


Figure 45: Full year water year availability for 'General Security' licences



Future carryovers and available water determinations 2020–21

Table 9. Carryovers and available water determinations 2020–21 (as of 6 August 2020)

Date	Individual announcement	Share component	Allocation volume (ML)	Cumulative volume (ML)	Allocation volume (%)	Cumulative volume (%)	Balance available (ML)	Balance not available (ML)	Balance total (ML)	Balance available (%)	Balance total (%)
Domestic and Stock											
1-Jul-20	Opening	13,736			0.0%	0.0%	(18)	0	(18)	(0.1)%	(0.1)%
1-Jul-20	AWD 100.0 %	13,736	13,736	13,736	100.0%	100.0%	13,718	0	13,718	99.9%	99.9%
Domestic and Stock[Domestic]											
1-Jul-20	Opening	1,259			0.0%	0.0%	(2)	0	(2)	(0.2)%	(0.2)%
1-Jul-20	AWD 100.0 %	1,259	1,259	1,259	100.0%	100.0%	1,257	0	1,257	99.8%	99.8%
Domestic and Stock[Stock]											
1-Jul-20	Opening	2,063			0.0%	0.0%	0	0	0	0.0%	0.0%
1-Jul-20	AWD 100.0 %	2,063	2,063	2,063	100.0%	100.0%	2,063	0	2,063	100.0%	100.0%
Eagle Creek Temporary Critical Conveyance [Critical Conveyance]											
1-Jul-20	Opening	800			0.0%	0.0%	0	0	0	0.0%	0.0%
1-Jul-20	AWD 100.0 %	800	800	800	100.0%	100.0%	800	0	800	100.0%	100.0%
Local Water Utility											
1-Jul-20	Opening	33,497			0.0%	0.0%	0	0	0	0.0%	0.0%
1-Jul-20	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-20	Opening	8,694			0.0%	0.0%	0	0	0	0.0%	0.0%
1-Jul-20	AWD 100.0 %	8,694	8,694	8,694	100.0%	100.0%	8,694	0	8,694	100.0%	100.0%
Mathoura Temporary Critical Conveyance [Critical Conveyance]											
1-Jul-20	Opening	150			0.0%	0.0%	0	0	0	0.0%	0.0%
1-Jul-20	AWD 100.0 %	150	150	150	100.0%	100.0%	150	0	150	100.0%	100.0%
Moira Temporary Critical Conveyance [Critical Conveyance]											
1-Jul-20	Opening	1,500			0.0%	0.0%	119	0	119	7.9%	7.9%
1-Jul-20	AWD 100.0 %	1,500	1,500	1,500	100.0%	100.0%	1,619	0	1,619	107.9%	107.9%
Regulated River (Conveyance)											
1-Jul-20	Opening	330,000			0.0%	0.0%	0	0	0	0.0%	0.0%

Date	Individual announcement	Share component	Allocation volume (ML)	Cumulative volume (ML)	Allocation volume (%)	Cumulative volume (%)	Balance available (ML)	Balance not available (ML)	Balance total (ML)	Balance available (%)	Balance total (%)
1-Jul-20	AWD 0.5 ML per Share	330,000	165,000	165,000	50.0%	50.0%	165,000	0	165,000	50.0%	50.0%
15-Jul-20	AWD 0.0078 ML per Share	330,000	2,574	167,574	0.8%	50.8%	167,574	0	167,574	50.8%	50.8%
3-Aug-20	AWD 0.0038 ML per Share	330,000	1,254	168,828	0.4%	51.2%	168,828	0	168,828	51.2%	51.2%
Regulated River (General Security)											
1-Jul-20	Opening	1,674,096			0.0%	0.0%	366,642	0	366,642	21.9%	21.9%
1-Jul-20	AWD 0.0 ML per Share	1,674,096	0	0	0.0%	0.0%	366,642	0	366,642	21.9%	21.9%
15-Jul-20	AWD 0.02 ML per Share	1,674,096	33,480	33,480	2.0%	2.0%	400,122	0	400,122	23.9%	23.9%
3-Aug-20	AWD 0.01 ML per Share	1,674,096	16,751	50,231	1.0%	3.0%	416,873	0	416,873	24.9%	24.9%
Regulated River (High Security)											
1-Jul-20	Opening	189,704			0.0%	0.0%	(531)	0	(531)	(0.3)%	(0.3)%
1-Jul-20	AWD 0.97 ML per Share	189,704	184,017	184,017	97.0%	97.0%	183,486	0	183,486	96.7%	96.7%
Regulated River (High Security) [Community and Education]											
1-Jul-20	Opening	47			0.0%	0.0%	0	0	0	0.0%	0.0%
1-Jul-20	AWD 100.0 %	47	47	47	100.0%	100.0%	47	0	47	100.0%	100.0%
Regulated River (High Security) [Research]											
1-Jul-20	Opening	1			0.0%	0.0%	0	0	0	0.0%	0.0%
1-Jul-20	AWD 100.0 %	1	1	1	100.0%	100.0%	1	0	1	100.0%	100.0%
Regulated River (High Security) [Town Water Supply]											
1-Jul-20	Opening	3,195			0.0%	0.0%	0	0	0	0.0%	0.0%
1-Jul-20	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-20	Opening	252,579			0.0%	0.0%	0	0	0	0.0%	0.0%
1-Jul-20	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%
West Corurgan Temporary Critical Conveyance [Critical Conveyance]											
1-Jul-20	Opening	3,000			0.0%	0.0%	0	0	0	0.0%	0.0%
1-Jul-20	AWD 100.0 %	3,000	3,000	3,000	100.0%	100.0%	3,000	0	3,000	100.0%	100.0%

Detailed item notes

Note 1—Allocation accounts

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

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

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

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

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

Data type

Derived from measured 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 Planning, Industry and Environment website

Data accuracy

A1—Nil inaccuracy +/- 0%

Providing agency

NSW Department of Planning, Industry and Environment

Data source

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

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 11 provides a balanced summary of the water allocation accounts for each category of access licence. Table 10 provides a description of each of the table components.

Table 10: Explanatory information for allocation account summary

Heading		Description
Share		The total volume of entitlement in the specific licence category on the specified date
Opening balance		The volume of water that has been carried forward from previous years allocation account
AWD (available water determination)		The total annual volume of water added to the allocation account as a result of allocation assessments This figure includes additional AWD made as a result of a storage spill reset as defined in the water sharing plan.
Licences	**New**	Increase in account water as a result of the issuing of a new licence
	Cancelled	Decrease in account water as a result of a license cancellation where account balance has not been traded to another license
Assignments	**In**	Increase in account water as a result of temporary trade in
	Out	Decrease in account water as a result of temporary trade out
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
Account usage		Volume of water that is extracted or diverted from the river and is accountable against the access license allocation
Uncontrolled extractions (UCF)		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.
Forfeits	**During year**	Account water forfeited throughout the year as a result of the accounting rules specified in the water sharing plan Forfeited water may occur due to account limits being reached, conversions between 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.
	End of year	Account water that is forfeited at the end of the water year as a result of carryover rules that restrict the carry forward volume
End of year balance		Account balance that is available to be taken at the conclusion of the water year
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 11: Allocation account balance summary for the NSW Murray regulated river 2019–20

