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General Purpose Water Accounting Report Lower Darling 2022-2023



2022_23

Acknowledgement of Country

The Department of Climate Change, Energy, the Environment and Water acknowledges that it stands on Aboriginal land.

We acknowledge the people of the Danggali and Barkindji Nations hold the land and waters of the New South Wales Lower Darling River catchment area being of spiritual, cultural, customary and economic importance.

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

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Abbreviations

Abbreviation	Description
ARCGIS	mapping and spatial analysis platform for designing and managing solutions through the application of geographic knowledge
AWAS 1	Australian Water Accounting Standard 1
AWD	available water determination
CAIRO	computer-aided improvements to river operations
GPWAR	general purpose water accounting report
MDBA	Murray–Darling Basin Authority
ML	megalitres (1,000,000 litres)
ML/d	megalitres per day
SILO	climatic data provision system run by the Queensland government for the provision of both measured and modelled data

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)

Term	Definition
carryover	the volume or share component that may be reserved by a licence holder for use in the subsequent year
catchment	<p>the areas of land that collect rainfall and contribute to surface water (streams, rivers, wetlands) or to groundwater</p> <p>A catchment is a natural drainage area, bounded by sloping ground, hills or mountains, from which water flows to a low point.</p>
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	<p>flow leaving a place or process</p> <p>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.</p>
entity	<p>a defined geographical area or zone within the accounting region</p> <p>Transactions and reports are produced for each entity.</p>
end of system	the last defined point in a catchment where water information can be measured and/or reported
environmental water	<p>water allocated to support environmental outcomes and other public benefits</p> <p>Environmental water provisions recognise the environmental water requirements and are based on environmental, social and economic considerations, including existing user rights.</p>
evaporation	<p>the process by which water or another liquid becomes a gas</p> <p>Water from land areas, bodies of water, and all other moist surfaces is absorbed into the atmosphere as a vapour.</p>
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

Term	Definition
extraction	<p>the pumping or diverting of water from a river or aquifer by licensed users for a specific purpose (irrigation, stock, domestic, towns, etc.)</p> <p>The volume is measured at the point of extraction or diversion (river pump, diversion works, etc.).</p>
general purpose water accounting report (GPWAR)	<p>a report prepared according to the Australian Water Accounting Standard</p> <p>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.</p>
General Security licence	<p>a category of water access licence implemented under the Water Management Act 2000</p> <p>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).</p>
groundwater	<p>Water location beneath the ground in soil pore spaces and in the fractures of rock formations</p>
High Security licence	<p>a category of water access licence implemented under the <i>Water Management Act 2000</i></p> <p>It receives a higher priority than General Security licences but less priority than essential requirements in the available water determination process.</p>
HYDSTRA database	<p>a database used by NSW Department of Climate Change, Energy, the Environment and Water to store continuous, time-series data such as river flow, river height, and water quality</p>
inflows	<p>surface water runoff and deep drainage to groundwater (groundwater recharge) and transfers into the water system (both surface and groundwater) for a defined area</p>
inter-valley trade	<p>trade of licence holder allocation account water via allocation assignment from one catchment to another catchment (or state)</p>
intra-valley trade	<p>trade of licence holder allocation account water via allocation assignment within the same catchment</p>

Term	Definition
median	the middle point of a distribution, separating the highest half of a sample from the lowest half
non-physical transaction	an accounting transaction representing a process that is not a component of the water cycle (e.g. an available water determination)
physical transaction	an accounting transaction representing a process of the water cycle (e.g. an extraction)
regulated river	<p>a river system where flow is controlled via one or more major man-made structures such as dams and weirs</p> <p>For the purposes of the 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.</p>
share component	<p>an entitlement to water specified on the access licence, expressed as a unit share or, in the case of specific purpose licences (e.g. Local Water Utility, Major Water Utility and Domestic and Stock), a volume in megalitres</p> <p>The amount of water a licence holder is allocated as a result of an available water determination and the amount they can take in any year is based on their share component.</p>
storage	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	<p>a smaller river or stream that flows into a larger river or stream</p> <p>Usually a number of smaller tributaries merge to form a river.</p>

Term	Definition
ungauged catchment	<p>a catchment without a flow gauge to accurately record stream flows</p> <p>Modelled estimates must be used to approximate the contribution of ungauged catchments to the main river.</p>
water accounting	<p>the systematic process of identifying, recognising, quantifying, reporting, assuring and publishing information about water, the rights or other claims to that water, and the obligations against that water</p>
water assets	<p>the physical water held in storage, as well as any claims to water that are expected to increase the future water resource (e.g. external water entering the system through inter-valley trading)</p>
water liabilities	<p>claims on the water assets of the water report entity including water that has been allocated to licence holder accounts or environmental accounts, but yet to be taken at the end of the reporting period</p>
water sharing plan	<p>a water management plan that defines the rules for sharing of water within a region under the <i>Water Management Act 2000</i></p>

Director's foreword

This is the twelfth annual release of the general-purpose water accounting report (GPWAR) for the Lower Darling regulated river water source. It has been prepared for the accounting period 1 July 2022 to 30 June 2023 under the Australian Water Accounting Standard 1 (AWAS 1) (WASB, 2012).

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

Included in the GPWAR are:

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

Detailed information on groundwater sources is excluded from the GPWAR.

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 and Environment, I hereby declare:

- the information presented in these accounts is a faithful representation of the management and operation of the Lower Darling 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

- the Department of Climate Change, Energy, the Environment and Water has to the best of its ability prepared this GPWAR in accordance with the Australian Water Accounting Standard 1.

Danielle Baker

Director Water Analytics

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

Contextual statement

The Lower Darling River is in the semi-arid environment of south-western New South Wales. The 'Lower Darling' commonly refers to the portion of the Darling River that is regulated by releases from the Menindee Lakes Scheme, from the township of Menindee to its junction with the Murray River at Wentworth 530 km downstream.

The general topography of the catchment is flat, with elevations lower than 100 metres across most of the floodplain. Land use is dominated by grazing, with small areas of cropping carried out in the southern half of the catchment and on some of the region's lake beds.

Prior to construction of the Menindee Lakes Scheme the Lower Darling River was unregulated, and like the unregulated portion of the catchment above Menindee, it was subject to highly variable flow conditions. With completion of the scheme in 1960, the flow regime of the river has changed significantly. It has reduced monthly flow volumes, long periods of constant low flow and reduced frequency of small- to medium-sized flow events (Green *et al.* 1998).

You can find a detailed description of the catchment in the document *Water resources and management overview – Lower Darling Catchment*, which is available from the NSW Department of Climate Change, Energy, the Environment and Water website (www.industry.nsw.gov.au/water).

Accounting extent

Surface water

The accounted river extent is illustrated in Figure 1 and includes the Lower Darling Water Source managed under the Water Sharing Plan for the NSW Murray and Lower Darling Water Sources. It includes the Lower Darling regulated river system downstream of Menindee Lakes from the township of Menindee to its junction with the Murray River at Wentworth. As the flow data at Wentworth is both limited and backwater-affected by flow in the Murray River, the flow site on the Darling River at Burtundy was used as an alternative measure for the end of system flow.

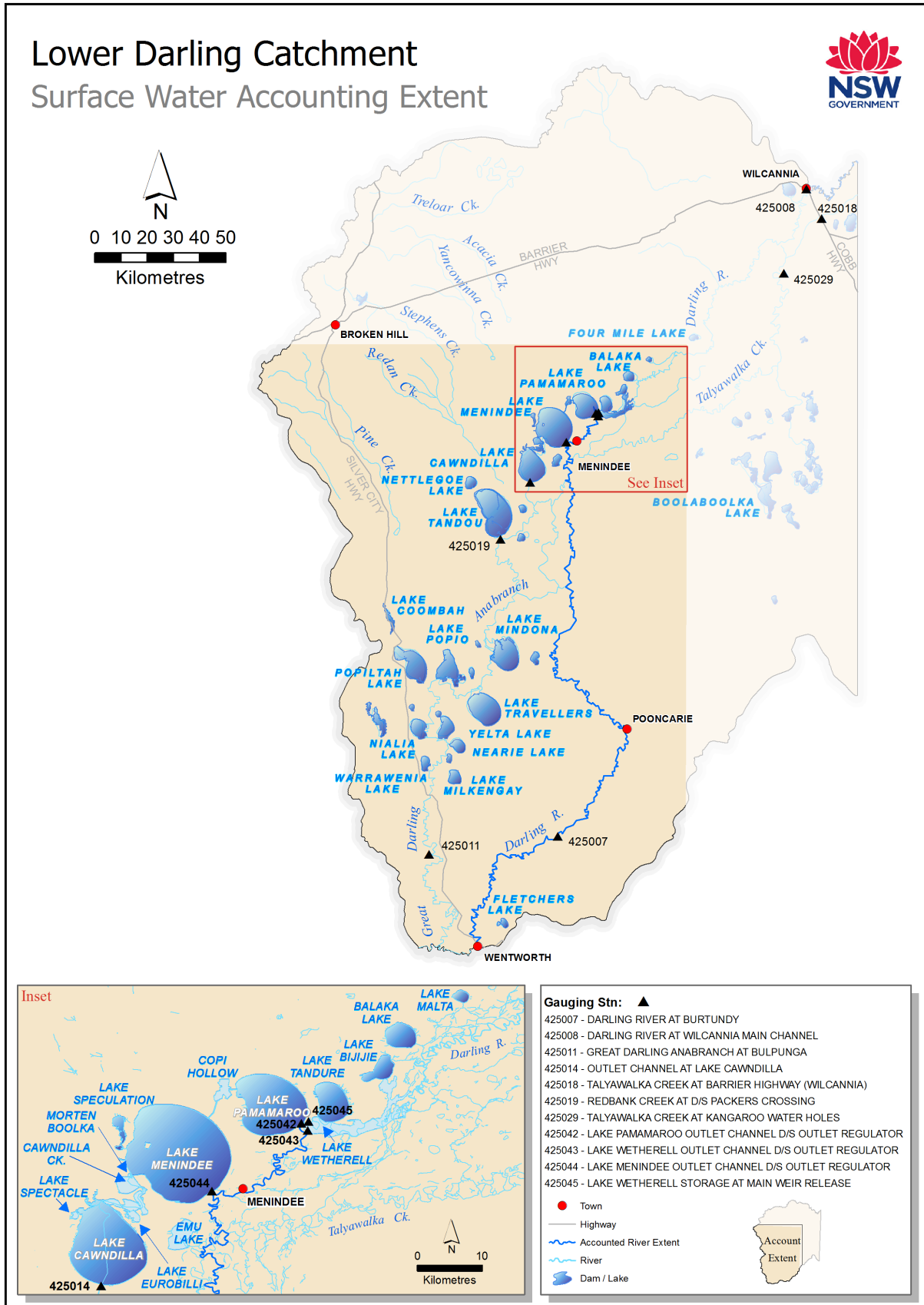
While the Great Darling Anabranch is not included as part of this GPWAR, the flow leaving the defined entity that enters the Anabranch is accounted for in order to achieve a correct mass balance. Licenced usages on the Great Darling Anabranch are also provided in the Lower Darling 2022–23 physical flow diagram (in the water accounting

statements section of this GPWAR). The only inflow that is considered to the Lower Darling River system is the return flow of Talyawalka Creek.

Groundwater

No groundwater information has been included in this GPWAR. There is a lack of adequate modelling information on which to make an estimation that will be of acceptable accuracy.

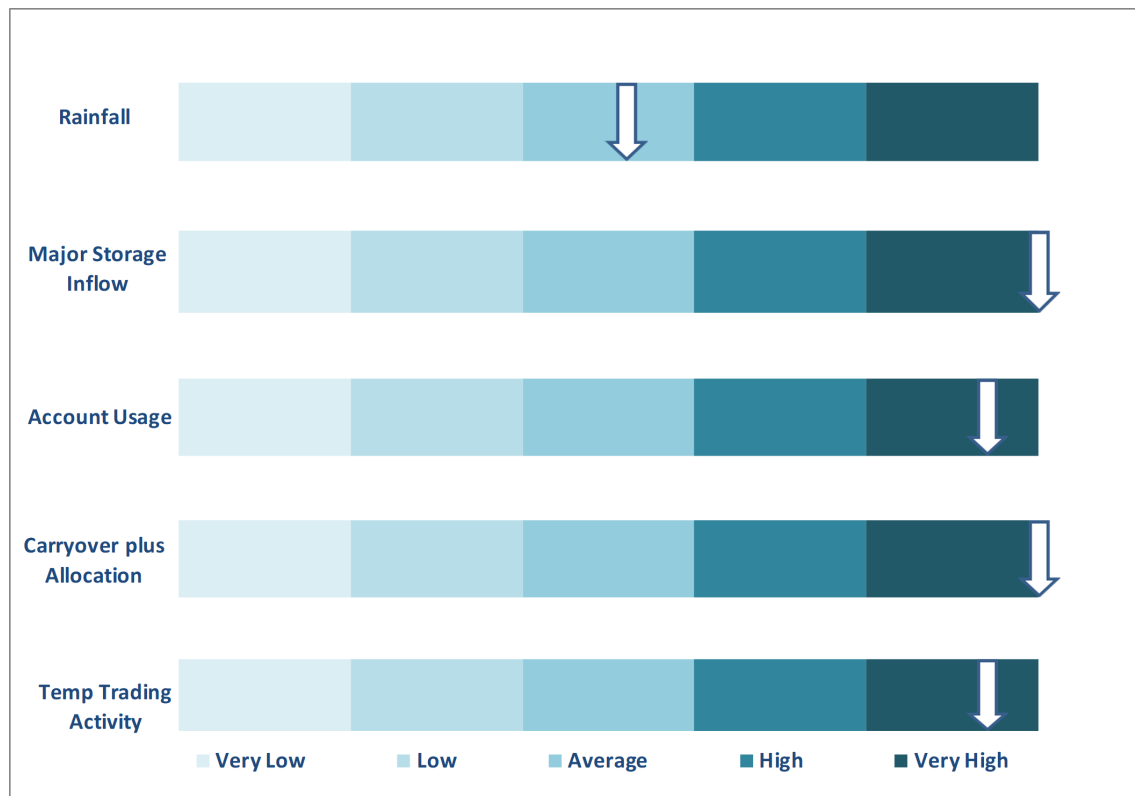
Figure 1: Surface water geographical extent of the accounts



Snapshot

The key indicators for 2022–23 relative to other years under water sharing plan management conditions are presented in Figure 2. Major storage inflow, account usage, Effective allocation (carryover plus allocation) and temporary trade activity were very high in comparison with the other years. Rainfall was at average level.

Figure 2: 2022–23 summary indicators



Climate

At Menindee (upper catchment), 378 mm of rainfall was recorded in the reporting period (Table 1). Comparatively this rainfall is:

- 175% of the long-term median rainfall (for this location)
- 52% of the highest rainfall on record.

October 2022 (88 mm) and November 2022 (75 mm). (Figure 3).

At Pooncarie (mid–lower catchment), 512 mm of rainfall was recorded (Table 2).

Comparatively this rainfall is:

- 209% of the long-term median rainfall (for this location)
- 67% of the highest rainfall on record.

October 2022 (152 mm) and June 2023 (118 mm). (Figure 3).

The spatial distribution of rainfall across the Lower Darling catchment during the reporting period is illustrated in Figure 5 and can be referenced against the mean historical annual rainfall distribution in Figure 6. Rainfall distribution was significantly higher than the comparative average conditions across the entire catchment area.