Category	Share 30 June 2020	Opening balance	AWD	New licences	Cancelled licences	Assign. in	Assign. out	Snowy water savings transfer	Account usage	UCF usage	Forfeit during year	EoY balance available	EoY balance not available	**End of year forfeit**	**Carry forward**
Domestic and Stock	13,736	(9)	13,748	0	12	47	37	0	8,534	0	0	5,203	0	5,221	(18)
Domestic and Stock [Domestic]	1,259	(4)	1,258	0	0	2	2	0	726	0	0	528	0	530	(2)
Domestic and Stock [Stock]	2,063	0	2,063	0	0	8	18	0	1,097	0	0	956	0	956	0
Eagle Creek Temporary Critical Conveyance [Critical Conveyance]	800	0	800	0	0	0	0	0	800	0	0	0	0	0	0
Local Water Utility	33,497	(2)	33,497	0	0	9	1,840	0	20,179	0	0	11,486	0	11,486	0
Local Water Utility (Domestic and Commercial)	8,694	0	6,989	0	0	28	0	0	6,565	0	0	452	0	452	0
Mathoura Temporary Critical Conveyance[Critical Conveyance]	150	0	150	0	0	0	0	0	150	0	0	0	0	0	0
Moira Temporary Critical Conveyance[Critical Conveyance]	1,500	0	1,500	0	0	0	0	0	1,381	0	0	119	0	0	119
Regulated River (Conveyance)	330,000	0	168,828	0	0	30,612	47,053	0	151,999	0	0	388	0	388	0
Regulated River (General Security)	1,674,096	298,037	50,231	0	(40)	403,335	282,587	0	116,525	2,142	0	352,531	0	961	351,570
Regulated River (High Security)	189,704	(1,080)	184,017	0	0	76,719	143,354	0	113,163	0	0	3,140	0	3,671	(531)

Category	Share 30 June 2020	Opening balance	AWD	New licences	Cancelled licences	Assign. in	Assign. out	Snowy water savings transfer	Account usage	UCF usage	Forfeit during year	EoY balance available	EoY balance not available	**End of year forfeit**	**Carry forward**
Regulated River (High Security)(Community and Education)	47	0	47	0	0	0	0	0	21	0	0	26	0	26	0
Regulated River (High Security)(Research)	1	0	1	0	0	0	0	0	0	0	0	1	0	1	0
Regulated River (High Security)(Town Water Supply)	3,195	0	3,195	0	0	701	0	0	3,195	0	0	701	0	701	0
Supplementary Water	252,579	0	252,579	0	0	164	164	0	0	2,491	0	250,088	0	250,088	0
West Corurgan Temporary Critical Conveyance[Critical Conveyance]	3,000	0	3,000	0	0	0	0	0	3,000	0	0	0	0	0	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 8—Limits to the availability of water
        - Division 2—Available Water Determinations.

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

Data accuracy

A1—Nil inaccuracy +/- 0%

Providing agency

NSW Department of Planning, Industry and Environment

Methodology

The AWD procedure itself is generally divided into two sections: the available water asset; and system commitments. Once 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 12).

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 12: Priority of access licence categories

Licence category	AWD priority
General Security	Low
High Security	High
Conveyance	Low
Domestic and Stock[12]	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.

Additional information

Table 14 presents the allocation summary report for the reporting period. Table 13 describes the terms used in the allocation summary report.

[12] 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.

Table 13: 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 14: Allocation announcements in the reporting period for the NSW Murray regulated river water source

Date	Individual Announcement	Share Component	Allocation Volume (ML)	Cumulative Volume (ML)	Allocation Volume (%)	Cumulative Volume (%)	Balance Available (ML)	Balance Not Available (ML)	Balance Total (ML)	Balance Available (%)	Balance Total (%)
DOMESTIC AND STOCK											
1 Jul 2019	Opening	13,748			0.0%	0.0%	(9)	0	(9)	(0.1)%	(0.1)%
1 Jul 2019	AWD 100.0 %	13,748	13,748	13,748	100.0%	100.0%	13,739	0	13,739	99.9%	99.9%
DOMESTIC AND STOCK[DOMESTIC]											
1 Jul 2019	Opening	1,250			0.0%	0.0%	(4)	0	(4)	(0.3)%	(0.3)%
1 Jul 2019	AWD 100.0 %	1,250	1,250	1,250	100.0%	100.0%	1,247	0	1,247	99.7%	99.7%
DOMESTIC AND STOCK[STOCK]											
1 Jul 2019	Opening	2,063			0.0%	0.0%	0	0	0	0.0%	0.0%
1 Jul 2019	AWD 100.0 %	2,063	2,063	2,063	100.0%	100.0%	2,063	0	2,063	100.0%	100.0%
EAGLE CREEK TEMPORARY CRITICAL CONVEYANCE [CRITICAL CONVEYANCE]											
1 Jul 2019	Opening				0.0%	0.0%	0	0	0	0.0%	0.0%
17 Feb 2020	AWD 100.0 %	800	800	800	100.0%	100.0%	800	0	800	100.0%	100.0%
LOCAL WATER UTILITY											
1 Jul 2019	Opening	33,497			0.0%	0.0%	(2)	0	(2)	0.0%	0.0%
1 Jul 2019	AWD 100.0 %	33,497	33,497	33,497	100.0%	100.0%	33,496	0	33,496	100.0%	100.0%
LOCAL WATER UTILITY [DOMESTIC AND COMMERCIAL]											
1 Jul 2019	Opening	4,720			0.0%	0.0%	0	0	0	0.0%	0.0%
1 Jul 2019	AWD 100.0 %	4,720	4,720	4,720	100.0%	100.0%	4,720	0	4,720	100.0%	100.0%
MATHOURA TEMPORARY CRITICAL CONVEYANCE [CRITICAL CONVEYANCE]											
1 Jul 2019	Opening				0.0%	0.0%	0	0	0	0.0%	0.0%
9 Jun 2020	AWD 100.0 %	150	150	150	100.0%	100.0%	150	0	150	100.0%	100.0%
MOIRA TEMPORARY CRITICAL CONVEYANCE [CRITICAL CONVEYANCE]											
1 Jul 2019	Opening				0.0%	0.0%	0	0	0	0.0%	0.0%
12 Feb 2020	AWD 100.0 %	1,500	1,500	1,500	100.0%	100.0%	1,500	0	1,500	100.0%	100.0%
REGULATED RIVER (CONVEYANCE)											
1 Jul 2019	Opening	330,000			0.0%	0.0%	0	0	0	0.0%	0.0%
1 Jul 2019	AWD 0.0606 ML per Share	330,000	19,998	19,998	6.1%	6.1%	19,998	0	19,998	6.1%	6.1%
1 Aug 2019	AWD 0.1212 ML per Share	330,000	39,996	59,994	12.1%	18.2%	59,994	0	59,994	18.2%	18.2%
2 Sep 2019	AWD 0.0303 ML per Share	330,000	9,999	69,993	3.0%	21.2%	69,993	0	69,993	21.2%	21.2%
16 Sep 2019	AWD 0.0303 ML per Share	330,000	9,999	79,992	3.0%	24.2%	79,992	0	79,992	24.2%	24.2%
1 Oct 2019	AWD 0.0182 ML per Share	330,000	6,006	85,998	1.8%	26.1%	85,998	0	85,998	26.1%	26.1%

Date	Individual Announcement	Share Component	Allocation Volume (ML)	Cumulative Volume (ML)	Allocation Volume (%)	Cumulative Volume (%)	Balance Available (ML)	Balance Not Available (ML)	Balance Total (ML)	Balance Available (%)	Balance Total (%)
15 Oct 2019	AWD 0.103 ML per Share	330,000	33,990	119,988	10.3%	36.4%	119,988	0	119,988	36.4%	36.4%
1 Nov 2019	AWD 0.0455 ML per Share	330,000	15,015	135,003	4.6%	40.9%	135,003	0	135,003	40.9%	40.9%
15 Nov 2019	AWD 0.0152 ML per Share	330,000	5,016	140,019	1.5%	42.4%	140,019	0	140,019	42.4%	42.4%
2 Dec 2019	AWD 0.0152 ML per Share	330,000	5,016	145,035	1.5%	44.0%	145,035	0	145,035	44.0%	44.0%
16 Dec 2019	AWD 0.0152 ML per Share	330,000	5,016	150,051	1.5%	45.5%	150,051	0	150,051	45.5%	45.5%
2 Mar 2020	AWD 0.0152 ML per Share	330,000	5,016	155,067	1.5%	47.0%	155,067	0	155,067	47.0%	47.0%
16 Mar 2020	AWD 0.0301 ML per Share	330,000	9,933	165,000	3.0%	50.0%	165,000	0	165,000	50.0%	50.0%
15 May 2020	AWD 0.0116 ML per Share	330,000	3,828	168,828	1.2%	51.2%	168,828	0	168,828	51.2%	51.2%
REGULATED RIVER (GENERAL SECURITY)											
1 Jul 2019	Opening	1,674,096			0.0%	0.0%	313,978	0	313,978	18.8%	18.8%
1 Jul 2019	AWD 0.0 ML per Share	1,674,096	0	0	0.0%	0.0%	313,978	0	313,978	18.8%	18.8%
15 May 2020	AWD 0.03 ML per Share	1,674,096	50,231	50,231	3.0%	3.0%	364,209	0	364,209	21.8%	21.8%
REGULATED RIVER (HIGH SECURITY)											
1 Jul 2019	Opening	189,704			0.0%	0.0%	(1,080)	0	(1,080)	(0.6)%	(0.6)%
1 Jul 2019	AWD 0.97 ML per Share	189,704	184,017	184,017	97.0%	97.0%	182,937	0	182,937	96.4%	96.4%
REGULATED RIVER (HIGH SECURITY) [COMMUNITY AND EDUCATION]											
1 Jul 2019	Opening	47			0.0%	0.0%	0	0	0	0.0%	0.0%
1 Jul 2019	AWD 100.0 %	47	47	47	100.0%	100.0%	47	0	47	100.0%	100.0%
REGULATED RIVER (HIGH SECURITY) [RESEARCH]											
1 Jul 2019	Opening	1			0.0%	0.0%	0	0	0	0.0%	0.0%
1 Jul 2019	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 2019	Opening	3,195			0.0%	0.0%	0	0	0	0.0%	0.0%
1 Jul 2019	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 2019	Opening	252,579			0.0%	0.0%	0	0	0	0.0%	0.0%
1 Jul 2019	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%
WEST CORURGAN TEMPORARY CRITICAL CONVEYANCE [CRITICAL CONVEYANCE]											
1 Jul 2019	Opening				0.0%	0.0%	0	0	0	0.0%	0.0%
17 Dec 2019	AWD 100.0 %	3,000	3,000	3,000	100.0%	100.0%	3,000	0	3,000	100.0%	100.0%

Note 3—Allocation account usage

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

Data type

Measured/administration data

Policy

- *Water Sharing Plan for the 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 Planning, Industry and Environment, MDBA

Data source

- Water Accounting System (jointly owned by WaterNSW and NSW Department of Planning, Industry and Environment)
- 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 15. 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 15: Licence category metered usage apportionment table

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

Additional information

A summary of account usage for the reporting period is presented in Table 16.

Table 16: Account usage summary

Licence category	Account usage NSW Murray by licence category (ML)	Total account usage Victoria (ML)
Domestic and Stock	8,534	not applicable
Domestic and Stock [Domestic]	726	not applicable
Domestic and Stock [Stock]	1,097	not applicable
Eagle Creek Temporary Critical Conveyance [Critical Conveyance]	800	not applicable
Local Water Utility	20,179	not applicable
Local Water Utility (Domestic and Commercial)	6,565	not applicable
Mathoura Temporary Critical Conveyance [Critical Conveyance]	150	not applicable
Moira Temporary Critical Conveyance [Critical Conveyance]	1,381	not applicable
Conveyance	151,999	not applicable
General Security[13]	118,666	not applicable
High Security	113,163	not applicable
High Security (Community and Education)	21	not applicable
High Security (Research)	0	not applicable
High Security (Town Water Supply)	3,195	not applicable
Supplementary Water	2,491	not applicable
West Corurgan Temporary Critical Conveyance [Critical Conveyance]	3,000	not applicable
Total Usage	**431,966**	**1,091,650**

[13] Includes uncontrolled flow extractions

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 60 Assignment of water allocation dealings
        - Clause 61 Rules for interstate access licence transfer and assignment of water allocation

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

Data accuracy

A1—Nil inaccuracy +/- 0%

Providing agency

NSW Department of Planning, Industry and Environment

Data source

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

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

Table 17: NSW Murray catchment allocation assignment summary

FROM		TO														
		Murrumbidgee		NSW Murray										South Australia	Victoria	Total
		General security	High security	Local water utility	Conveyance	General security	High security	Supplementary water	Domestic and Stock	Local water utility (d&c)	Domestic and Stock (stock)	High security (town water supply)	Domestic and Stock (domestic)	Interstate licence	Interstate licence	
Murrumbidgee	Local water utility					600										**600**
Murrumbidgee	General security					117,488	4,012									**121,501**
Murrumbidgee	High security					43,612	6,345			28						**49,985**
NSW Murray	Local water utility			9		730	400					701				**1,840**
NSW Murray	Conveyance				4,287	42,265	500									**47,053**
NSW Murray	General security	25,488	2,092		5,113	78,042	26,803							15,394	129,654	**282,587**
NSW Murray	High security	6,297	5,778		18,439	45,239	18,194							13,025	36,383	**143,354**
NSW Murray	Supplementary water							164								**164**
NSW Murray	Domestic and Stock								29		8					**37**
NSW Murray	Domestic and Stock (stock)								18							**18**
NSW Murray	Domestic and Stock (domestic)												2			**2**
South Australia	Interstate transfer					16,459	1,840									**18,299**
Victoria	Interstate transfer				2,773	58,899	18,626									**80,298**
Total		**31,785**	**7,870**	**9**	**30,612**	**403,335**	**76,719**	**164**	**47**	**28**	**8**	**701**	**2**	**28,420**	**166,037**	**745,736**

Internal trade = 240,934 Trade out of Murray = 234,120 Trade into Murray = 270,682

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* (Federal)
    - 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)
        - 71G Assignment of water allocations between access licences
        - 71I 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 60 Assignment of water allocation dealings
        - Clause 61 Rules for interstate access licence transfer and assignment of water allocation

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

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 18 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 18—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 18.