Figure 3: Monthly rainfall and historical monthly medians at Menindee and Pooncarie

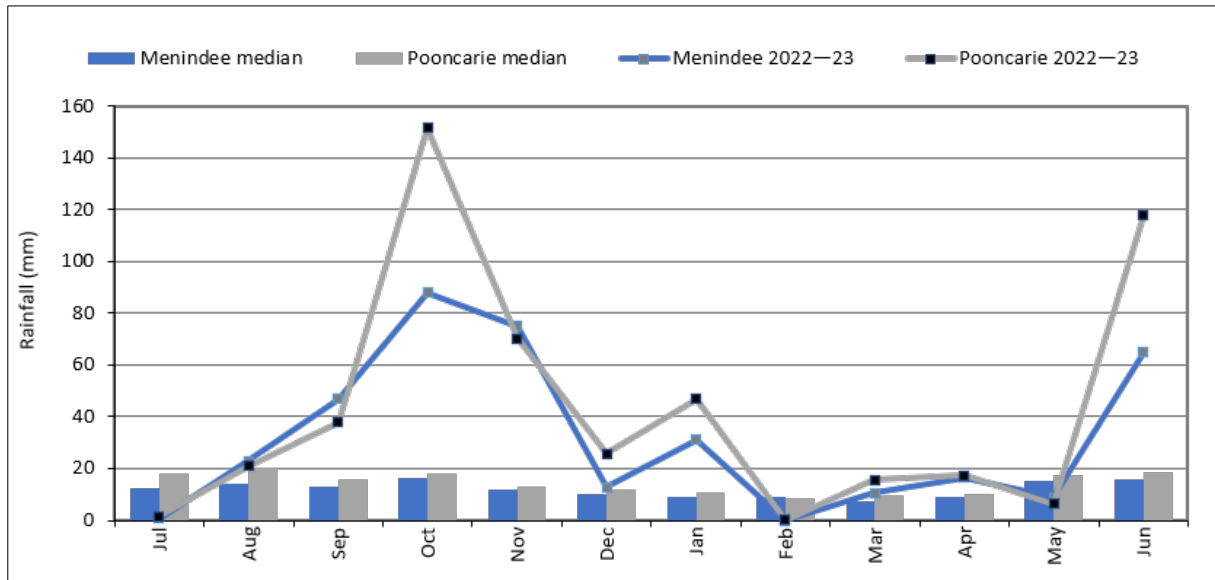


Figure 4: Monthly rainfall deviation from historical median at Menindee and Pooncarie

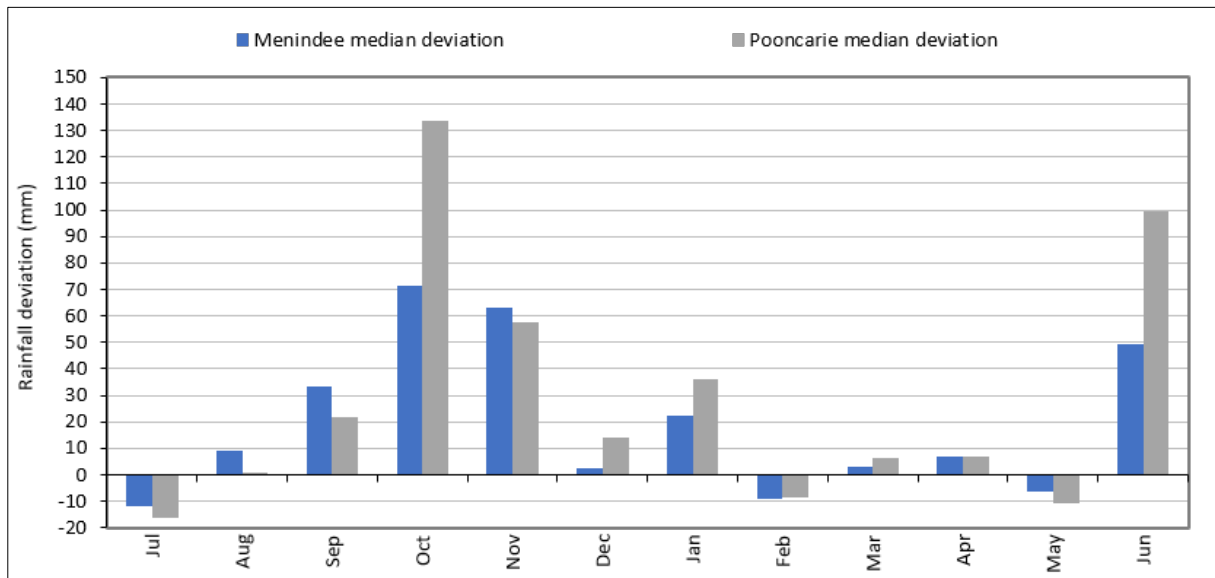


Table 1: Monthly rainfall and historic monthly statistics at Menindee¹ – measurements in millimetres

Menindee	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Annual
2022 – 23	1	23	47	88	75	13	31	0	11	16	9	65	378
Historical mean	18	18	19	23	21	22	24	20	18	17	22	22	245
Historical median	13	14	13	16	12	10	9	9	7	9	15	16	217
Historical lowest	0	0	0	0	0	0	0	0	0	0	0	0	62
Historical highest	114	68	144	113	164	198	232	157	166	152	107	112	732
Year of highest ²	1,886	1,901	2,016	1,938	1,933	1,887	1,993	1,950	1,989	1,974	1,989	1,923	1973-1974

Table 2: 2022 –23 Monthly rainfall and historic monthly statistics at Pooncarie¹ – measurements in millimetres

Pooncarie	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Annual
2022 – 23	2	21	38	152	70	26	47	0	16	17	6	118	512
Historical mean	22	23	22	27	22	21	23	22	18	18	26	26	269
Historical median	18	20	16	18	13	12	11	9	9	10	17	18	245
Historical lowest	0	0	0	0	0	0	0	0	0	0	0	0	87
Historical highest	82	92	115	152	146	201	162	193	179	158	152	131	764
Year of highest ^{Error! Bookmark not defined.}	1,996	1,901	2,016	2,022	2,021	1,962	2,011	2,000	1,989	1,974	1,889	1,923	2010-2011

¹ Long-term statistics are derived from the Bureau of Meteorology – climate data online. The data presented is collected from the stations ‘47019 – Menindee Post Office’ and ‘47029 – Pooncarie Mail Agency’. Historic statistics use data from 1876 to 2023 for Menindee and 1883 to 2023 for Pooncarie.

Figure 5: Darling River catchment 2021–22 total annual rainfall

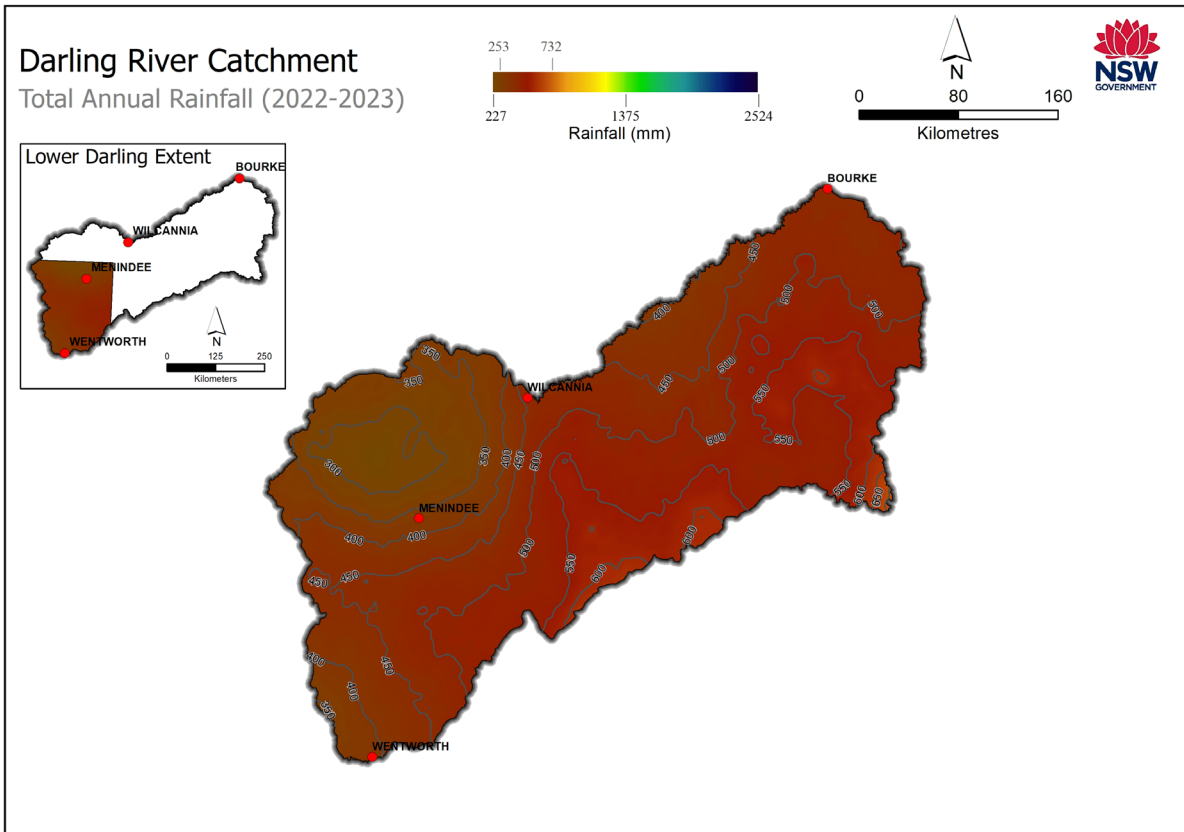
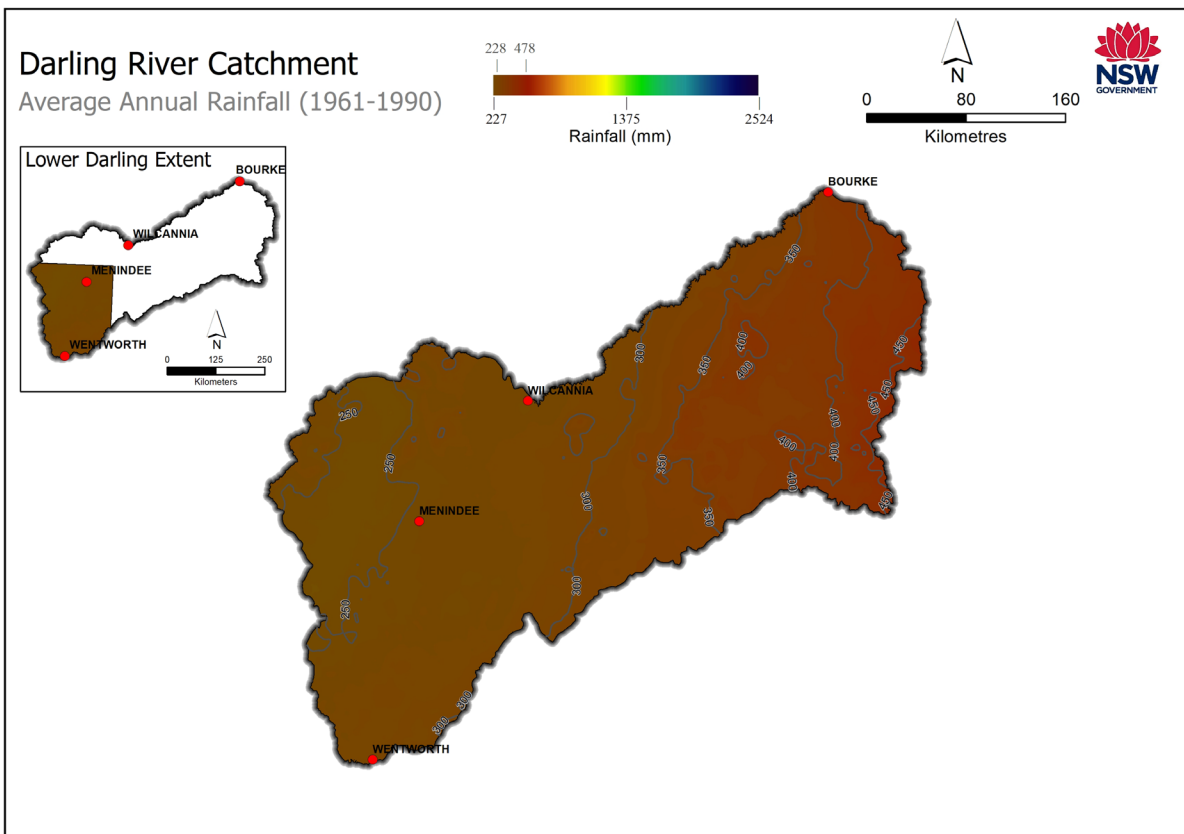


Figure 6: Darling River catchment average annual rainfall 1961–90



Storage inflows and volume

Inflows

The potential inflow to Menindee Lakes (indicated by flow recorded at the Darling River at Wilcannia) has historically varied significantly, cycling through prolonged periods of predominantly dry (1895–1950) and predominantly wet climatic regimes (1950–2000) except for a dry period in the 1960's. Since 2000, the system has experienced both wet and prolonged dry periods (Figure 7). Over the last 20 years the trend has been generally drier conditions, with 2 distinct periods separated by a shorter sequence of wet conditions between 2009 and 2012. Annual inflows are highly variable relative to the mean.

For the reporting period a total flow of 9,545,304 megalitres was recorded at Wilcannia (Figure 9), which is:

- 1115% long-term median annual flow (856,142 megalitres)
- very high relative to the long-term data set exceeding 98% of years in the dataset (1895-96 to 2022-23)
- the 2nd consecutive year of above average inflow.

The maximum mean daily flow rate for the reporting period was 100,966 megalitres, occurring on 27 December 2022 (Figure 10).

Figure 7: Long-term total flow (ML/year) at Wilcannia cumulative deviation from mean