Table 18: Murray- Murrumbidgee inter-valley trade account summary

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

[14] 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)
        - 71G 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 Planning, Industry and Environment website (www.industry.nsw.gov.au/water)

Data accuracy

A1—Estimated in the range +/- 10%

Providing agency

NSW Department of Planning, Industry and Environment

Data source

- NSW Department of Planning, Industry and Environment 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 19 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 19: Explanatory information for environmental account summary

Heading		Description
Share		This is the total volume of entitlement in the specific licence category.
Opening balance		The volume of water that has been carried forward from previous years allocation account.
AWD—Available water determination		The total annual volume of water added to the allocation account as a result of allocation assessments. This figure includes additional AWD made as a result of a storage spill reset as defined in the water sharing plan.
Licences	**New**	Increase in account water as a result of the issuing of a new licence.
	Cancelled	Decrease in account water as a result of a licence cancellation where account balance has not been traded to another licence.
Assignments	**In**	Increase in account water as a result of temporary trade in.
	Out	Decrease in account water as a result of temporary trade out.
Transfer to Snowy for environmental release		Access licences (share component) recovered under the water for rivers program. Allocations accumulate under standard accounting rules and are annually transferred for release in the Snowy River as opposed to being utilized in the Murray
Account usage		Volume of water that is extracted or diverted from the river and is accountable against the access licence allocation
Forfeits	**During year**	Account water forfeited throughout the year as a result of the accounting rules specified in the water sharing plan. Forfeited water may occur due to account limits being reached, conversions between licence categories and various types of other licence dealings. It also includes any reductions on carryover volumes due to storage evaporation as required by the water sharing plan.
	End of year forfeit	Account water that is forfeited at the end of the water year as a result of carryover rules that restrict the carry forward volume.
End of year balance		Account balance that is available to be taken at the conclusion of the water year.
Carry forward		This represents the account water that is permitted to be carried forward into the next water year as determined by the carryover rules.
( )		Negative figures are shown in red brackets

Table 20: NSW Murray regulated water source 2019–20 environmental account balance summary

Category	Share	Opening balance	AWD	Licences		Assignments		Transfer to Snowy	Acc. usage	During year forfeit	End of year balance		End of year forfeit	Carry forward
				New	Cancelled	In	Out				Available balance	Unavailable balance		
Conveyance	50,214	0	25,690	0	0	30,612	43,807	0	12,106	0	388	0	388	0
General Security—excl. Murray Irrigation	290,847	33,015	8,726	0	0	37,333	8,582	0	46,653	0	23,839	0	0	23,839
General Security—within Murray Irrigation	193,826	3,390	5,815	0	0	2,009	3,363	0	0	0	7,851	0	0	7,851
High Security	0	0	0	0	0	18,150	904	0	17,246	0	0	0	0	0
Supplementary	25,009	0	24,259	0	0	0	24,259	0	0	0	0	0	0	0

Table 21: NSW Murray regulated water source environmental holding summary

Category	Volume 30 June 2019	Volume 30 June 2020	Volume difference	No. licences 30 June 2019	No. licences 30 June 2020	No. licence difference
Regulated River (Conveyance)	50,214	50,214	0	2	2	0
Regulated River (General Security)	290,690	290,847	157	18	18	0
Regulated River (General Security)—Within Murray Irrigation or part held licences	193,983	193,826	(157)	2	1	(1)
Regulated River (High Security)	25,009	25,009	0	10	12	2
Supplementary Water	100,211	100,211	0	5	5	0

Table 22 summarises the movement between held environmental water licences and consumptive licences via temporary trading (allocation assignments). This is an alternative summarisation than provided in past GPWAR's (movement by purpose of use). Table 23 summarise the purpose of the trade movements in Table 22.

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

		To licence type	Consumptive	Consumptive	Enviro	Enviro	Enviro	Total
		To location	Murrumbidgee			NSW Murray		
From licence type	From location	Category	General security	High security	General security	Regulated river (conveyance)	General security	
Consumptive	NSW Murray	General security			1,500	75	112	1,686
Consumptive	Victoria	Interstate transfer					232	232
Enviro	NSW Murray	Regulated river (conveyance)	3,760	500		4,287	35,260	43,807
Enviro	NSW Murray	General security	77			5,038	4,241	9,356
Enviro	NSW Murray	High security	300			18,439	5,520	24,259
Enviro	Victoria	Interstate transfer				2,773	8,600	11,373
		Total	4,137	500	1,500	30,612	53,964	90,713

Consumptive to environmental = 1,918 Environmental to consumptive = 4,637 Environmental to environmental = 84,157

Table 23: Held environmental allocation assignments purpose

Trade purpose	Volume (ML)
Consumptive Renting Carryover Space (from Enviro) - Activated	1,500
Consumptive to Enviro (e-delivery return)	75
Consumptive to Enviro (non-sale, compensatory, gifted)	344
Enviro to Consumptive (e-delivery)	4,637
Enviro to Enviro (e-water administration)	66,752
Enviro to Enviro (part licence movement)	17,406
Total	**90,713**

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 Planning, Industry and Environment website (www.industry.nsw.gov.au/water)

Data accuracy

A1—Nil inaccuracy +/- 0%

Providing agency

NSW Department of Planning, Industry and Environment

Data source

- Water Accounting System (jointly owned by WaterNSW and NSW Department of Planning, Industry and Environment)
- 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 24 and Table 25 respectively. The Barmah–Millewa overdraw account has not yet been credited under water sharing plan management conditions.

Table 24: Barmah–Millewa environmental allowance

Water year	Borrow carryover	Account carryover	Credits	Spill	Use	Evaporation forfeit	Account balance	Borrow	Borrow repay	Borrow account	Available
2004–05	175,000	175,000	50,000	0	0	0	225,000	50,000	225,000	0	225,000
2005–06	225,000	225,000	75,000	0	256,450	0	43,550	50,000	275,000	275,000	0
2006–07	0	43,550	47,500	0	0	0	91,050	91,050	91,050	0	91,050
2007–08	91,050	91,050	21,500	0	0	0	112,550	21,500	112,550	0	112,550
2008–09	112,550	112,550	17,500	0	0	0	130,050	17,500	130,050	0	130,050
2009–10	130,050	130,050	50,000	0	0	0	180,050	50,000	180,050	0	180,050
2010–11	180,050	180,050	50,000	0	134,500	720	94,830	48,500	228,550	228,550	0
2011–12	0	94,830	75,000	0	141,550	0	28,280	0	0	0	0
2012–13	0	28,280	75,000	0	0	850	102,430	0	0	0	0
2013–14	0	102,430	75,000	77,430	0	2,520	97,480	0	0	0	0
2014–15	0	97,480	75,000	0	0	2,350	170,130	0	0	0	0
2015–16	0	170,130	50,000	0	0	0	220,130	220,130	0[15]	0	0
2016–17	220,130	220,130	75,000	94,510	84,030	3,370	113,290	25,590	245,720	0	113,290
2017–18	0	113,290	75,000	0	0	2,570	185,720	187,280	187,280	0	185,720
2018–19	0	185,650	75,000	0	0	0	260,650	260,650	0	260,650	0
2019–20	260,650	260,650	33,000	0	0	0	293,650	35,440	0	296,090	0

[15] Revised figure, 2016–17 GPWAR.

Table 25: Additional environmental allowance

Water year	Carryover	HS share	AWD reached 0.97ML/share	Credit	Account limit forfeit	Use	Spill	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	0	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[16]	Yes	5,812	0	0	5,810	0
2017–18	0	193,747	Yes	5,812	0	5,812[17]	0	0
2018–19	0	189,704[18]	Yes	5,691	0	5,691	0	0
2019–20	0	189,704	Yes	5,691	0	5,691	0	0

[16] Assessment included sub-categories of high security
[17] Amended figure since 2017-18 water account publication
[18] Assessment excludes sub-categories of high security

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 Planning, Industry and Environment 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 Planning, Industry and Environment

Data source

- NSW Department of Planning, Industry and Environment 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 26.