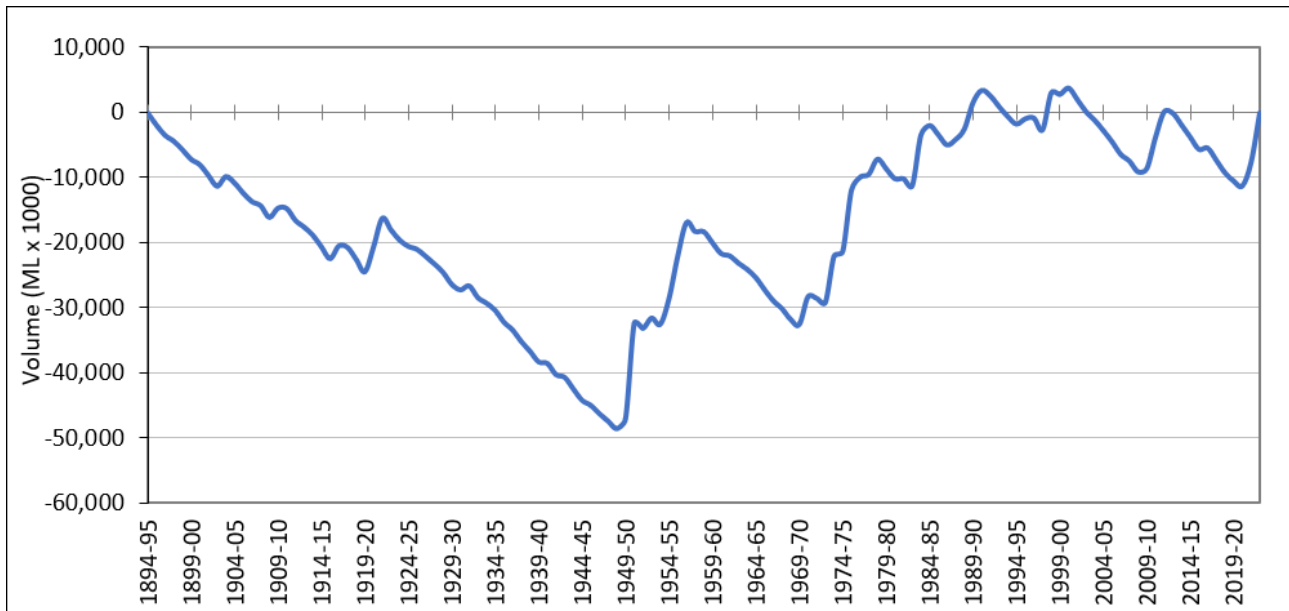


Figure 8: Menindee Lakes long-term sequence of years below mean inflow

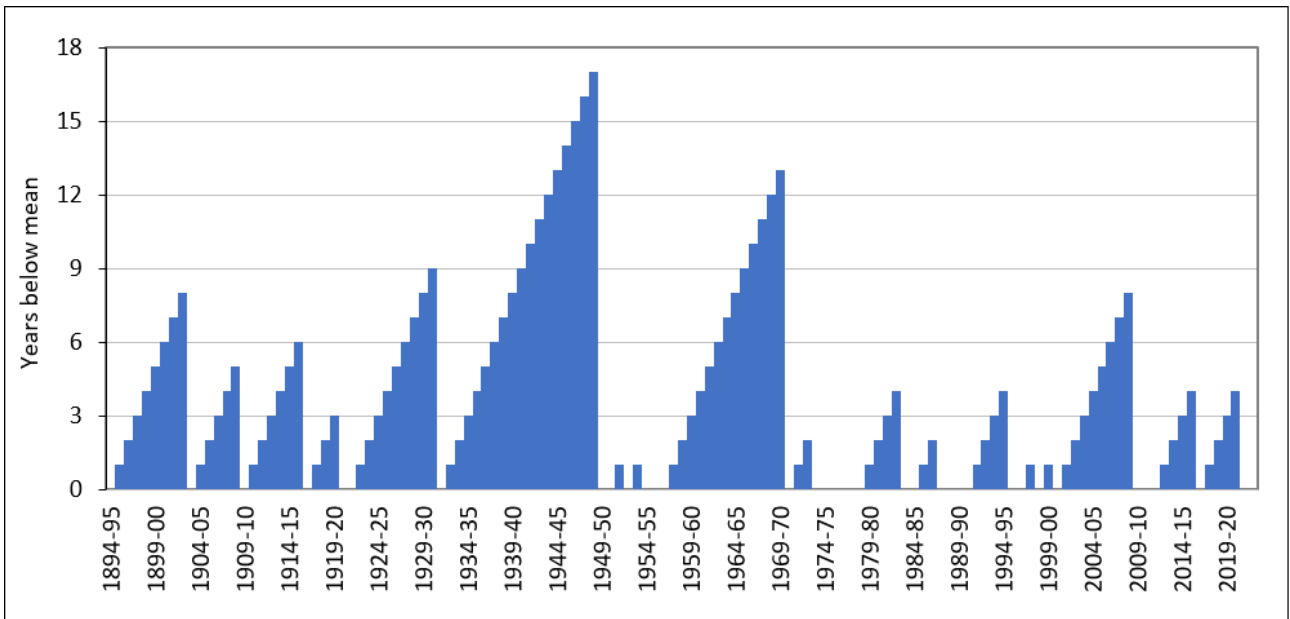


Figure 9: Long-term total flow (ML/year) at Wilcannia

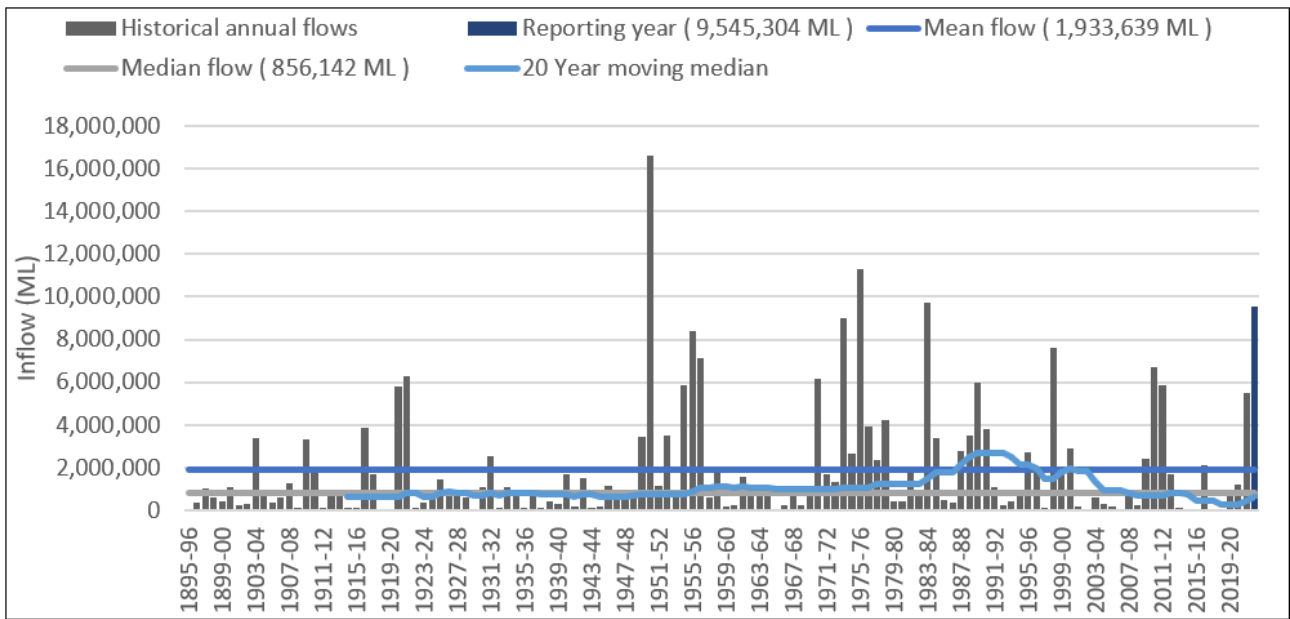
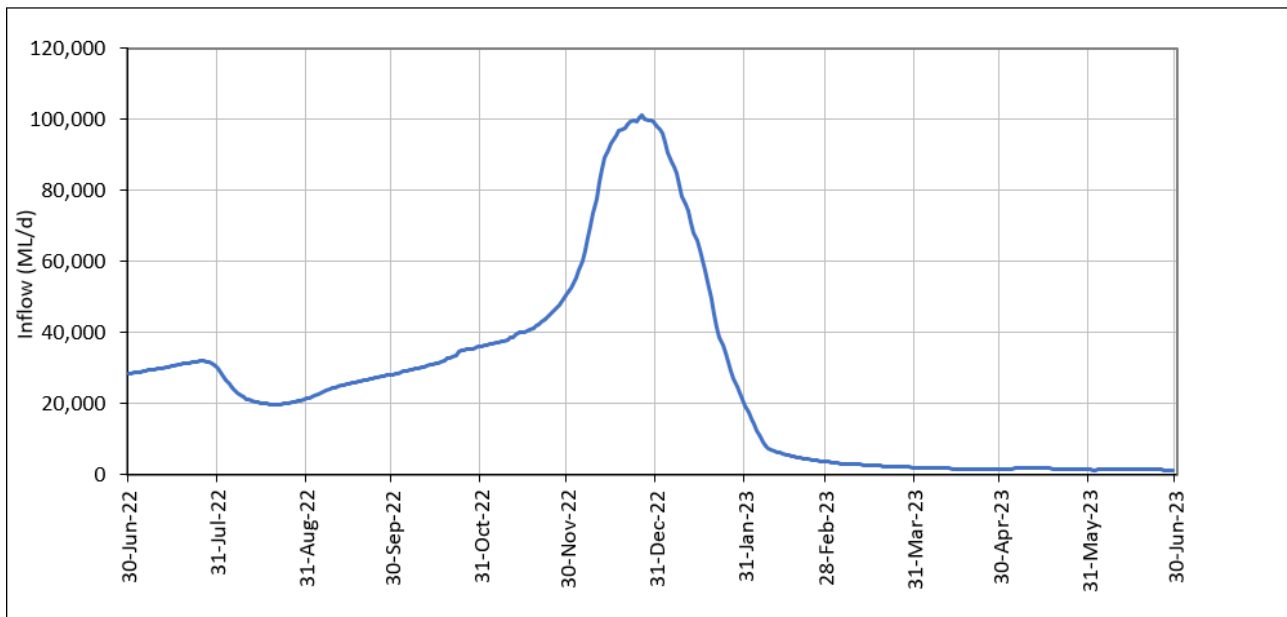


Figure 10: Total daily flow at Wilcannia (reporting period)



Storage volume

For the reporting period, the combined Menindee Lakes volume:

- started the reporting period at 1,903,357 megalitres or 110% of full supply capacity (Figure 11)
- closed at 1,423,096 megalitres or 82% of full supply capacity, a decrease of 28% for the water year
- held a maximum volume of 2,042,168 megalitres, being 118% of full supply volume, on 30 December 2022.
- was at or above full supply level through till March 2023.
- volume remained above 640 GL throughout the reporting period and remained under MDBA control allowing water to be ordered by the MDBA for the Murray

For more details, including individual storage, refer to disclosure Note 7 of this GPWAR.

Figure 11: Menindee combined storage capacity volume and % full (reporting period)

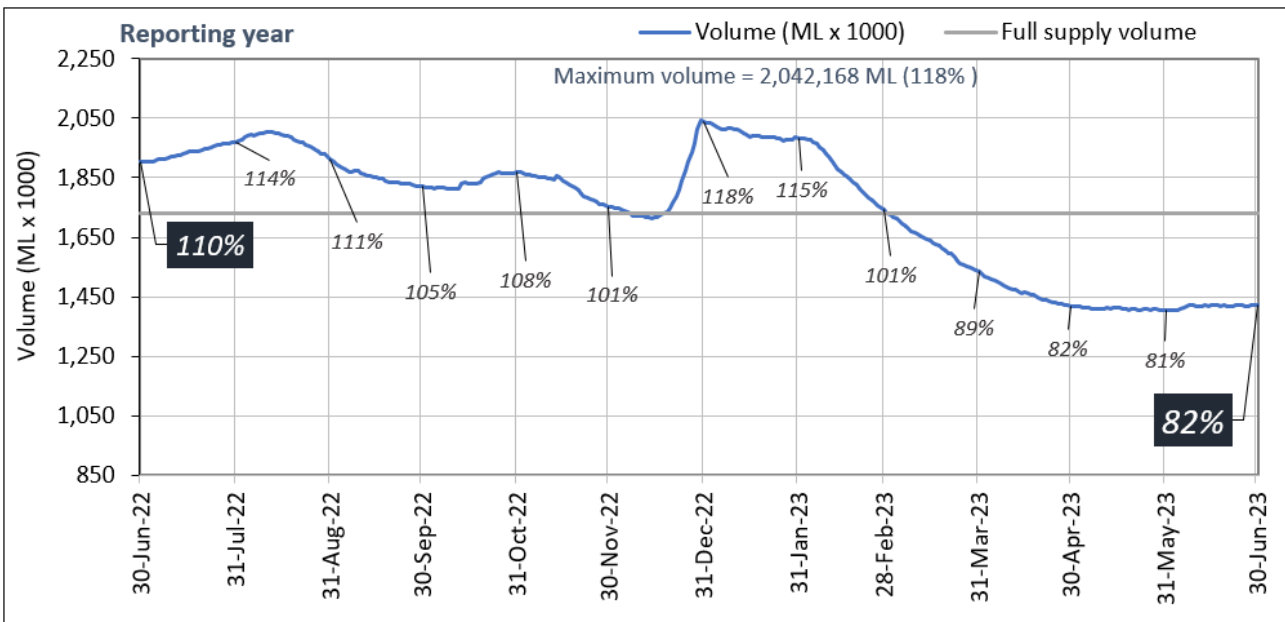
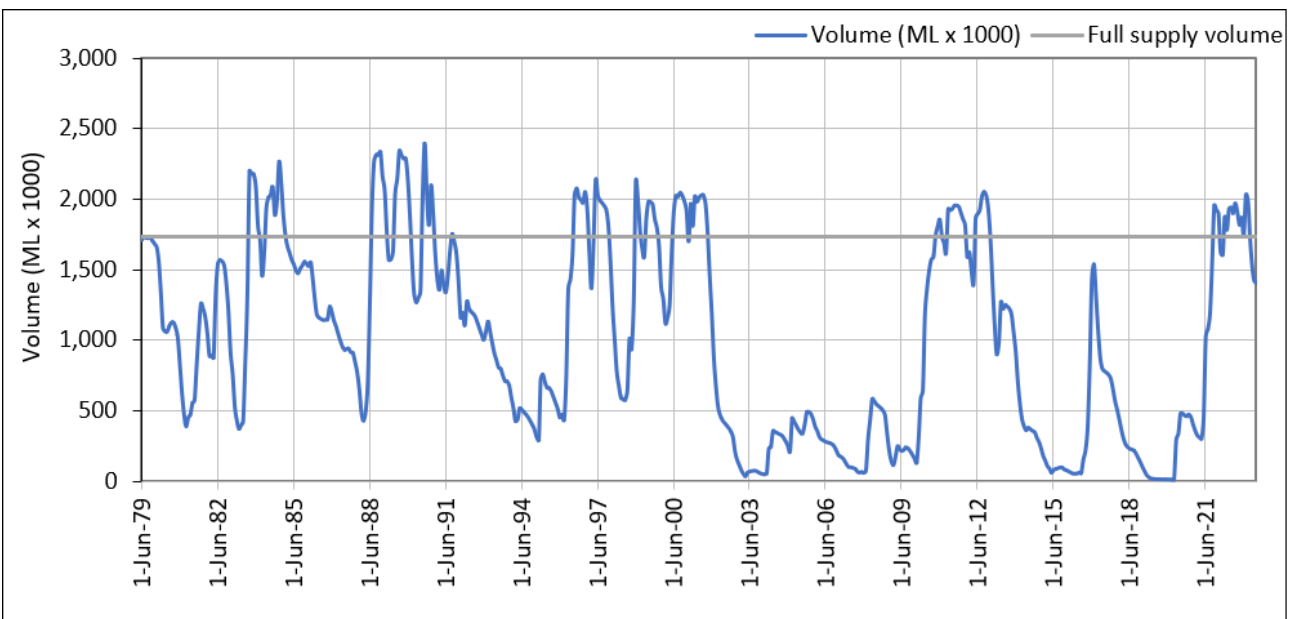


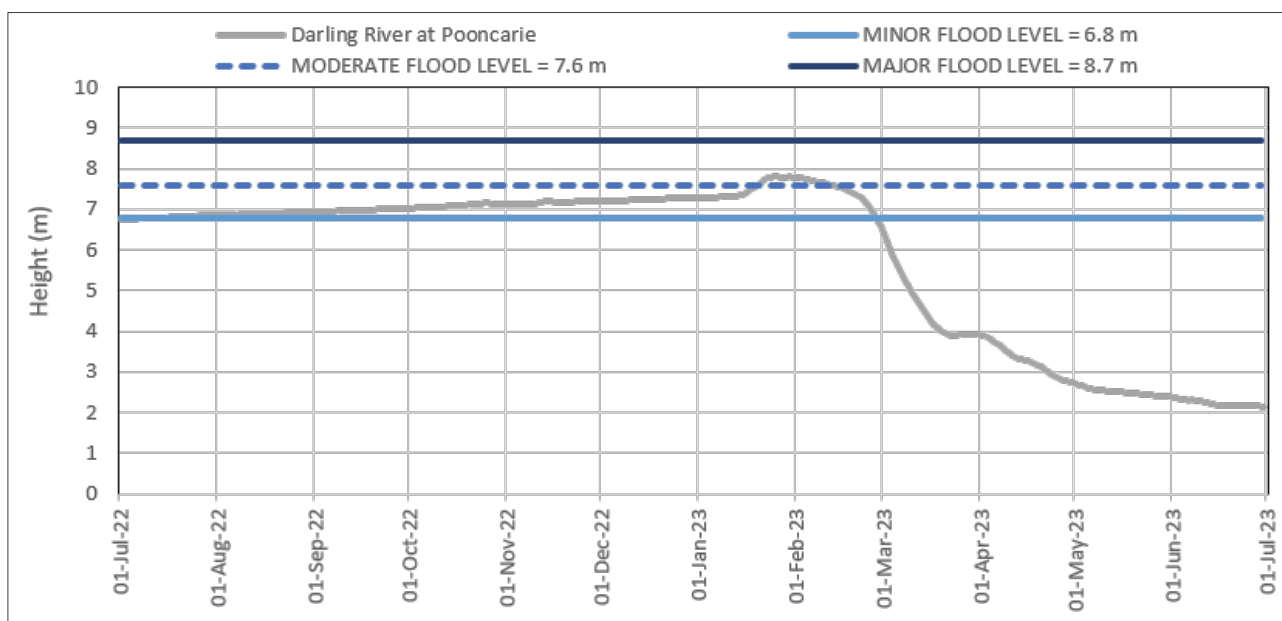
Figure 12: Menindee Lakes historical storage volumes against full supply volume



Major flow events

One event exceeded the flood level indicators for the Darling River at Pooncarie within the reporting period. The event is a result of releases from Menindee Lakes and ran for 224 days starting July 2022 and ending in February 2023. The highest peak was 7.8 metres on the 25 January 2023. (Figure 13).

Figure 13: Darling River at Pooncarie - river heights 2022-23



Surface water resources and management

Legislation

The Lower Darling regulated river water source was managed under conditions in the *Water Sharing Plan for the NSW Murray and Lower Darling Regulated Rivers Water Sources 2016*².

Access licence account management

The licence allocation accounting rules applicable are summarised in Table 3. To mitigate against water resource shortfalls, General Security licence holders are eligible to carry over up to 0.5 megalitres per issued share (50% equivalent), plus, subject to approval, the volume of available (empty) on-farm storage on the property linked to the relevant access licence. Carryover volumes may restrict, however, the amount of water that may be credited to an account through the available water determination process (AWD plus carryover limit).

Access to high flow events without debit to the General Security holders' access licences may be available in years of below-optimum allocations (uncontrolled flow access) (Table 4).

² The *Water Sharing Plan for the NSW Murray and Lower Darling Regulated Rivers Water Sources 2003* was replaced on 1 July 2016 by the *Water Sharing Plan for the NSW Murray and Lower Darling Regulated Rivers Water Sources 2016*. This plan is due for replacement in July 2026.

Table 3: Access licence accounting rules 2022–23

Licence category	AWD plus carryover limit	Carryover limit	Annual use limit	Maximum AWD
Domestic and Stock	N/A	0%	N/A	100%
Domestic and Stock [Domestic]	N/A	0%	N/A	100%
Domestic and Stock [Stock]	N/A	0%	N/A	100%
Local Water Utility	N/A	0%	N/A	100%
Regulated River (General Security)	The maximum of 0.5 ML per share or 1 ML per share minus carryover	0.5 ML/share ³	N/A	1 ML/share ⁴
Regulated River (High Security)	N/A	0 ML/share	N/A	1 ML/share
Supplementary Water	N/A	0 ML/share	N/A	1 ML/share

Table 4: Uncontrolled flow access provisions

Licence category	AWD limit for access	Carryover plus AWD plus UCF usage limit
Regulated River (General Security)	0.6 ML/share	1.0 ML/share

Extreme events stage and temporary water restrictions

The NSW Extreme Events Policy was released in October 2018 and updated in August 2023 to include drought measures with drought stages. The policy provides a framework for managing extreme events in the major river systems of the NSW Murray–Darling Basin. This framework is based on a staged approach, providing a range of measures for water managers to implement as conditions deteriorate.

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

Table 5 outlines the conditions that may be associated with different stages of criticality for surface water quantity. Further information is available at [NSW Extreme events policy](#)

³ Plus the volume of empty on-farm storage space specified associated with an approved work linked to the access licence. Evaporation reductions are applicable to carryover water.

⁴ The maximum volume shall be the greater of 0.5 megalitres per share or 1 megalitres per share minus the volume of water carried into the year

Table 5: 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.