Table 26: Storage summary table

Name	Capacity (ML)	Dead storage (ML)
Hume Dam	3,005,156	1,790
Dartmouth Dam	4,056,896	91,190
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 16, Figure 17, Figure 18 and Figure 19.

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 27: 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.

Snowy Hydro Limited operates under a May to April accounting year, which is different to the water accounting period being considered in this report.

The delivered RAR is assessed as being the sum of:

- actual releases from Murray 1 Power Station
- total montane release

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. The figure used for the accountable portion of Hume Dam inflows in the accounting statements therefore excludes montane releases.

Policy

Snowy Water Licence 2010

Data type

Derived from measured data

Data accuracy

A1—Nil inaccuracy +/- 0%

Providing agency

NSW Department of Planning, Industry and Environment

Data sources

- Snowy Mountains Authority water operations report

Methodology

Snowy Accounting Year (May–April)

RAR deliverable for Snowy–Murray Development is calculated as being:

- annual fixed RAR
- plus DISV as at 1 March (previous water year)
- less water savings allocated to Snowy Tumut
- less pre-release (previous water year).

The adjusted RAR for Snowy–Murray Development is calculated as being:

- RAR deliverable
- less DISV on 1 March (water year)
- less RAR permitted shortfalls and relaxations
- less Murray–Murrumbidgee inter-valley transfer settlement.

- **Total RAR delivered** = adjusted RAR plus pre-release (next water year) plus above target release less relaxation volume payback

Reporting period (July–June)

RAR inflow to Hume = delivered RAR less montane release (July–June)

Additional information

Table 28: Annual Snowy–Murray RAR delivery summary 1 July 2013 to 30 June 2019

Water year	RAR delivered	Montane release	RAR physical inflow to Hume
2013–14	816,600	(20,700)	**795,900**
2014–15	727,600	(13,000)	**714,600**
2015–16	1,090,000	(12,700)	**1,077,300**
2016–17	1,546,800	(32,100)	**1,514,700**
2017–18	1,082,090	(21,500)	**1,060,590**
2018–19	784,700	(19,300)	**765,500**
2019–20	773,200	(20,700)	**752,500**

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 Planning, Industry and Environment

Data sources

- NSW Department of Planning, Industry and Environment: HYDSTRA, Integrated quantity and quality model (IQQM)

Methodology

In most of the major storages in NSW there is no direct measurement of inflows. However, it is possible to calculate inflows by using a mass balance approach (based on balancing the change in storage volume) where 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 29.

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

Table 29: Components for back-calculation of inflow

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

Assumptions and approximations:

- Constant storage-specific pan evaporation factors are applied (one annual factor).

- Seepage was assumed to be zero.

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 Planning, Industry and Environment, MDBA, WaterNSW

Data source

- NSW Department of Planning, Industry and Environment: 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 Planning, Industry and Environment

Data source

- NSW Department of Planning, Industry and Environment: HYDSTRA, ARCGIS
- QLD Department of Natural Resources: SILO

Methodology

The volume applied for evaporation and rainfall on the regulated river is achieved by first calculating 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.

Area (m^2) = Average W (m) x L (m)

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

With daily area determined, various climate stations are 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	m^2
ETO	reference evapotranspiration from SILO	mm/day
Kc	Crop coefficient for open water (1.05)	-

Note 14—Gauged tributary inflow

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

Policy

Not applicable

Data type

Measured data

Data accuracy

A—Estimated in the range +/- 10%

Providing agency

NSW Department of Planning, Industry and Environment

Data sources

- NSW Department of Planning, Industry and Environment: HYDSTRA
- 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 inflow for the reporting period for NSW and Victorian tributaries are presented in Figure 46 and Figure 47 respectively.

Table 32: Summary of NSW Murray gauged tributary inflow

Station code	Station name	Volume (ML)
Victoria Murray gauged tributary inflows		
402205	Kiewa River	503,904
405232	Goulburn River	906,684
404210	Broken Creek	95,306
406202	Campaspe River	48,002
403241	Ovens River	955,182
Torrumbarry system return (multiple tributaries and effluent returns)		238,800
	Total Victorian gauged tributary inflow	**2,747,879**
NSW Murray tributary inflows		
410130	Murrumbidgee River at D/S Balranald Weir	400,941
410134	Billabong Creek at Darlot	77,359
425007	Darling River at Burtundy	36,822
	Total NSW gauged tributary inflow	**515,123**
	Total Murray Gauged Tributary Inflow	**3,263,002**

Figure 46: NSW daily tributary inflow to Murray

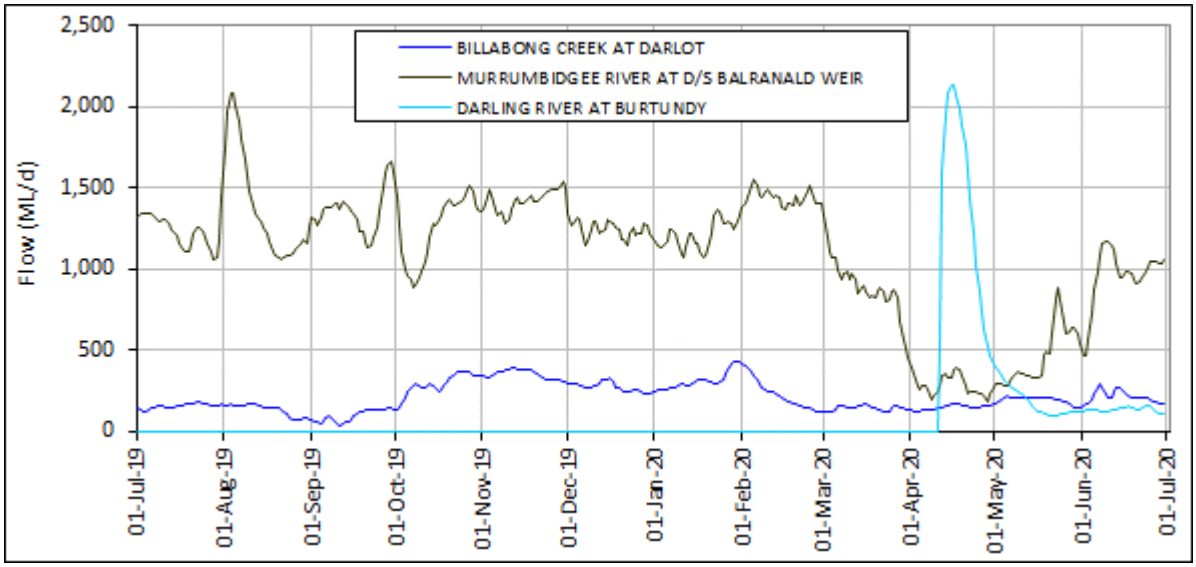
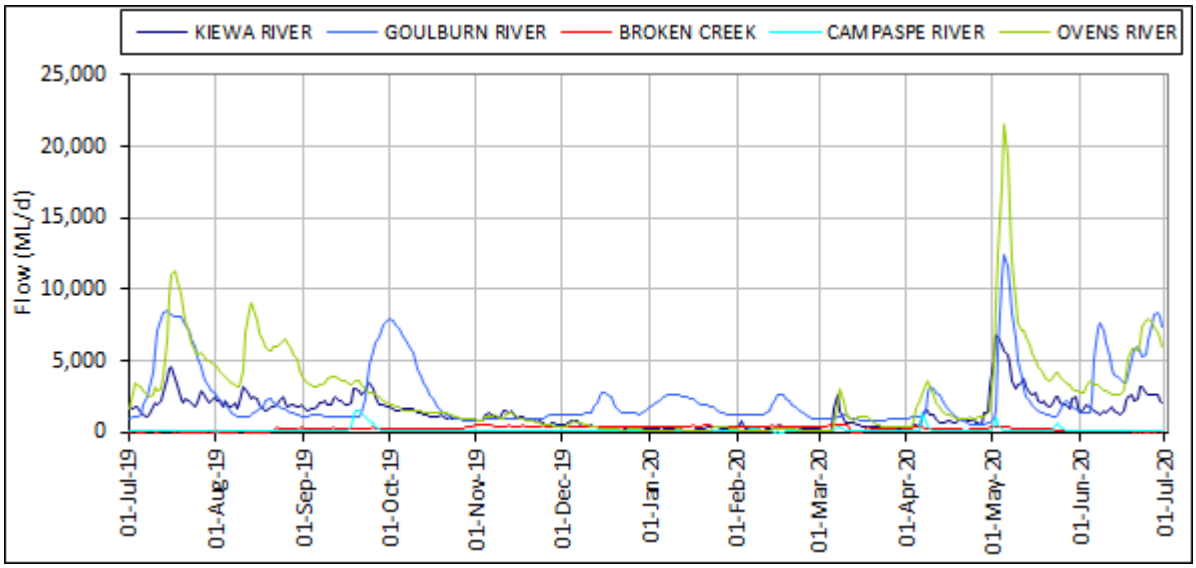


Figure 47: Victorian daily tributary inflow to Murray



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 Planning, Industry and Environment

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 48, Figure 49, Figure 50 respectively.

Figure 48: Hume Dam releases for the reporting period

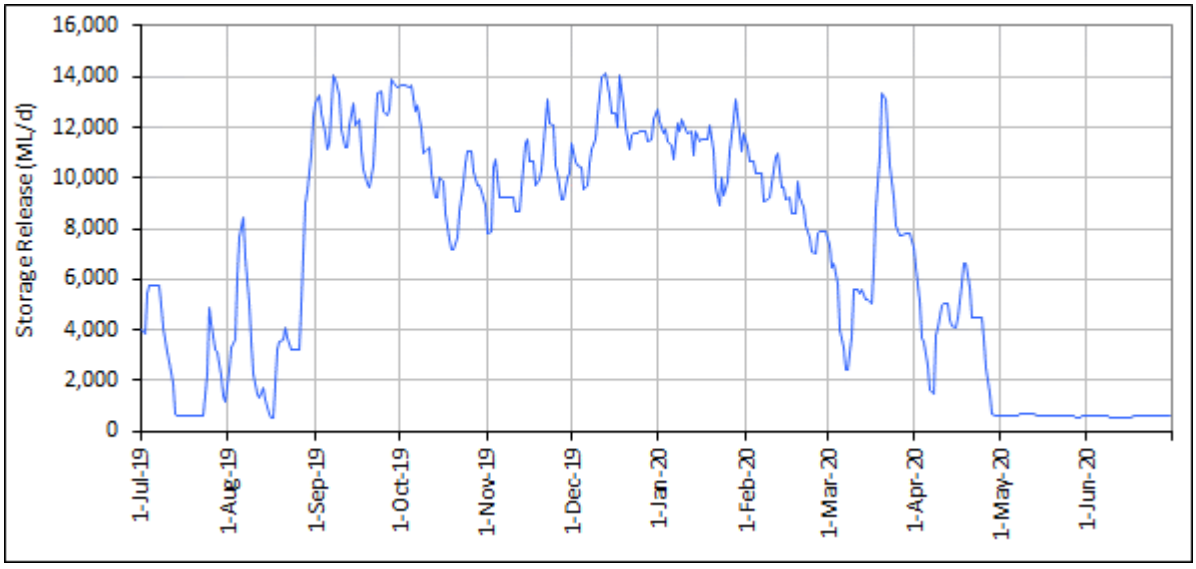


Figure 49: Dartmouth Dam releases for the reporting period

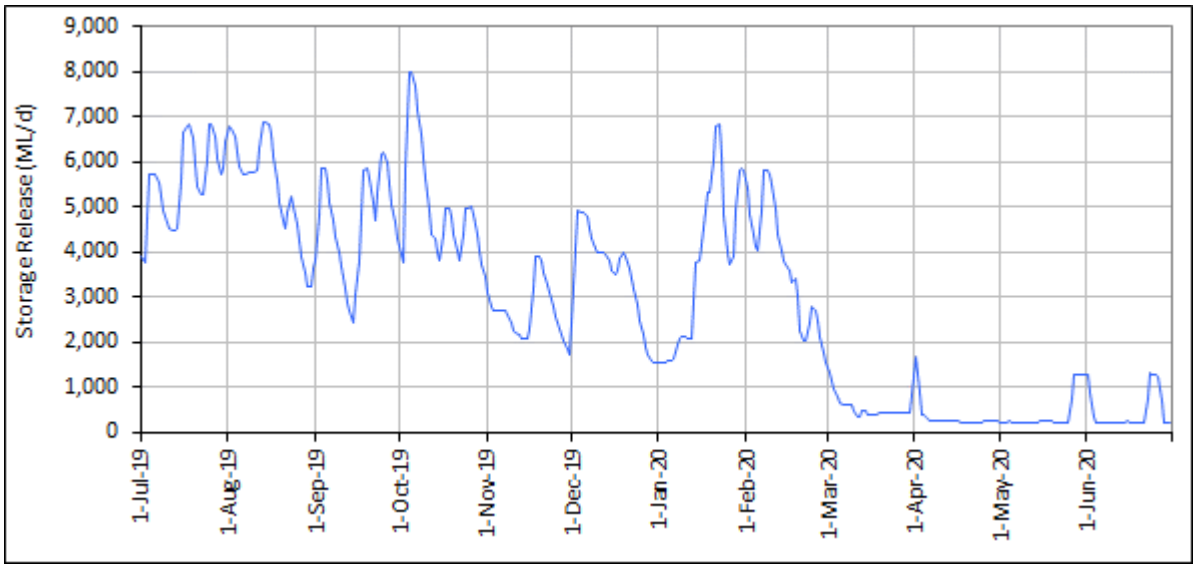
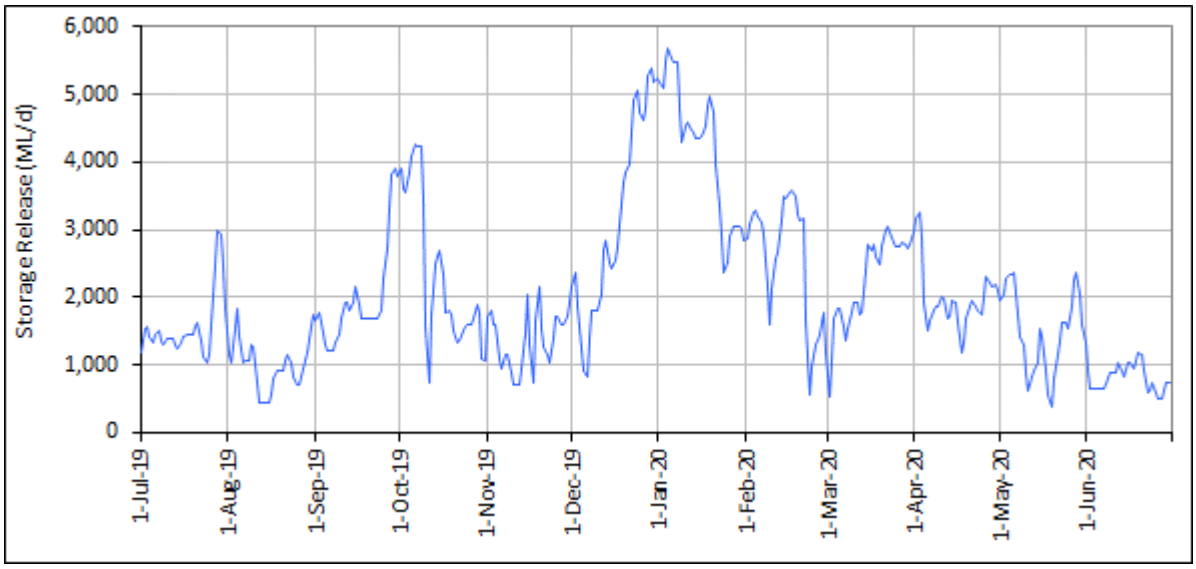