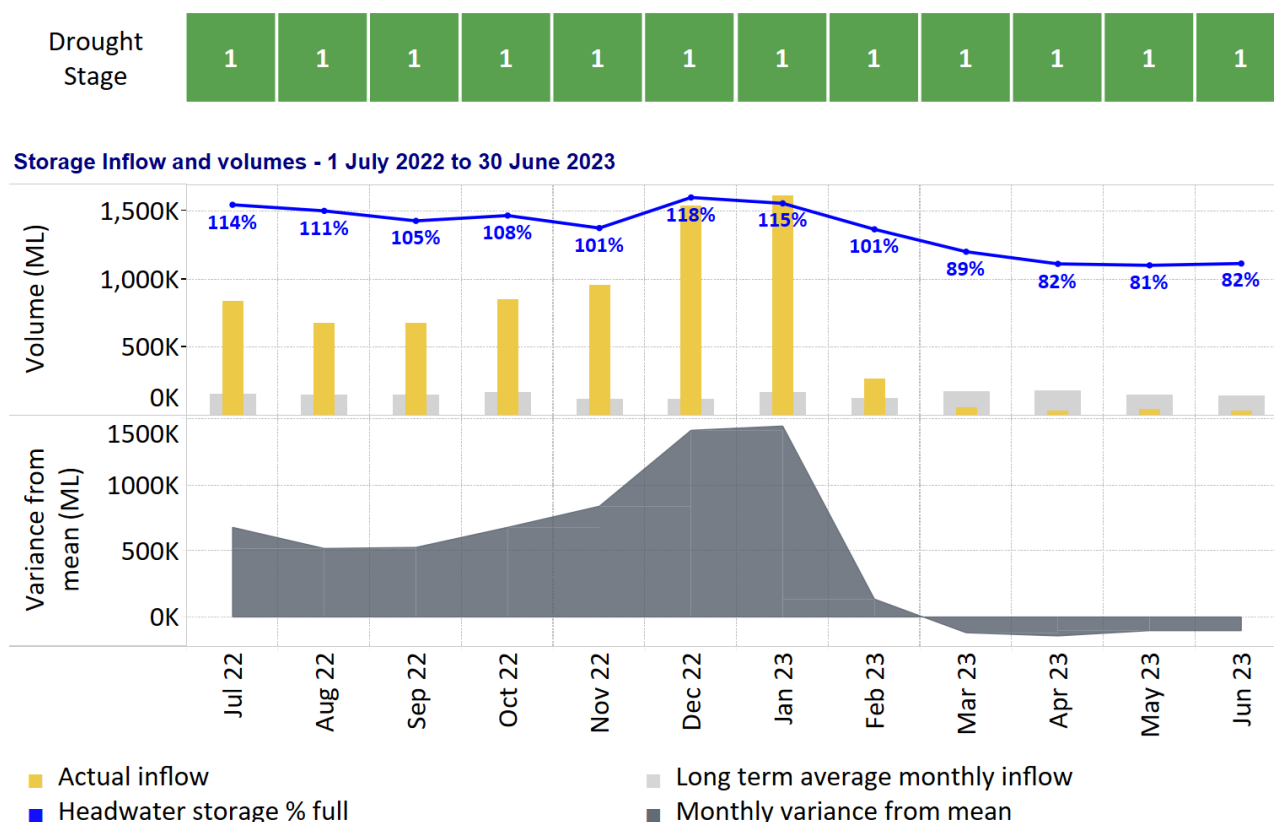
Extreme events stage

- At the commencement of the reporting period, the Lower Darling was in Stage 1 Normal Management and the Lakes were at 114% capacity. Both High Security and General Security users received an allocation of 1 ML per share.

Drought measures

- No drought restrictions were required during 2022–23 in the Lower Darling.
- (Figure 14).

Figure 14: Drought stage for the reporting period referenced with monthly headwater storage inflows, and monthly storage inflow variance from mean



Access rights

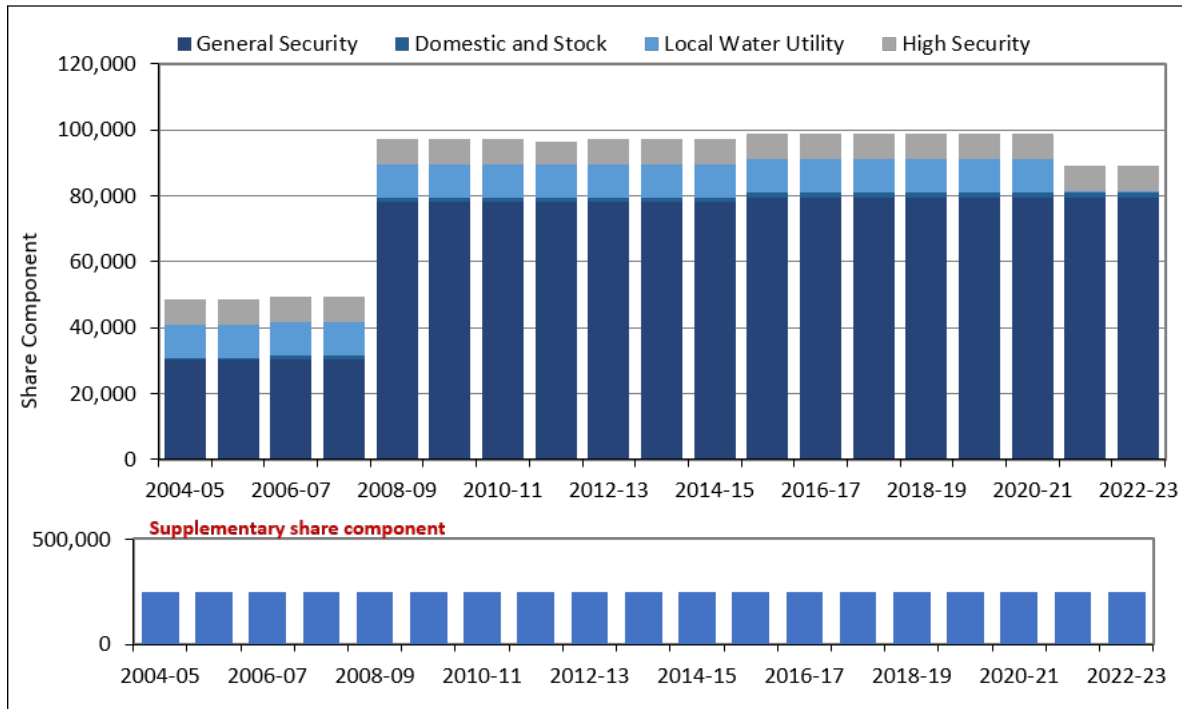
There was no change to the total issued share component across all licence categories for current reporting period. The total shares on issue (339,036), including the distribution by category can be seen in Table 6. The total annual issued share component by category since the commencement of water sharing plan management is presented in Figure 15.

Table 6: Issued share component on 30 June 2022

Category	Issued share component ⁵
Domestic and Stock	311
Domestic and Stock [Domestic]	418
Domestic and Stock [Stock]	612
Local Water Utility	422
Regulated River (General Security)	79,507
Regulated River (High Security)	7,771
Supplementary Water	250,000
Total	339,041

⁵ Specific purpose licences are issued as a volume in megalitres. All access licence volumetric units are referred to as shares for the purpose of this report

Figure 15: Issued share component since the commencement of the water sharing plan (supplementary licences separately)⁶



System operation

The total combined storage volume in the Menindee Lakes System was above 640,000 megalitres for all of 2022–23, with operational responsibility residing with the Murray Darling Basin Authority. See Note 7 for further details.

Allocation account summary

A summary illustration of the accounting for General Security and High Security access licence categories in the Lower Darling is provided in Figure 16 and Figure 17 respectively. Detailed information on the water accounts for all categories of licence issued are provided in Note 1 of this report.

⁶ Increase in entitlement in 2008–09 due to the granting of an environmental licence equivalent to savings obtained through a channel piping program.

Figure 16: Annual water account summary Lower Darling General Security

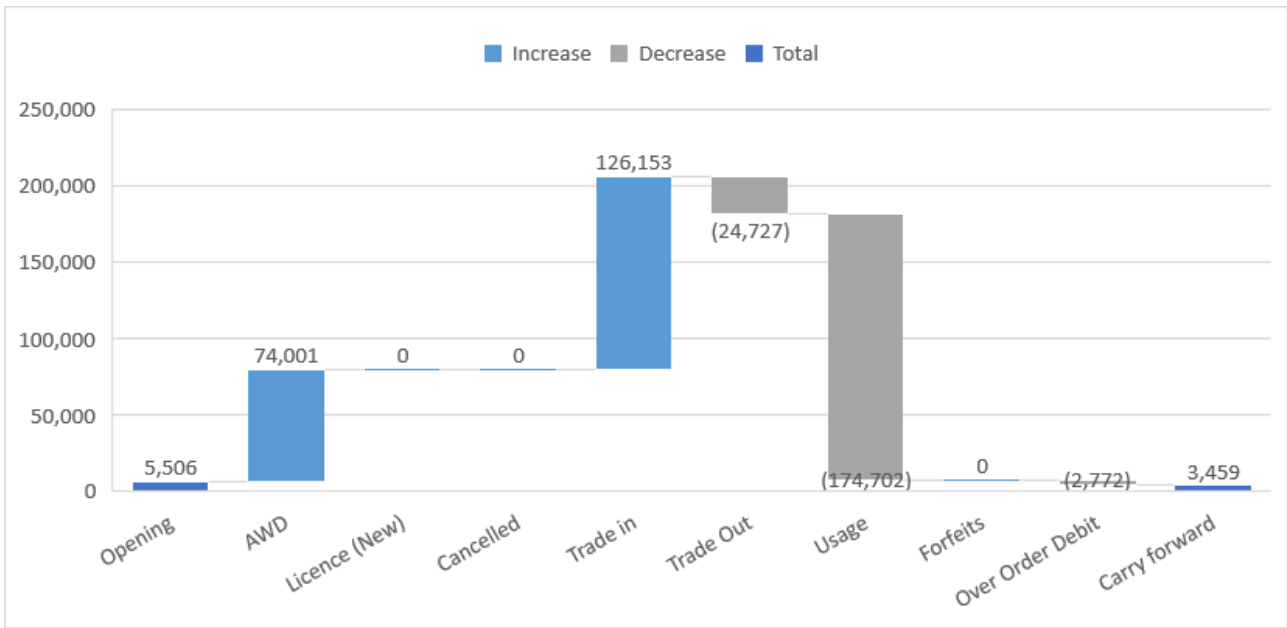
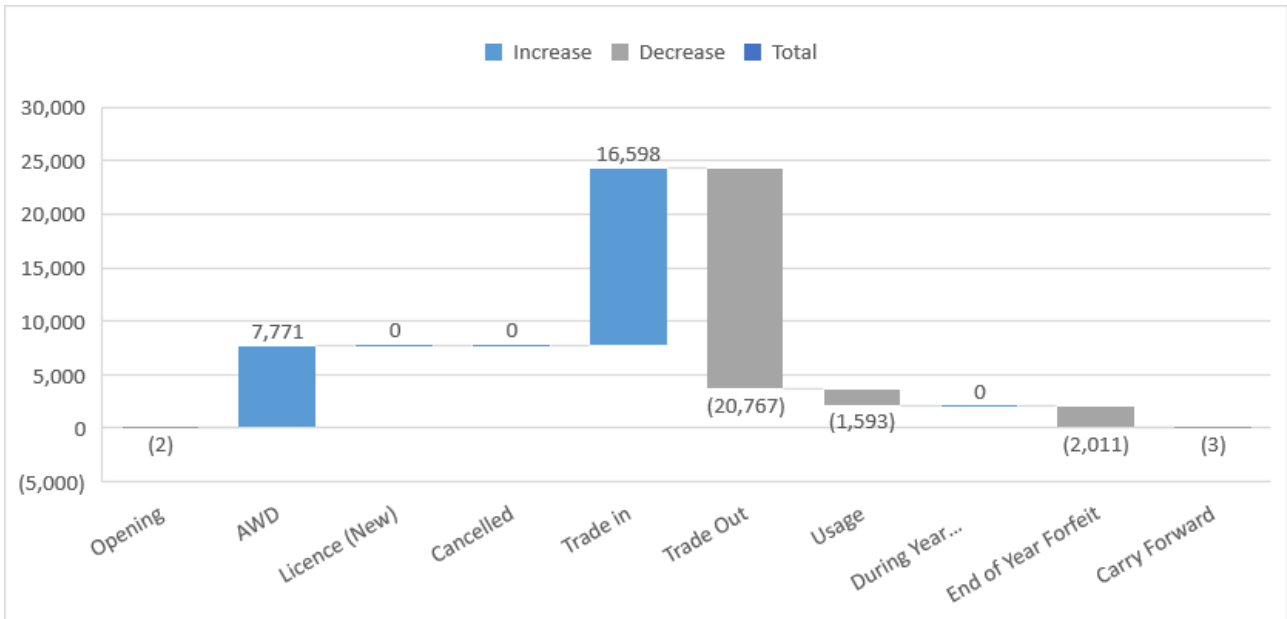


Figure 17: Annual water account summary Lower Darling High Security

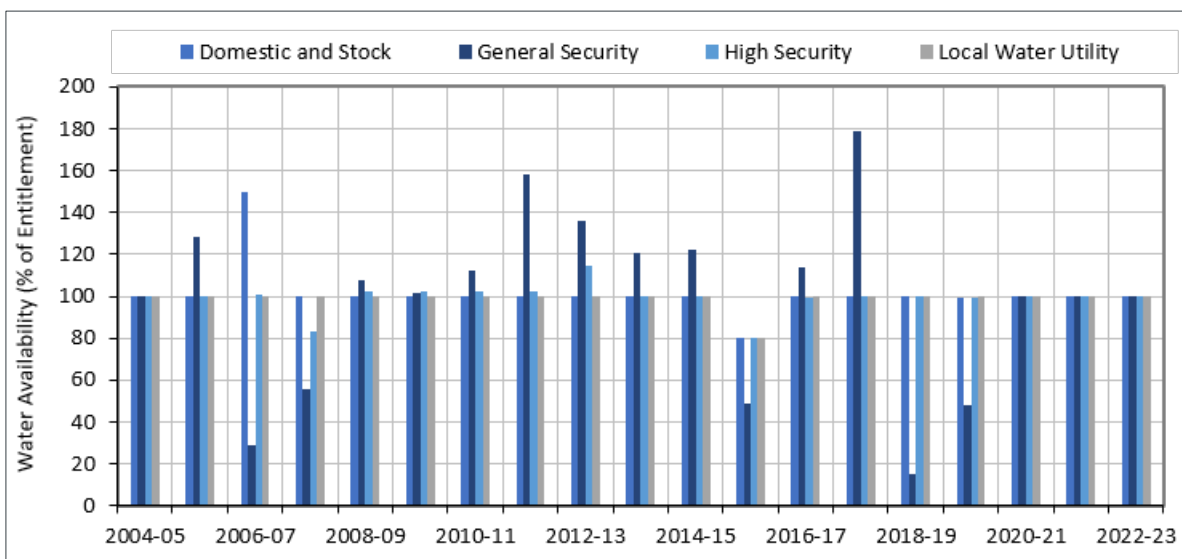


Water availability

- Domestic and Stock and Local Water Utility access licence holders received an opening available water determination (AWD) of 100%, the maximum permitted under the water sharing plan. No carryover provision is in place for these categories of licence.

- High Security access licence holders received an opening available water determination (AWD) of 1 megalitres per share (100%), the maximum permitted under the water sharing plan. No carryover provision is in place for High Security access licences.
- Supplementary water access licence holders received an opening AWD of 100%, the maximum allowed for under the water sharing plan.
- General Security access licences carried 5,506 megalitres into the reporting period, equivalent to 7% of the total issued share for this licence category.
- General Security access licences received an opening AWD of 1 megalitre per share, taking the total effective allocation (based on the AWD plus carryover limit) to 100% of the total issued share for this licence category the maximum allowed for under the water sharing plan.
- Excluding supplementary access (and temporary restrictions on account water usage) the overall water availability for access licences in the reporting period was 89,039 megalitres, equivalent to 100% of shares (Figure 18).
- Historical monthly water availability (carryover and available water determinations) under water sharing plan management conditions is presented for General Security and High Security access licences in Figure 19 and Figure 20 respectively. Periods when temporary water restrictions on usage were applied have been highlighted.

Figure 18: Water availability (AWD plus carry over)⁷



⁷ The Water Availability represented here is resulting from the AWD process and excludes the impacts of external trades. The AWD plus carryover for General Security licences in excess of 100% is a result of the water sharing plan rules that allow for carryover to include the on-farm storage capacities. An individual's maximum availability is the greater of 100% AWD or carryover plus 50% AWD. For more details, refer to water sharing plan.