Figure 50: Lake Victoria Dam releases for the reporting period



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).

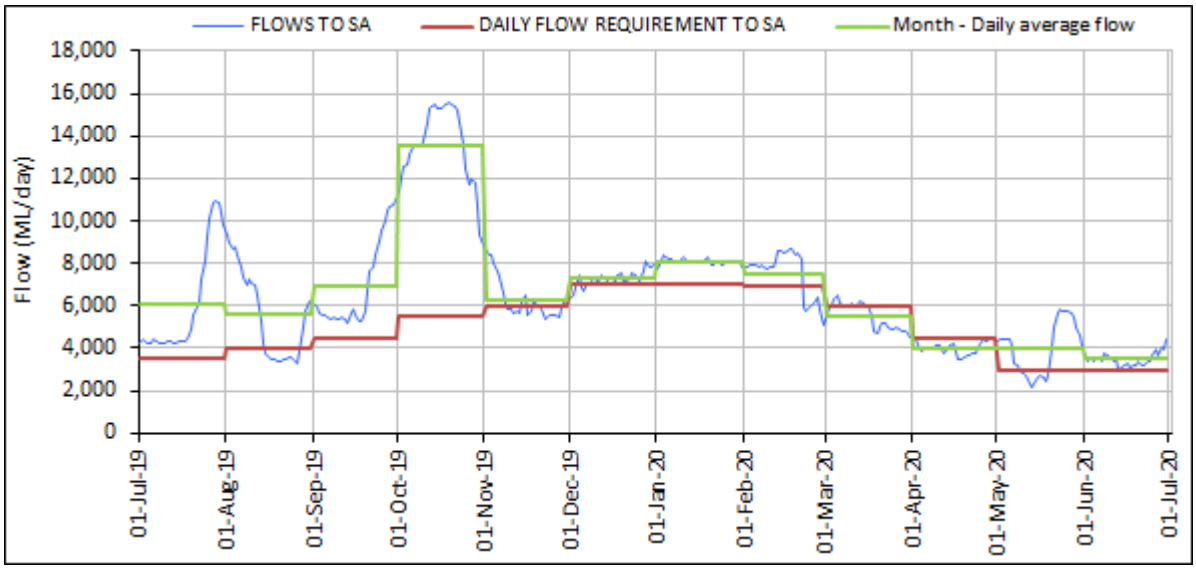
Additional Information

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 51.

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

Station name	Outflow (ML)
NSW Murray flow to South Australia	829,100
Victoria Murray flow to South Australia	1,563,870
Total Murray River flow to South Australia	**2,392,970**
Finley Escape (outflow to Murrumbidgee)	32,150
Total	**2,425,120**

Figure 51: End-of-system flow to South Australia



Note 18—NSW extractions from river

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

Data type

Measured data

Policy

Not applicable

Data accuracy

A—Estimated in the range +/- 10%

Providing agency

NSW Department of Planning, Industry and Environment

Data source

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

Methodology

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

Additional information

A reconciliation of physical extractions relative to accounted access licences usage is provided in Table 34.

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

Component	NSW Murray
Licenced extractions from river [19]	379,026
plus	
Licenced flow leaving system[20]	0
plus	
In-stream licenced usage [21]	52,941
equals	
Total account usage [22]	431,966

[19] Direct licenced extractions from the river excluding basic rights usage estimate
[20] Licenced water ordered to leave accounted NSW Murray extent for environmental benefits, subject to data availability, estimate based on MDBA matter 9.3 reporting
[21] Water ordered and used within the accounted system for environmental benefit (not extracted from the river), subject to data availability
[22] The total amount of water accounted for usage against the allocation accounts

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

Data accuracy

A1—Nil inaccuracy +/- 0%

Providing agency

NSW Department of Planning, Industry and Environment

Data source

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

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

Data accuracy

C—Estimated in the range +/- 50%

Providing agency

NSW Department of Planning, Industry and Environment

Data source

- *Water Sharing Plan for the 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 49 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 Department of Planning, Industry and Environment website at www.industry.nsw.gov.au/water

Data accuracy

A—Estimated in the range +/- 10%

Providing agency

NSW Department of Planning, Industry and Environment

Data source

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

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

The supplementary and uncontrolled flow access periods for the reporting period are summarised in Table 35.

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

Catchment	River section	Section start date	Section end date	% use limit	Supple-mentary usage	UCF Usage
Barbers Creek	Murrayd, Barbers Creek	27-Jun-20	30-Jun-20	100	0	0
Bookit Creek	Ewakool, Bookit Creek	27-Jun-20	30-Jun-20	100	0	0
Bullanginya Lagoon	Murrayb, Bullanginya Lagoon	27-Jun-20	30-Jun-20	100	0	0
Buronga Billabong	Murrayh, Buronga Billabong	27-Jun-20	30-Jun-20	100	0	0
Collendina Lagoon	Murraya, Collerdina Lagoon	27-Jun-20	30-Jun-20	100	0	0
Colligen Creek	Ecolligen, O/T to Weir	27-Jun-20	30-Jun-20	100	382	0
Colligen Creek	Ecolligen, Weir to Werai Station	27-Jun-20	30-Jun-20	100	0	134
Coobool Creek	Murrayd, Coobool Creek	27-Jun-20	30-Jun-20	100	0	0
Dairy Lagoon	Murraya, Dairy	27-Jun-20	30-Jun-20	100	0	0
Darling River Went. Pool	Murrayg, Wentworth Weir Pool	27-Jun-20	30-Jun-20	100	19.8	6.2
Deep Creek	Murrayc, Deep Creek	27-Jun-20	30-Jun-20	100	0	0
Dights Creek	Murraya, Dights Creek	27-Jun-20	30-Jun-20	100	0	0
Dry Lake	Murrayf, Dry Lake	27-Jun-20	30-Jun-20	100	0	0
Edward River	Eedward1, O/T to Toonalook	27-Jun-20	30-Jun-20	100	0	0
Edward River	Eedward2, Toonalook to Stevens	27-Jun-20	30-Jun-20	100	0	15.2
Edward River	Eedward3, Stevens to Moulamein	27-Jun-20	30-Jun-20	100	381.3	51
Edward River	Eedward4, Moulamein to Liewah	27-Jun-20	30-Jun-20	100	178.2	258.5
Edward River	Eedward5, Liewah to Wakool Junction	27-Jun-20	30-Jun-20	100	68.4	0
Frenchmans Creek	Murrayh, Frenchmans Creek	27-Jun-20	30-Jun-20	100	0	0
Gol Gol Creek	Murrayg, Gol Gol Creek	27-Jun-20	30-Jun-20	100	0	0
Gol Gol North Creek	Murrayg, Gol Gol North Creek	27-Jun-20	30-Jun-20	100	0	5.1
Gulpa Creek	Eedward1, Gulpa Creek	27-Jun-20	30-Jun-20	100	0	171.3