Figure 19: General Security progressive (monthly) carryover and available water determinations as a percentage of share component

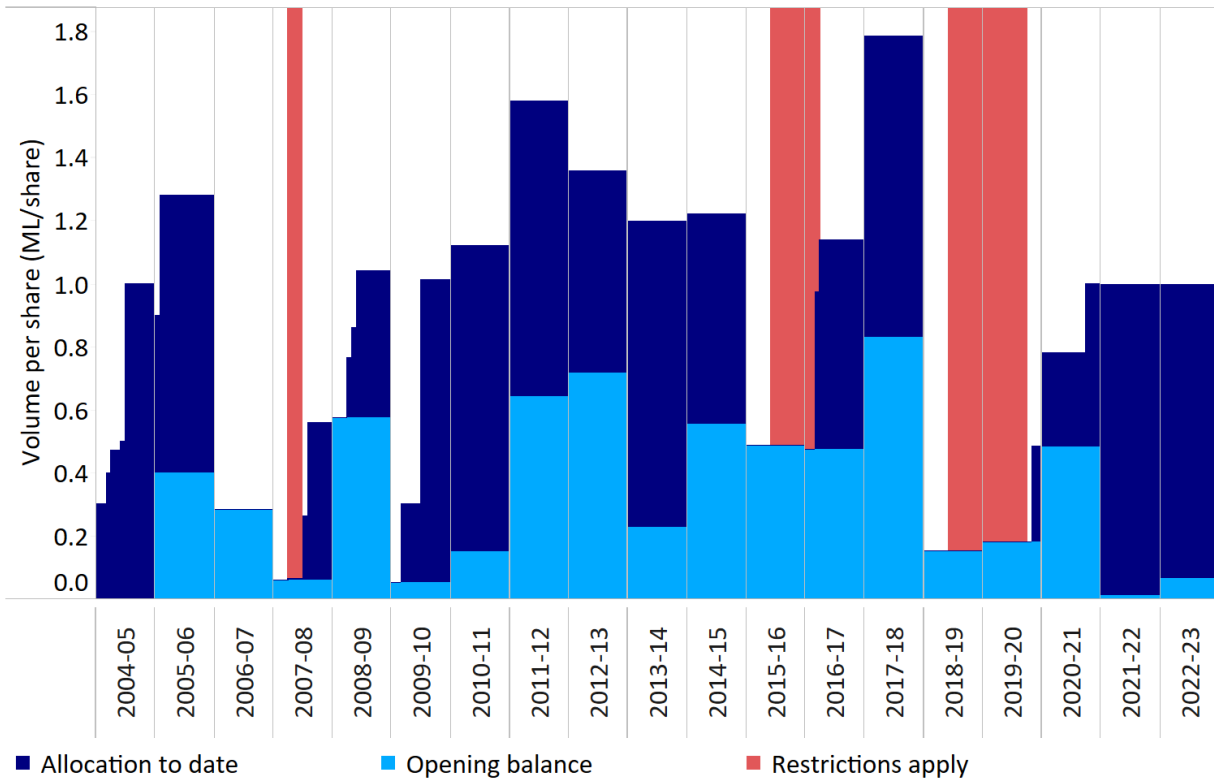
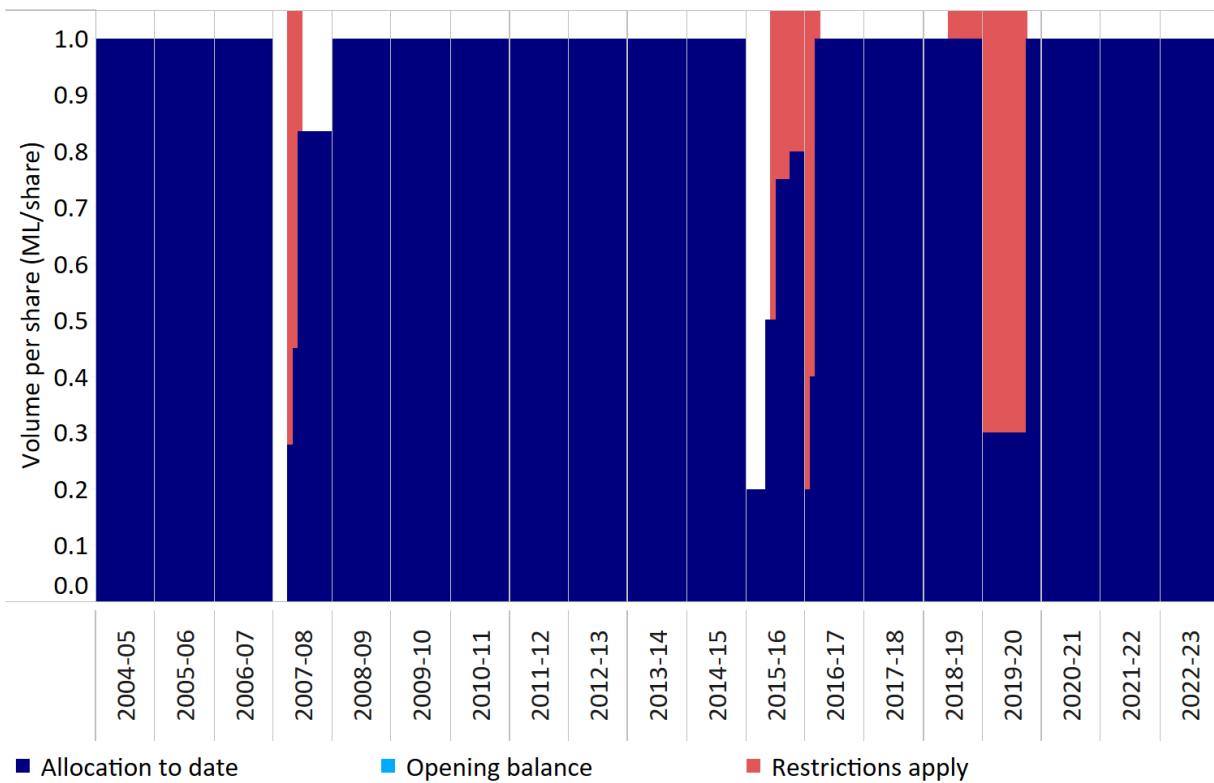


Figure 20: High Security progressive (monthly) carryover and available water determinations as a percentage of share component

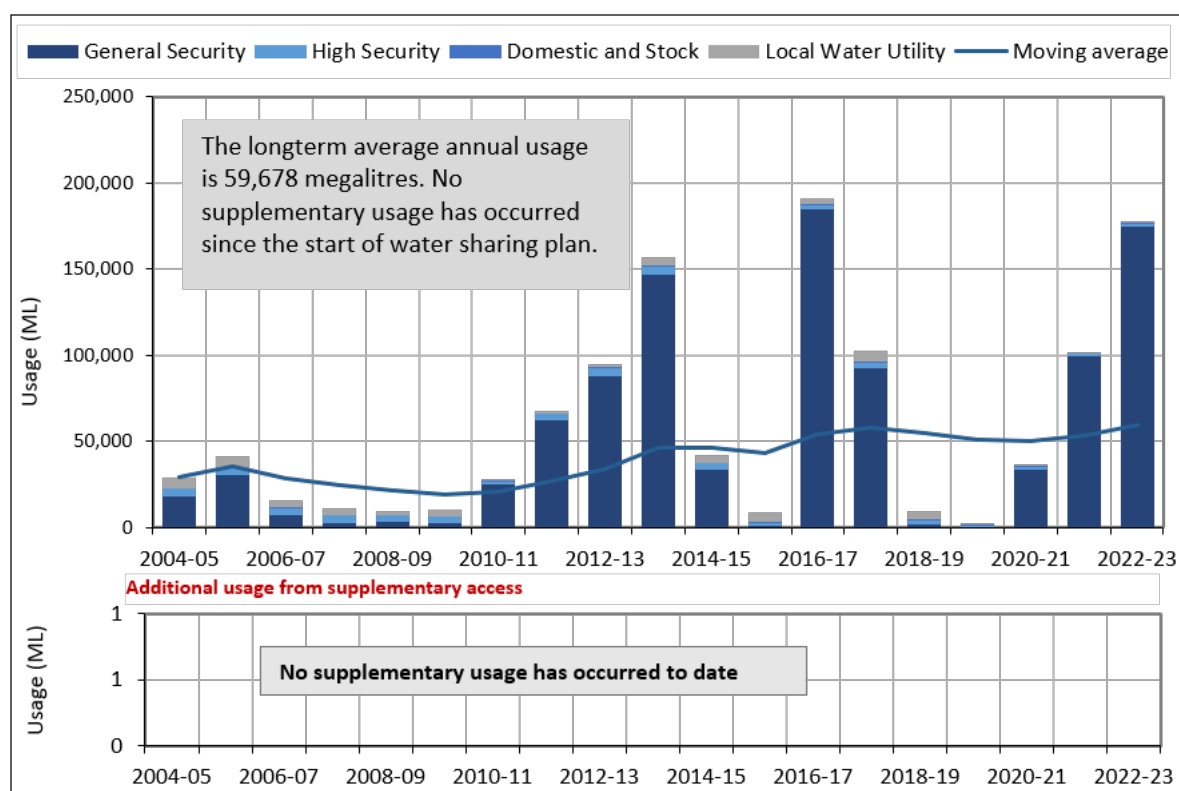


Account usage

Account usage refers to the total volume of water debited against an access licence account. Extractions that do not debit the account (uncontrolled flow provisions) may be available and are additional to account usage.

- Account usage from regulated supply totalled 176,809 megalitres for the reporting period, which was the highest since the 2016–17 water year ().
- No supplementary or uncontrolled flow usage has occurred under water sharing plan management conditions.
- Average usage (all categories of licence) is 59,678 megalitres (2004-05 to 2022-23)

Refer to disclosure Note 3 for further usage details.



Utilisation and inactive share

We consider an access licence entitlement 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 supply (this excludes supplementary water) in a specific water year, relative to the maximum amount available for use in that year.

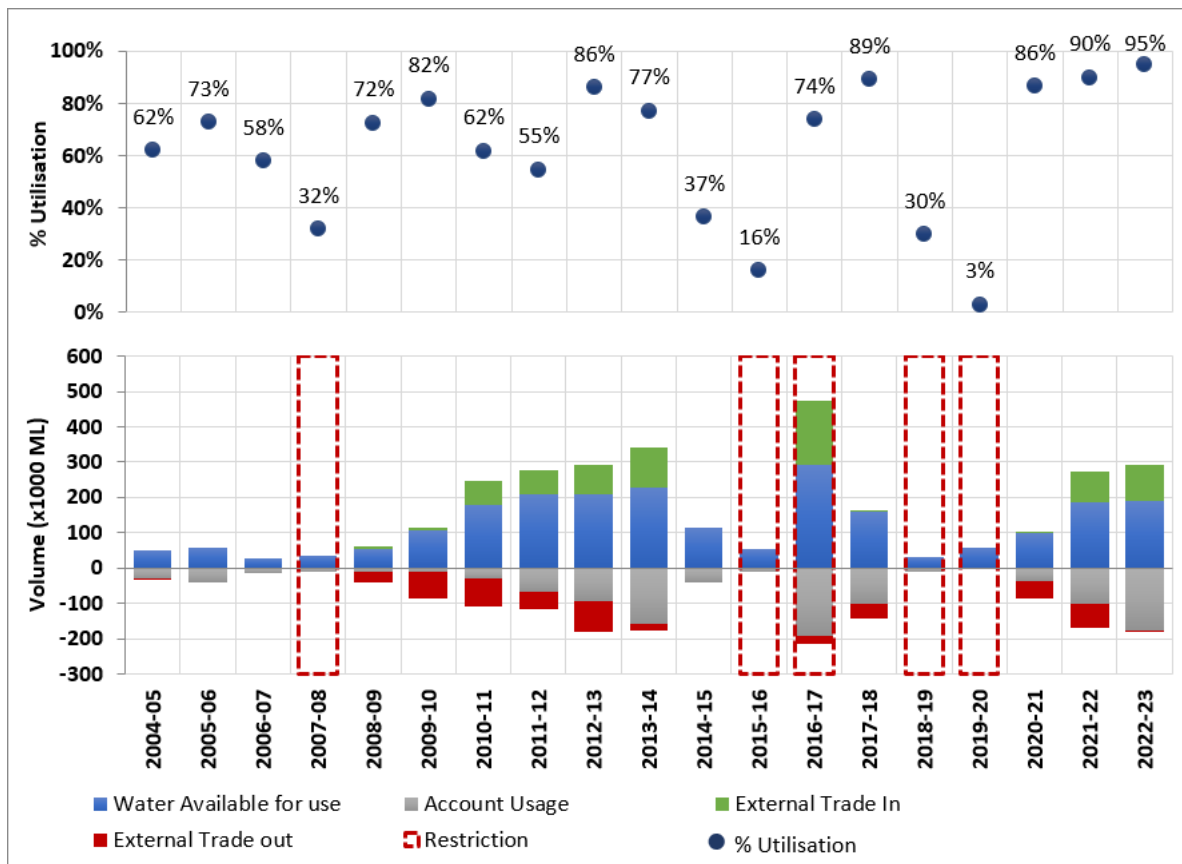
- 5% of General Security share component was inactive for the reporting period, a decrease of 3% on the prior reporting period (Table 7).

- Considering all categories of access licences with regulated supply, 6% of the share component was inactive, a decrease of 4% on the prior reporting period.
- No Supplementary Water access occurred in the reporting period.
- Utilisation of account water from regulated supplies (that is excluding supplementary access), increased to 95% from 90%, the highest under water sharing plan management conditions and reflective of the high level of water availability following significant inflows to storage during the 2 previous and current reporting period (Figure 21).

Table 7: NSW Lower Darling Regulated Water Source inactive licence summary

Licence Category	Inactive Licences (number)	Inactive Share Component	Inactive Share Component % of total (reporting period)	Inactive Share Component % of total (prior reporting period)
Domestic and Stock	9	73	23%	48%
Domestic and Stock [Stock]	2	573	94%	96%
Domestic and Stock [Domestic]	32	92	22%	49%
Local water utility	0	0	0%	0%
Regulated river (General Security)	52	4,077	5%	3%
Regulated river (High Security)	30	707	9%	3%
Total regulated supply	125	5,522	6%	4%
Supplementary Water	3	250,000	100%	100%

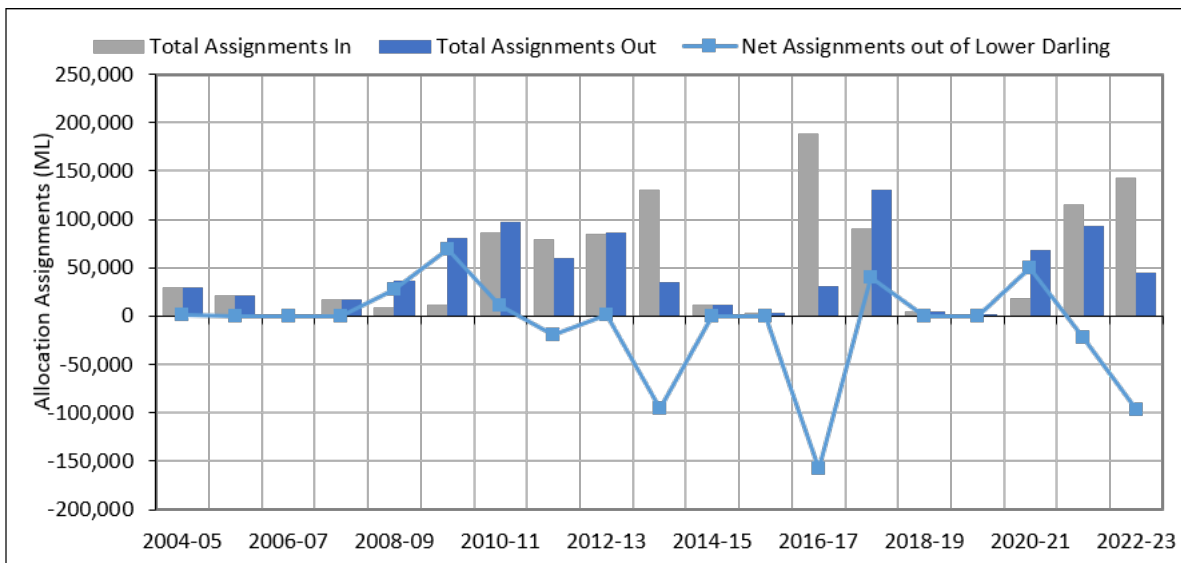
Figure 21: Percentage utilisation (water availability plus trade in from external water sources against account usage plus trade out to external water sources). Excludes supplementary and account usage restrictions.



Allocation assignments (temporary trading)

The volume of water moved between accounts via allocation assignments has increased for the period reflective of increased water availability. A total of 142,751 megalitres was assigned in to access licences and 45,494 megalitres assigned out, resulting in a net trade into the Lower Darling of 97,257 megalitres (Figure 22). This was the 2nd consecutive year since 2016–17 that a net movement into the water source has occurred. Detailed information on temporary trading is available in Note 4 of this GPWAR.

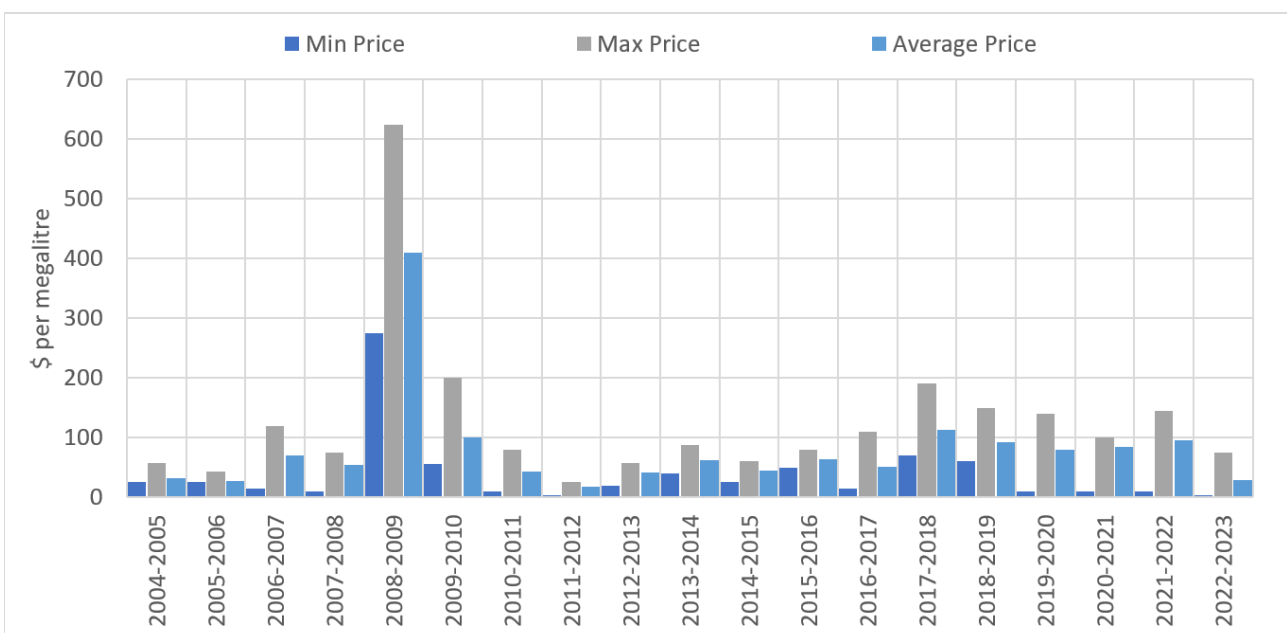
Figure 22: Net trade out of the Lower Darling (excluding supplementary)



Commercial temporary trading statistics

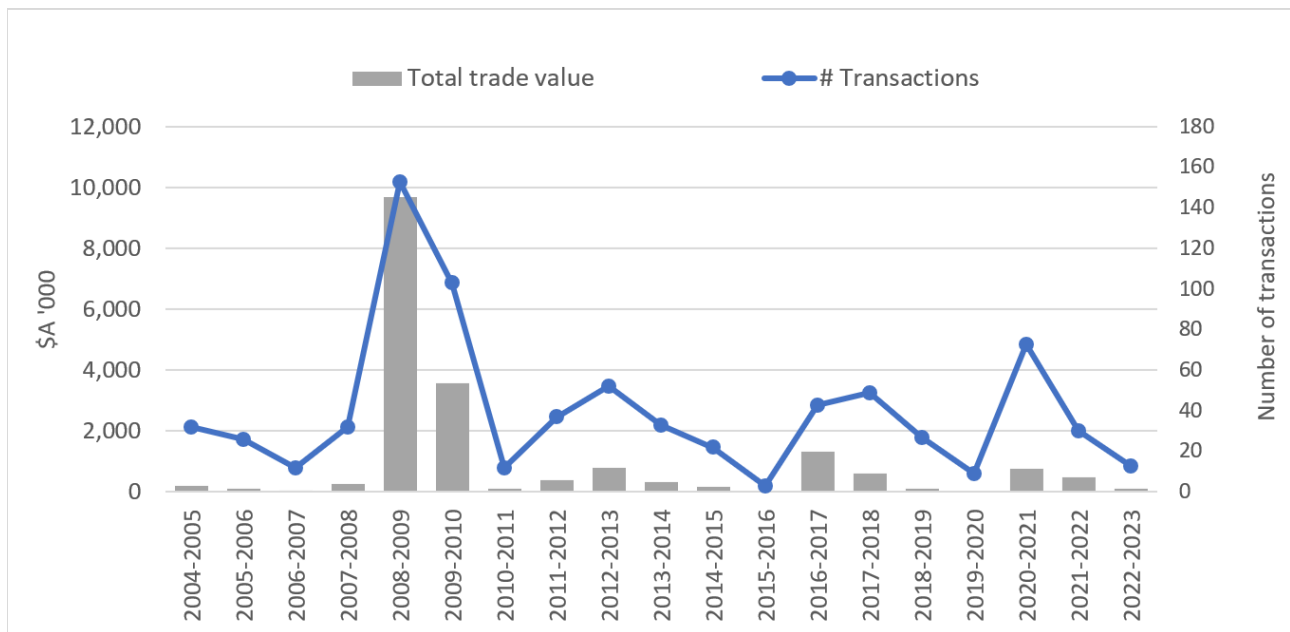
- A total of 13 transactions were processed for commercial consideration⁸ (Figure 25).
- The average price was \$29 per megalitre, up from \$95 per megalitre, a 70% decrease from the prior year.
- The maximum price paid for water was \$75 per megalitre.
- The total market value of temporary commercial trade was \$97,639, which is 80% decrease from last water year’s market value.

Figure 23: Lower Darling allocation assignments commercial price statistics since commencement of water sharing plan



⁸ Assumed as trades exchanged for a consideration of greater than \$1 per megalitres

Figure 24: Lower Darling allocation assignments commercial value statistics since commencement of water sharing plan



Permanent trading

There were Zero High Security share assignment processed in the reporting period (Figure 26). No General Security shares have been traded since 2013–14 (Figure 25). Overall, the permanent trading market in the Lower Darling (relative to other water sources in the southern Murray Darling Basin) remains subdued.

In addition to the share assignments, 1 transfer⁹ of licence holder occurred in 2022–23 for commercial purposes for a total of 123 shares (Figure 30).

⁹ Transfers associated with a consideration greater than \$1. The total for licence transfers was 963 shares via 7 transactions.

Figure 25: Lower Darling permanent assignments of shares commercial price statistics since the commencement of the water sharing plan – General Security

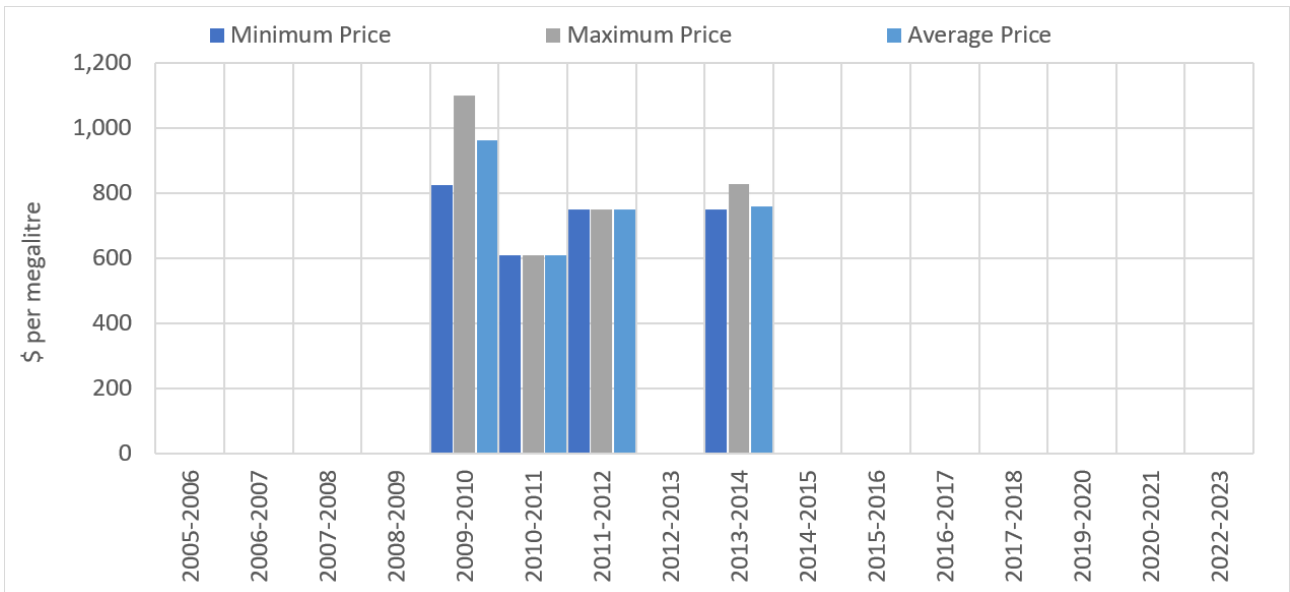


Figure 26: Lower Darling permanent assignments of shares commercial value statistics since the commencement of the water sharing plan – General Security

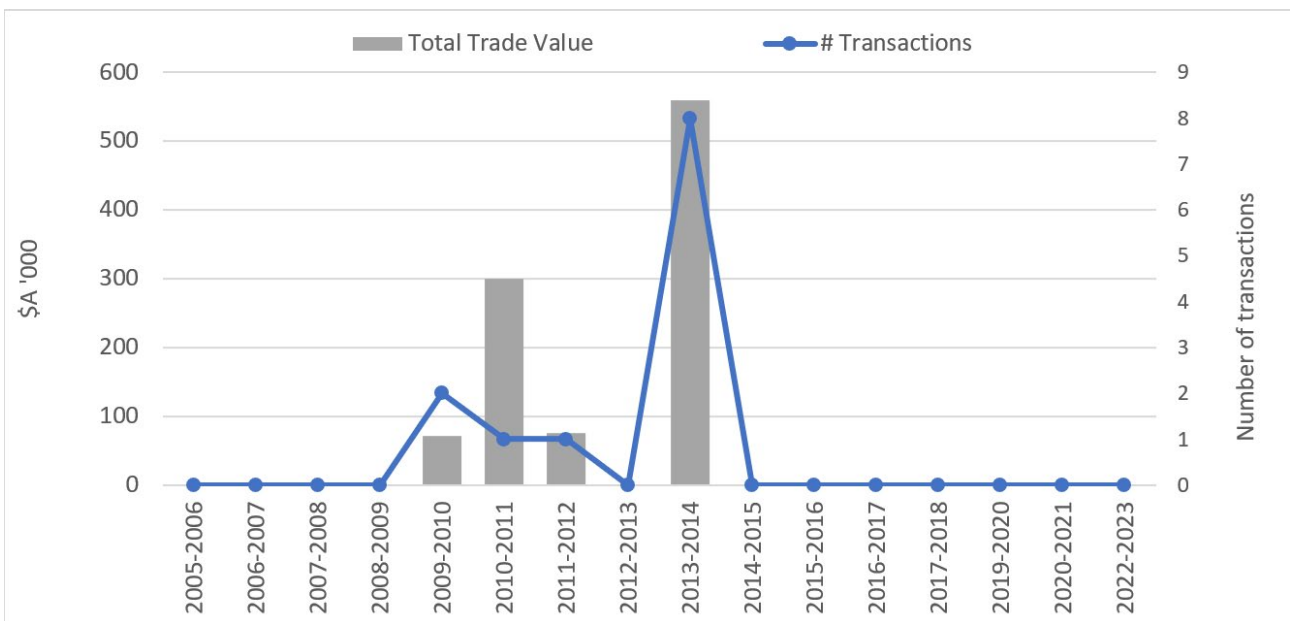


Figure 27: Lower Darling permanent assignments of shares commercial price statistics since the commencement of the water sharing plan – High Security

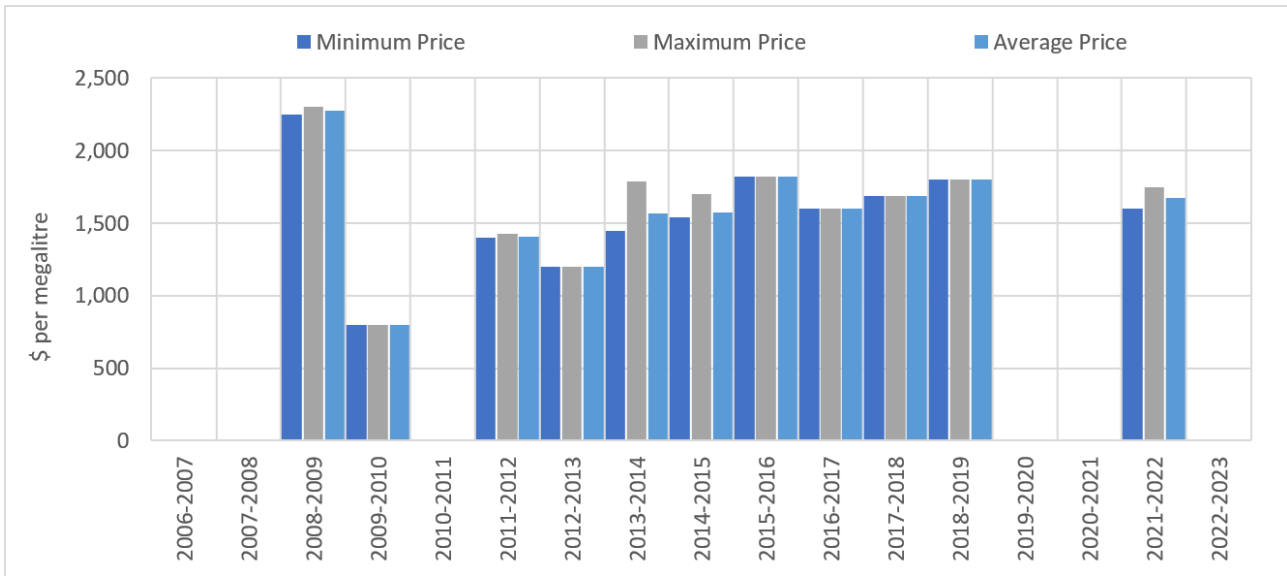


Figure 28: Lower Darling permanent assignments of shares commercial value statistics since the commencement of the water sharing plan – High Security

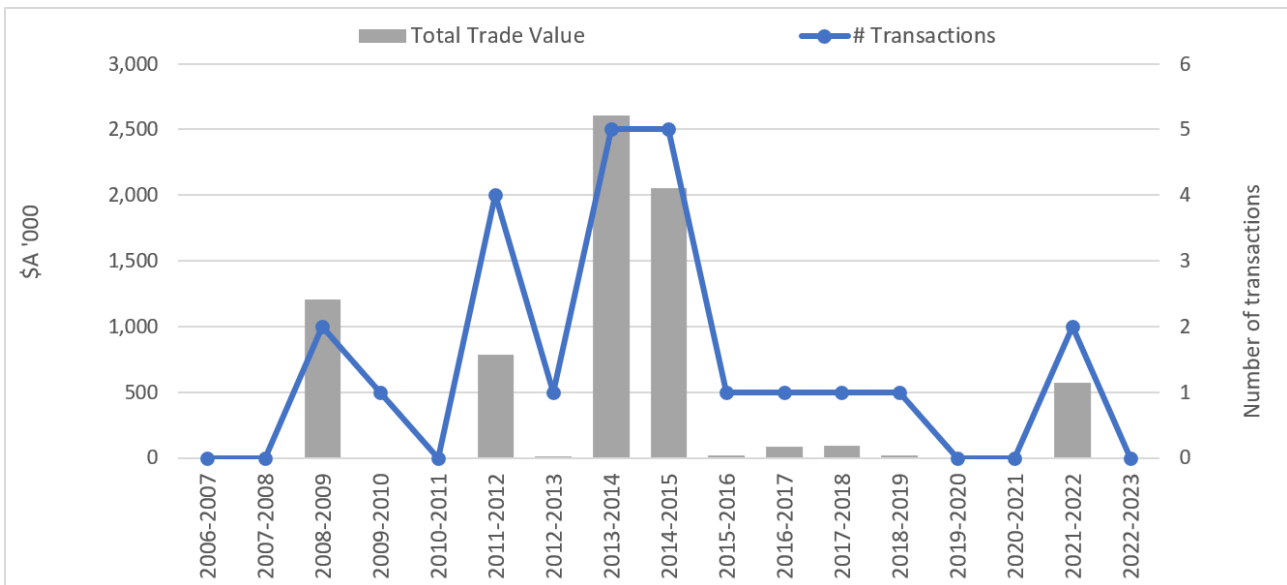
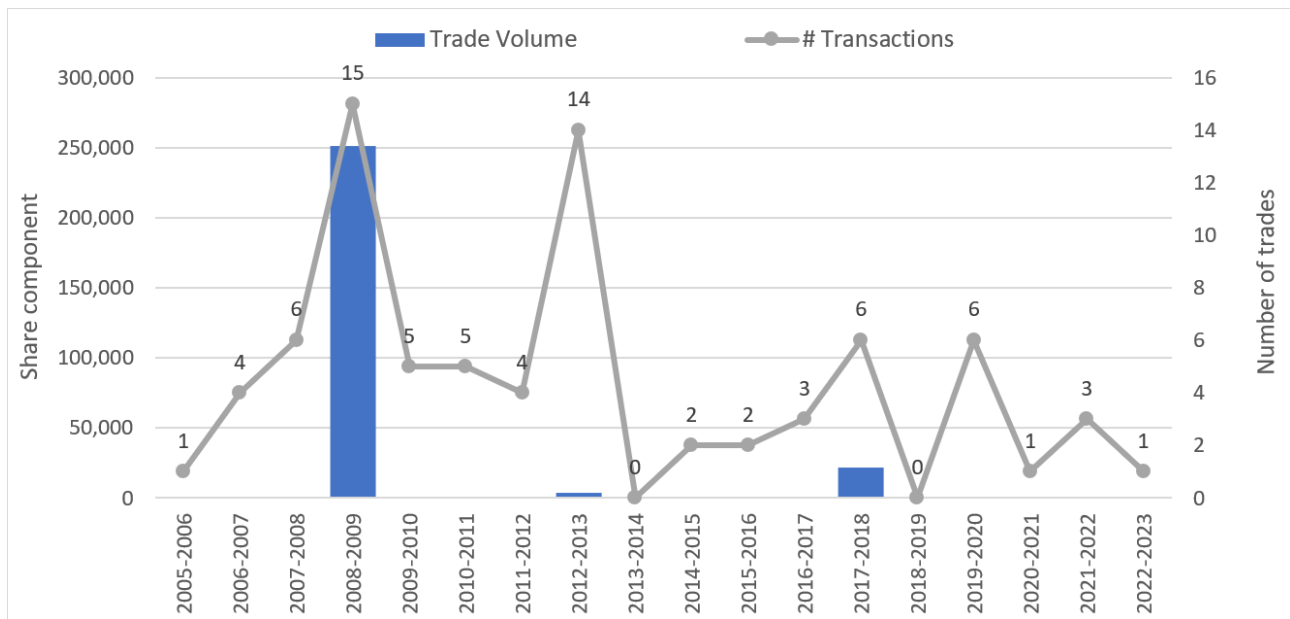


Figure 29: Change of licence holder



Environmental water

Held environmental water

There were no changes to the held environmental water portfolio in 2022–23. The total held environmental water share component as of 30 June 2023 was 324,098 shares, which includes a supplementary licence of 250,000 shares (Figure 30).

A total of 173,681 megalitres usage was accounted against general security environmental water holdings (Figure 31). No usage was recorded against high security environmental water holdings.

Detailed information about environmental watering in NSW is available from the Energy, Environment and Science website (www.environment.nsw.gov.au) and the Australian Department of the Environment & Energy (www.environment.gov.au). Further details about held environmental licence balances and trading are available in Note 5 of this document.