Catchment	River section	Section start date	Section end date	% use limit	Supple-mentary usage	UCF Usage
Gum Creek	Murrayd, Gum Creek	27-Jun-20	30-Jun-20	100	0	0
Jingera Jingera Lagoon	Murraya, Jingera Jingera	27-Jun-20	30-Jun-20	100	0	0
Lake Benanee	Murrayf, Lake Benanee	27-Jun-20	30-Jun-20	100	0	0
Lake Mulwala	Murraya, Lake Mulwala	27-Jun-20	30-Jun-20	100	0	0
Lake Victoria	Murrayh, Lake Victoria	27-Jun-20	30-Jun-20	100	0	0
Lara Creek	Murrayf, Lara Creek	27-Jun-20	30-Jun-20	100	0	0
Larrys Creek	Murrayd, Larrys Creek	27-Jun-20	30-Jun-20	100	0	0
Lesters Lagoon	Murrayb, Lesters Lagoon	27-Jun-20	30-Jun-20	100	0	0
Little Murray River	Murrayd, Little Murray	27-Jun-20	30-Jun-20	100	0	0
Merangatuk Creek	Ewakool, Merangatuk Ck	27-Jun-20	30-Jun-20	100	0	0
Merran Creek	Merran Creek, Cuttings to Franklings Bridge	27-Jun-20	30-Jun-20	100	0	0
Merran Creek	Merran Creek, Franklings Bridge to Moulamein Rd	27-Jun-20	30-Jun-20	100	215.3	251.8
Merran Creek	Merran Creek, Moulamein Rd to Station 409036	27-Jun-20	30-Jun-20	100	131.2	15.1
Merran Creek	Merran Creek, Station 409036 to Wakool Confluence	27-Jun-20	30-Jun-20	100	0	0
Merribit Creek	Ewakool, Merribit Ck	27-Jun-20	30-Jun-20	100	33.9	28
Moira Creek	Murrayb, Moira	27-Jun-20	30-Jun-20	100	409.2	0
Mulligans Creek	Murrayd, Mulligans Creek	27-Jun-20	30-Jun-20	100	15.8	18.5
Murray River	Murraya, Hume Dam	27-Jun-20	30-Jun-20	100	0	0
Murray River	Murraya, Hume to Yarrawonga	27-Jun-20	30-Jun-20	100	0	0
Murray River	Murrayb, Edward O/T Barmah	27-Jun-20	30-Jun-20	100	0	0
Murray River	Murrayb, Yarrawonga to Edward O/T	27-Jun-20	30-Jun-20	100	0	23.3
Murray River	Murrayc, Barmah To Torrumbarry	27-Jun-20	30-Jun-20	100	18.4	76
Murray River	Murrayd, Torrumbarry to Wakool Jn	27-Jun-20	30-Jun-20	100	394.9	703.8
Murray River	Murrayf, Wakool to Euston Weir	27-Jun-20	30-Jun-20	100	0	0
Murray River	Murrayg, Euston Weir to Mildura	27-Jun-20	30-Jun-20	100	0	0
Murray River	Murrayh, Mildura To S.A.	27-Jun-20	30-Jun-20	100	0	12.9
Niemur River	Eniemur, Mallan School to Wakool Confluence	27-Jun-20	30-Jun-20	100	53.2	0
Niemur River	Eniemur, Moulamein Rd to Mallan School	27-Jun-20	30-Jun-20	100	368.9	71.8
Niemur River	Eniemur, O/T to Moulamein Rd	27-Jun-20	30-Jun-20	100	0	2.3
Paddock Lagoon	Murrayb, Paddock Lagoon	27-Jun-20	30-Jun-20	100	0	0
Porthole Creek	Ewakool, Porthole Creek	27-Jun-20	30-Jun-20	100	0	0

Catchment	River section	Section start date	Section end date	% use limit	Supple-mentary usage	UCF Usage
Ruel Lagoon	Murrayf, Ruel Lagoon	27-Jun-20	30-Jun-20	100	0	0
Salt Creek	Murrayh, Salt Creek	27-Jun-20	30-Jun-20	100	0	0
St Helena Creek	Murrayd, St Helena Creek	27-Jun-20	30-Jun-20	100	32.1	0
Tallys Lake	Murrayd, Tally'S Lake	27-Jun-20	30-Jun-20	100	0	24.5
Tuckers Creek	Murrayh, Tuckers Creek	27-Jun-20	30-Jun-20	100	0	0
Unnamed Watercourse	Ecolligen, Unnamed Watercourse	27-Jun-20	30-Jun-20	100	0	18.7
Unnamed Watercourse	Eedward6 Unnamed watercourse	27-Jun-20	30-Jun-20	100	0	115
Unnamed Watercourse	Murraya, 889900 Unnamed Watercourse	27-Jun-20	30-Jun-20	100	0	0
Unnamed Watercourse	Murraya, 889999 Unnamed Watercourse	27-Jun-20	30-Jun-20	100	0	0
Unnamed Watercourse	Murrayh, Unnamed Watercourse	27-Jun-20	30-Jun-20	100	0	0
Waddy Creek	Murrayd, Waddy Creek	27-Jun-20	30-Jun-20	100	0	46.7
Wakool River	Ewakool, Brassi Rd to Wakool Rd	27-Jun-20	30-Jun-20	100	0	0
Wakool River	Ewakool, Coonamit to Stoney Xing	27-Jun-20	30-Jun-20	100	53.3	34.5
Wakool River	Ewakool, Gee Gee to Coonamit	27-Jun-20	30-Jun-20	100	54.9	0
Wakool River	Ewakool, Moulamein Rd to Gee Gee	27-Jun-20	30-Jun-20	100	8	6.2
Wakool River	Ewakool, O/T to Brassi Rd	27-Jun-20	30-Jun-20	100	0	0
Wakool River	Ewakool, Wakool Rd to Moulamein Rd	27-Jun-20	30-Jun-20	100	54	28.2
Washpen Creek	Murrayf, Washpen Creek	27-Jun-20	30-Jun-20	100	0	0
Yallakool Creek	Eyallakool	27-Jun-20	30-Jun-20	100	0	28

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[23] (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

[23] 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 Planning, Industry and Environment

Data source

Not applicable

Methodology

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

Additional information

Prior reporting year adjustments are presented in

Table 37: Prior year account adjustment summary

Item	Pre-adjustment	Post adjustment	Reason
Lake Mulwala (Yarrawonga Weir) volume	37,620	108,678	Incorrect gauging site utilised in 2018-19
IVT closing balance	18,408	18,745	Reconciliation to operational account balance
Account balance—Domestic and Stock	(35)	(13)	Reconciliation to access licence balance
Account balance—General Security	297,984	298,037	Reconciliation to access licence balance

References

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