Figure 30: Held environmental water share component in the Lower Darling since the commencement of the water sharing plan

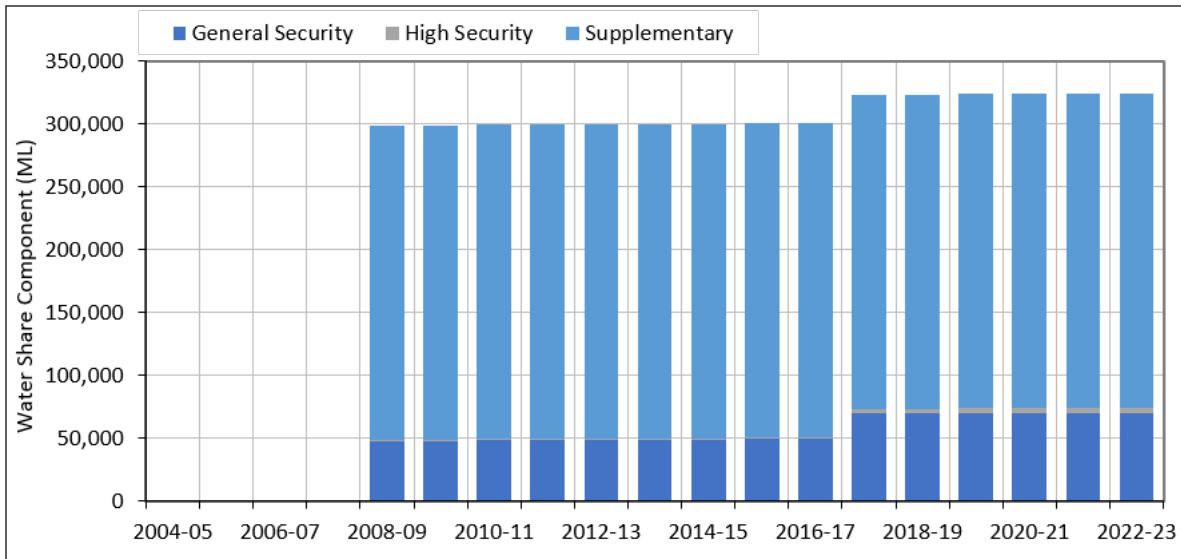
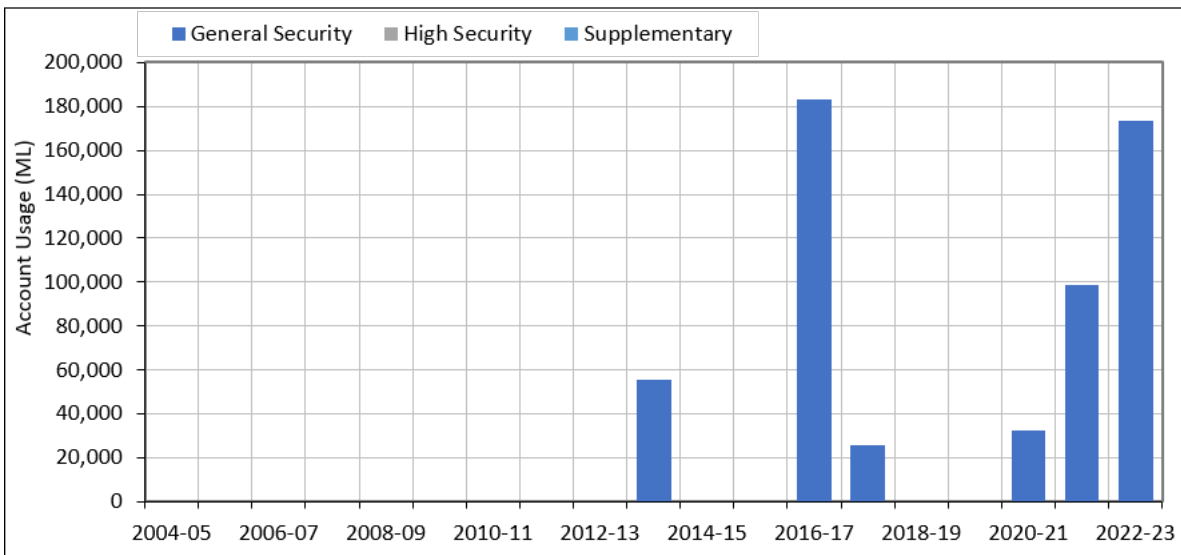


Figure 31: Held environmental usage since commencement of the water sharing plan



Planned environmental water – environmental water allowance

Planned environmental water refers to a range of environmental allowances and provisions implemented under the water sharing plan to improve environmental outcomes.

- The environmental water allowance (EWA) had an opening balance of 0 megalitres.
- 30,000 megalitres was credited to the EWA for the reporting period
- The EWA was used for the first time used since the commencement of the water sharing plan
- 30,000 was used to address critical water quality issues in the Lower Darling River at Menindee. Critically low oxygen levels, or hypoxic conditions, resulted in unprecedented numbers of fish dying in the Menindee town weir pool reach. Further Details can be found on <https://www.environment.nsw.gov.au>

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 'Physical Flow Diagram' that represents the physical movements of water to provide a clearer picture of this process.

For a detailed explanation of how to interpret the NSW Department of Climate Change, Energy, the Environment and Water water accounting statements, refer to *Interpreting New South Wales Office of Water General Purpose Water Accounting Reports*, which is available for download [here](#).

Quantification of data

Data accuracy

We have gathered the data for water movement and management from a variety of sources and systems. The data ranges from observed values where we anticipate a high degree of accuracy through to modelled results and estimates where accuracy can be highly variable, depending on a range of factors. To improve accuracy and prevent misuse of the data in the accounts, we have added an accuracy assessment to all figures in the water accounting statements (Table 8).

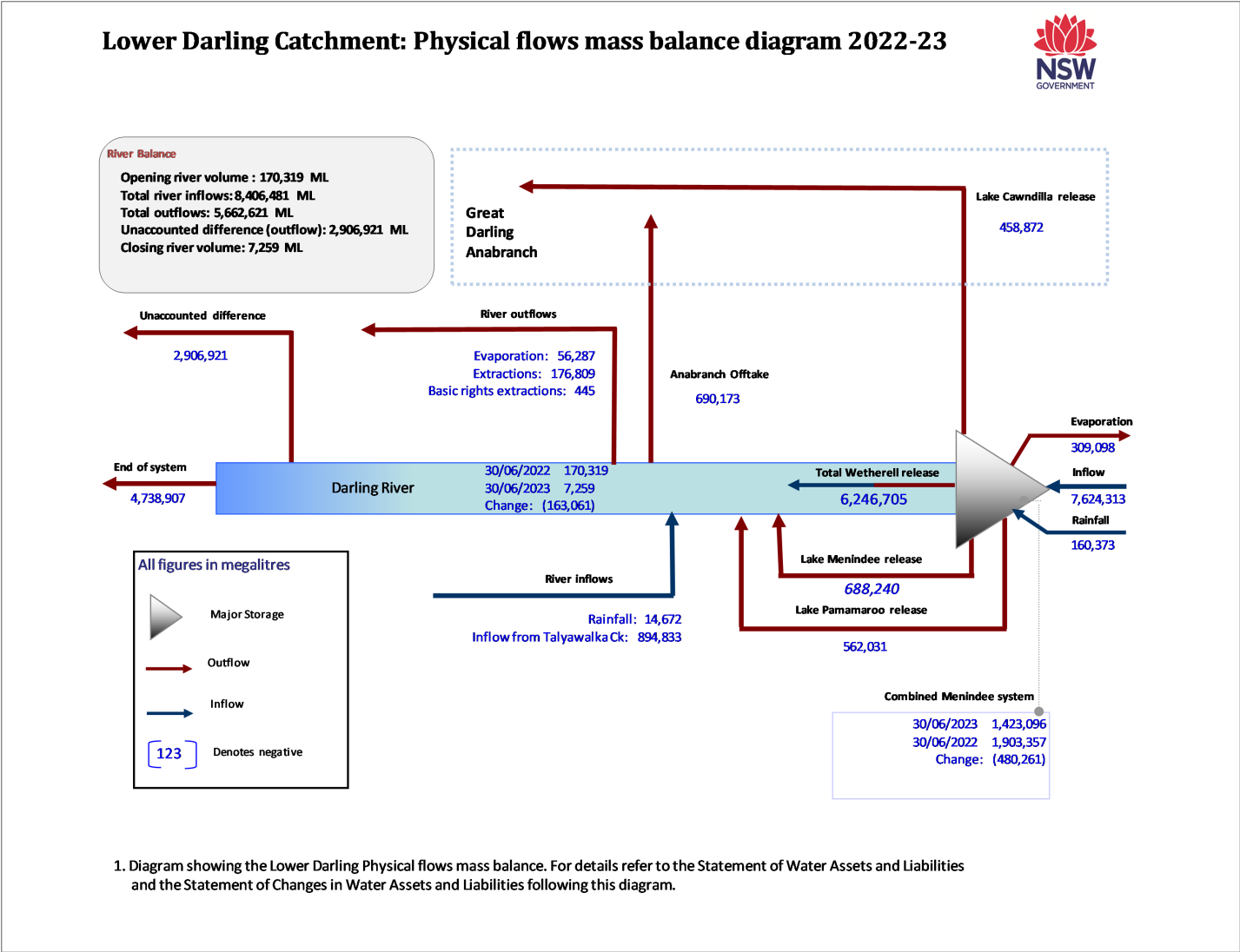
Table 8: Water account data accuracy estimates key

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

¹⁰ Non-physical administration items, such as available water determinations, trading and carryover volumes are assumed to have no inherent error for the purposes of this report. Items are reported as extracted from the NSW Department of Planning and Environment corporate database.

Accuracy	Description
C	+/- 50%
D	+/- 100%

Physical flows mass balance diagram



Statement of water assets and liabilities

For the year ended 30 June 2023

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

Surface water assets

1. Surface water storage	Accuracy	Notes	30 June 2023	30 June 2022
Combine Menindee System	A	7	1,423,097	1,903,357
River	B	8	7,259	170,319
Total surface water storage (Asws)	-	-	1,430,355	2,073,677
<i>Change in surface waters storage</i>	-	-	(643,321)	991,122

Surface water liabilities

2. Allocation account balance	Accuracy	Notes	30 June 2023	30 June 2022
Domestic and Stock	A1	1	0	0
Domestic and Stock [Domestic]	A1	1	0	0
Domestic and Stock [Stock]	A1	1	0	0
Local Water Utility	A1	1	0	0
General Security	A1	1	3,459	5,506
High Security	A1	1	(3)	(2)
Total allocation account balance (Lsws)	-	-	3,456	5,505
<i>Change in allocation account balance</i>	-	-	(2,049)	4,433

3. Planned Environmental Water Provisions	Accuracy	Notes	30 June 2023	30 June 2022
Environmental water allowance (Lewa)	A1	6	0	30000
<i>Change in environmental stimulus flow account balance</i>	-	-	(30000)	0

Surface water net changes

4. Net changes	30-06-2023	30 June 2022
Net surface water assets (Asws - Lsws - Lewa)	1,426,900	2,068,171
<i>Change in net surface water assets</i>	(641,272)	986,689

Statement of changes in water assets and liabilities

1 July 2022 to 30 June 2023

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

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

Surface water storage increases	Accuracy	Notes	2022-23	2021-22
Combined Menindee System	-	-	-	-
Inflow	A	9	7,624,313	5,045,780
Rainfall	B	10	160,373	135,712
River	-	-	-	-
Rainfall	C	11	14,672	7,074
Inflow from releases (total)	A	13	894,833	3,434,280
Inflow from Talyawalka Creek	B	12	7,496,976	37,316
Total surface water storage increases (Isws)	-	-	16,191,167	8,660,162

Surface water storage decreases	Accuracy	Notes	2022-23	2021-22
Menindee Lakes (combined storages)	-	-	-	-
Evaporation	B	10	309,098	474,886
Release (valve/spillway)	-	-	7,955,848	3,880,605
River	-	-	-	-
Evaporation	C	11	56,287	33,810
Outflow other	A	14	690,173	136,251
Flow leaving	A	14	4,738,907	2,506,989
Licence extractions	A	15	176,809	3,166
Basic landholder rights extractions	C	16	445	445
Unaccounted difference	D	17	2,906,921	632,877
Total Surface Water Storage Decreases (Dsws)	-	-	16,834,488	7,669,029
Net Surface Water Storage Inflow (Isws-Dsws-Usws)	-	-	(643,321)	991,122

2. Changes in allocation accounts

Allocation account increases	Accuracy	Notes	2022-23	2021-22
Available water determinations	-	-	-	-
Domestic and Stock	A1	2	311	311
Domestic and Stock [Domestic]	A1	2	418	418
Domestic and Stock [Stock]	A1	2	612	612
Local Water Utility	A1	2	74,001	78,334
General Security	A1	2	7,771	7,771
High Security	A1	2	422	10,135
Unregulated Flow Demand				
Supplementary Water (Demand)	A1	2	0	0
New licences	A1	1	0	0
Assignments in	A1	4	142,751	115,601
Total Allocation Account Increases (Iaa)			226,285	213,182

Allocation account decreases	Accuracy	Notes	2022-23	2021-22
Account usage	-	-	-	-
Domestic And Stock	A1	3	92	68
Domestic And Stock (Domestic)	A1	3	239	84
Domestic And Stock (Stock)	A1	3	25	15
General Security	A1	3	174,702	99,607
High Security	A1	3	1,593	1,614
Local Water Utility	A1	3	159	163
Supplementary Water	A1	3	0	0
Account forfeits	-	-	-	-
Domestic And Stock	A1	1	218	243
Domestic And Stock (Domestic)	A1	1	175	334
Domestic And Stock (Stock)	A1	1	587	597
General Security	A1	1	2,772	1,671
High Security	A1	1	2,011	696
Local Water Utility	A1	1	263	9,972
Licences cancelled	-	-	0	27
Domestic And Stock	A1	1	0	0
Domestic And Stock (Domestic)	A1	1	5	0
Assignments out	A1	4	45,494	93,686
Trade allocation account decreases (Daa)	-	-	228,334	208,749
Net Allocation Account Balance Increases (Iaa-Daa)	-	-	(2,049)	4,433

3. Change in environmental water allowance allowance (EWA)

Environmental water allowance increases	Accuracy	Notes	2022-23	2021-22
Account increases	A1	6	0	0
Total PEW account increases (Ipew)			0	0

Environmental water allowance decreases	Accuracy	Notes	2022-23	2021-22
Account usage	A1	6	30,000	0
Other account decreases	-	-	0	0
Total PEW account decreases (Dpew)	-	-	30,000	0
Net Environmental Contingency Allowance increase (Ipew - Dpew)	-	-	(30000)	0

4. Overall changes

Surface water assets	2022-23	2021-22
Change in net surface water assets (Isws - Dsws - Usws - laa + Daa - lewa + Deca)	(641,272)	986,689

Note disclosures

Reconciliation and future prospect descriptions

Lower Darling Catchment: Reconciliation of change in net water asset to net change in physical water storage	2022-23 (ML)	2021-22 (ML)
Change in net surface water assets	(641,272)	986,689
Non-physical adjustments	-	-
Net change in allocation accounts	(2,049)	4,433
Net change in environmental stimulus flow account	0	0
Net change in physical surface water storage	(636,839)	991,122

Lower Darling Catchment: Reconciliation of closing water storage to total surface water assets	30 June 2023 (ML)	30 June 2022 (ML)
Closing water storage	-	-
Lake Menindee	455,466	705,478
Lake Pamamaroo	279,042	313,135
Lake Wetherell	177,564	195,787
Lake Cawndilla	511,024	688,957
River	7,259	170,319
Total surface water assets	1,430,355	2,073,676
Add non-physical surface water assets	0	0
Subtract other state shares (when system in MDBA control)	718,150	948,890
Volume remaining to settle current NSW commitments and future demand	712,205	1,124,786

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 Lower Darling regulated river water source. This includes carryovers and available water determinations at the time of reporting, along with probability information about the Lower Darling system's reliability.

Latest water availability

You can find the latest information on water availability, including water allocation statements, water allocations summaries and the latest available water determinations, on the NSW Department of Climate Change, Energy, the Environment and Water webpage at 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 Menindee Lakes storage system at realtimedata.watarnsw.com.au

Significant events since 2022–23

Since the conclusion of 2022–23 Menindee Lakes has remained above 640 GL and continues to be managed by MDBA. There have been no significant flow events upstream and Inflows to Menindee Lakes have decreased accordingly. .

Flows downstream of the Menindee Lakes at Darling River at Pooncarie, have remained below the minor flood level (6.8 metres) with peak flows in flow a result of releases from Menindee Lakes..

System reliability

The Murray–Darling Basin Authority's long-term planning model (BIGMOD) reflects water sharing plan management conditions in the Lower Darling. It provides indicative system reliability information for the commencement and closure of a watering season.¹¹

¹¹ The BIGMOD model simulation uses a water year of July to June. Simulation period 1 July 1895 to 30 June 2008

In a given year, the simulation indicates High Security entitlements are likely to have full allocation maintained at 100% for 73% of the time (Figure 32). By the end of the water year, effective allocation improves to 100% for 96% of the time (Figure 33).

For General Security holders, long-term opening allocations reach 100% effective allocation 64% of the time (Figure 34). However, by the end of the water year, this significantly increases, with 100% of effective allocation achieved 93% of the time (Figure 35).

Figure 32: Start of water year simulated availability for High Security licences

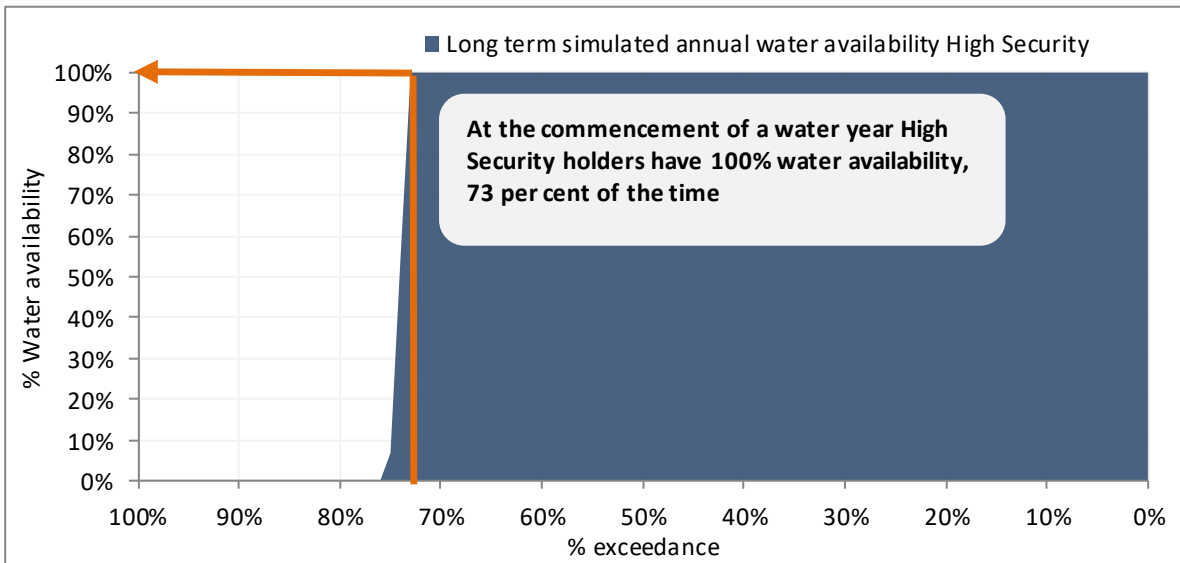


Figure 33: End of water year simulated availability for High Security licences

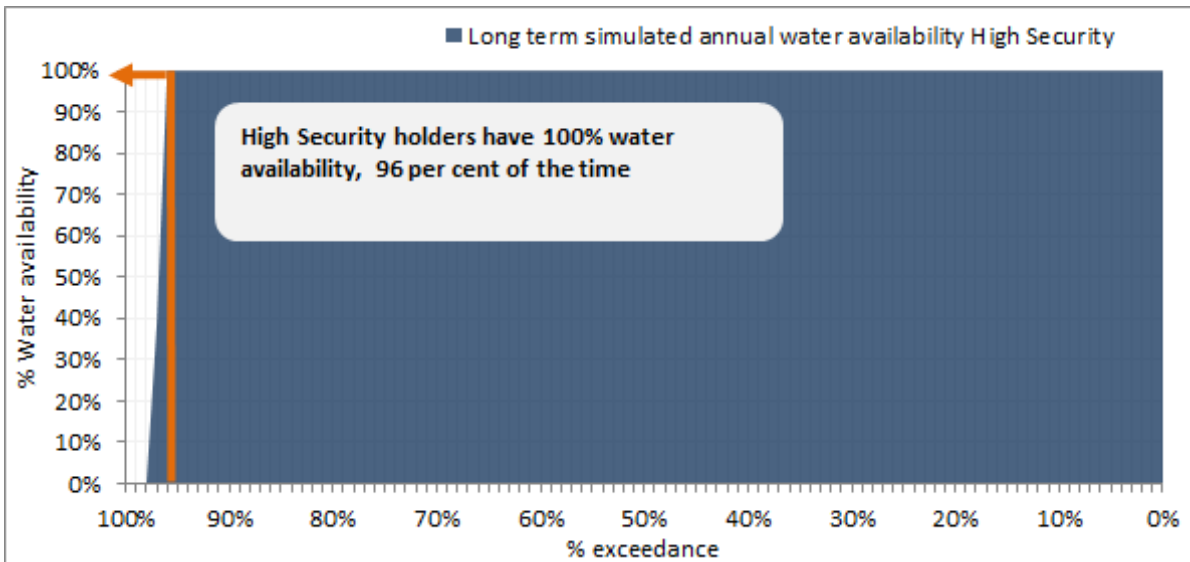


Figure 34: Start of water year availability for General Security licences

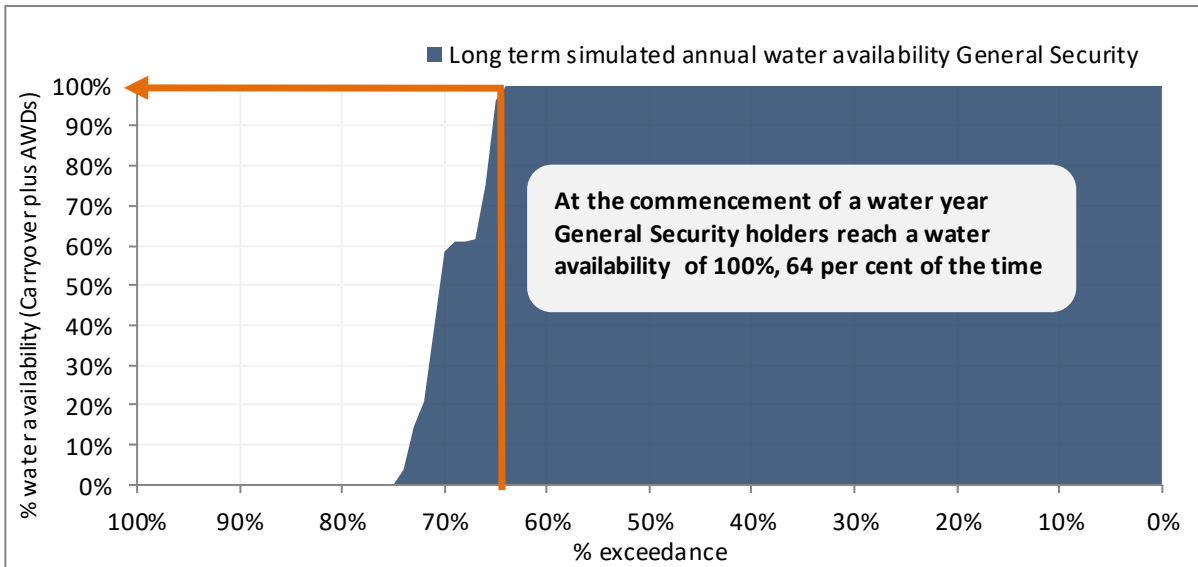
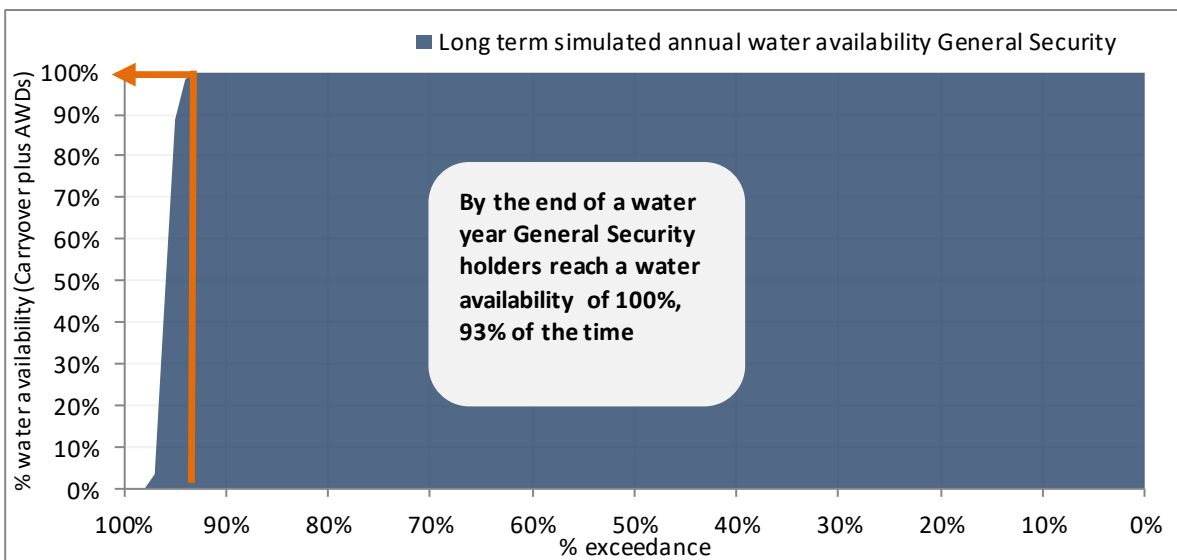


Figure 35: Full water year availability for General Security licences



Carryovers and available water determinations since close of reporting period (2022–23)

Table 9: Carryovers and available water determinations 2023–24 (as of March 2024)

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 (%)
LOWER-DARLING REGULATED RIVER WATER SOURCE											
DOMESTIC AND STOCK											
01-Jul-23	AWD 100.0 %	311	311	311	100.0%	100.0%	311	0	311	100.0%	100.0%
DOMESTIC AND STOCK[DOMESTIC]											
01-Jul-23	AWD 100.0 %	413	413	413	100.0%	100.0%	413	0	413	100.0%	100.0%
DOMESTIC AND STOCK[STOCK]											
01-Jul-23	AWD 100.0 %	612	612	612	100.0%	100.0%	612	0	612	100.0%	100.0%
LOCAL WATER UTILITY											
01-Jul-23	AWD 100.0 %	422	422	422	100.0%	100.0%	422	0	422	100.0%	100.0%
REGULATED RIVER (GENERAL SECURITY)											
01-Jul-23	AWD 1.0 ML per Share	79,507	76,049	76,049	95.7%	95.7%	79,508	0	79,508	100.0%	100.0%
REGULATED RIVER (HIGH SECURITY)											
01-Jul-23	AWD 1.0 ML per Share	7,771	7,771	7,771	100.0%	100.0%	7,768	0	7,768	100.0%	100.0%
SUPPLEMENTARY WATER											
01-Jul-23	Opening	250,000			0.0%	0.0%	0	0	0	0.0%	0.0%
01-Jul-23	AWD 1.0 ML per Share	250,000	250,000	250,000	100.0%	100.0%	250,000	0	250,000	100.0%	100.0%

Detailed item notes

Note 1 – Allocation accounts

This note is a reference for the volume held in the allocation accounts at the time of reporting but is also relevant for the various processes that 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 that licence category. It represents the 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.

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 is done by licence category and is therefore inclusive of licences held by environmental holders (these are also detailed separately in Note 5).

Supplementary account water has not been represented as a liability in the accounts, as the liability is contingent on river conditions at any time.

Data type

Derived from measured data

Policy

- *Water Management Act 2000*
- *Water Sharing Plan for the NSW Murray and Lower Darling Regulated River Water Source 2016*
- Available on the NSW Department of Climate Change, Energy, the Environment and Water website at www.industry.nsw.gov.au/water

Data accuracy

A1 – Estimated in the range +/- 0%

Providing agency

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

Data source

Water Accounting System

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 determinations (AWD) (detailed in Note 2)
- licenced usage (detailed in Note 3)
- forfeiture due to:
 - carryover rules
 - account spillage as a result of AWD
 - licence conversions or cancellations
 - allocation account limits
- trade of allocation water between accounts (detailed in Note 4).

Additional information

Table 11 provides a balanced summary of the water allocation accounts for each category of access licence. Below (Table 10) is a description of each of the table components for Table 11 and Table 18.

Table 10: Explanatory information for allocation account summary (Table 11) and held environmental allocation account summary (Table 18)

Heading	Description
Share	Total amount of entitlement in the specific licence category
Opening balance	Volume of water carried forward from the previous year's allocation account
AWD	Total available water determination – The total annual volume of water added to the allocation account because of allocation assessments
Lic New	Licences – New: Increase in account water because of issuing new access licences
Lic Can	Licences – Cancelled: Decrease in account water because of licence cancellation
Asn In	Assignment – In: Increase in account water because of temporary trade in

Heading	Description
Asn Out	Assignment – Out: Decrease in account water because of temporary trade out
Account usage	Volume of water extracted or diverted from the river and accountable against the relevant licence category
During-year forfeit	Water forfeited throughout the year because of the accounting rules specified in the water sharing plan, such as because account limits being reached, conversions between licence categories and various other licence dealings
EoY Avail	End of year balance – Available: That part of the account balance available to be taken at the conclusion of the water year
EoY NA	End of year balance – Not available: That part of the account balance not available to be taken at the conclusion of the water year
EoY forfeit	End of year forfeit: Account water forfeited at the end of the water year because of carryover rules that restrict the carry forward volume
Carry fwd	Carry forward: Account water permitted to be carried forward into the next water year, as determined by the carryover rules

Table 11: Allocation account balance summary for the Lower Darling regulated river 2022–23. See Table 10 for explanation of headings.

Licence category	Share (30 June)	Opening balance	AWD	Lic New	Lic Can	Asn In	Asn Out	Account usage	During-year forfeit	EoY Avail	EoY NA	EoY forfeit	Carry fwd
Domestic and Stock	311	0	311	0	0	0	0	92	0	218	0	218	0
Domestic and Stock [Domestic]	413	0	418	0	0	0	0	239	0	175	0	175	0
Domestic and Stock [Stock]	612	0	612	0	0	0	0	25	0	587	0	587	0
Local Water Utility	422	0	422	0	0	0	0	159	0	263	0	263	0
General Security	79,507	5,506	74,001	0	0	126,153	24,727	174,702	0	6,231	0	2,772	3,459
High Security	7,771	(2)	7,771	0	0	16,598	20,767	1,593	0	2,008	0	2,011	(3)
Supplementary Water	250,000	0	250,000	0	0	0	0	0	0	250,000	0	250,000	0

Note 2 – Available water determination (AWD)

This is the process by which the regulated surface water asset available for use within the regulated system is determined and shared. It determines the volume of water that we add 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.

Data type

Derived from 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.

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

Data accuracy

A1 – Nil inaccuracy +/- 0%

Providing agency

NSW Department of Planning and Environment

Data source

- Water Accounting System
- Available Water Determination Register: waterregister.watarnsw.com.au

Methodology

The AWD procedure itself is generally divided into 2 sections: the available water asset, and system commitments. Once system commitments have been met, the available water asset is then available for distribution to the access licence categories in order of priority (Table 12).

The volume of the announced allocation is expressed as the percentage share component of the licence.

Table 12: Priority of access licence categories

Licence category	AWD priority
GS	Low
High Security	High
Conveyance	Low
Domestic and Stock ¹	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 (for example, orchards, vineyards) and environmental allowances
- **undelivered account water**, which is the water already in accounts that is 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.

The AWD for supplementary licence accounts is a separate process and is not dependent on the water asset available. It is made once at the start of the year. Unless there is a management change due to the growth in use, the strategy is maintained at the maximum value prescribed in the plan – generally 100% of the share component. Therefore, it is not

¹ Domestic and Stock is further broken down into 3 subcategories: Domestic and Stock, Domestic and Stock (Domestic) and Domestic and Stock (Stock). For the purposes of this report and the general-purpose water account, they were all treated as Domestic and Stock.

considered a liability on the system and is only considered an extraction that reduces the water asset.

Additional information

Table 14 contains the allocation summary report for the reporting period. Table 13 is contains notes to help interpret the report.

Table 13: Explanatory information for allocation announcement table

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 % (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 now
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 for Lower Darling regulated river water source 2022-23

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											
01-Jul-22	Opening	311			0.0%	0.0%	0	0	0	0.0%	0.0%
01-Jul-22	AWD 100.0 %	311	311	311	100.0%	100.0%	311	0	311	100.0%	100.0%
DOMESTIC AND STOCK[DOMESTIC]											
01-Jul-22	Opening	418			0.0%	0.0%	0	0	0	0.0%	0.0%
01-Jul-22	AWD 100.0 %	418	418	418	100.0%	100.0%	418	0	418	100.0%	100.0%
DOMESTIC AND STOCK[STOCK]											
01-Jul-22	Opening	612			0.0%	0.0%	0	0	0	0.0%	0.0%
01-Jul-22	AWD 100.0 %	612	612	612	100.0%	100.0%	612	0	612	100.0%	100.0%
LOCAL WATER UTILITY											
01-Jul-22	Opening	422			0.0%	0.0%	0	0	0	0.0%	0.0%
01-Jul-22	AWD 100.0 %	422	422	422	100.0%	100.0%	422	0	422	100.0%	100.0%
REGULATED RIVER (GENERAL SECURITY)											
01-Jul-22	Opening	79,507			0.0%	0.0%	5,506	0	5,506	6.9%	6.9%
01-Jul-22	AWD 1.0 ML per Share	79,507	74,001	74,001	93.1%	93.1%	79,507	0	79,507	100.0%	100.0%
REGULATED RIVER (HIGH SECURITY)											
01-Jul-22	Opening	7,771			0.0%	0.0%	(2)	0	(2)	0.0%	0.0%
01-Jul-22	AWD 1.0 ML per Share	7,771	7,771	7,771	100.0%	100.0%	7,770	0	7,770	100.0%	100.0%
SUPPLEMENTARY WATER											
01-Jul-22	Opening	250,000			0.0%	0.0%	0	0	0	0.0%	0.0%
01-Jul-22	AWD 1.0 ML per Share	250,000	250,000	250,000	100.0%	100.0%	250,000	0	250,000	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.

Data type

Measured/administration data

Policy

Not applicable

Data accuracy

A – Estimated in the range +/- 10%

Providing agency

NSW Department of Planning and Environment

Data source

- Water Accounting System

Methodology

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

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

- Based on periods of announcement – during periods of supplementary water announcements, extractions can be debited against the Supplementary Water licences

- Usage is based on water orders – users place orders for water against an access licence and usages are debited against accounts in proportion to the orders placed
- Licence category apportionment – if no water orders are available, water extracted is apportioned against categories of access licence in order of priority, as set out in the next table. The ranking is based on the nature and rules of each of the licence categories.

Table 15 shows the order in which extractions are apportioned to access licence categories, starting at priority 1. This is a generic list where not all categories will necessarily appear in this GPWAR. There are also various sub-categories of licence associated with some of these.

Account usages for the reporting period are illustrated in Table 16.

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 (GS)
6	Conveyance
7	Local Water Utility
8	Major Water Utility

Table 16: Account usage summary for reporting period

Licence category	Account usage (ML)
Domestic and Stock	92
Domestic and Stock [Domestic]	239
Domestic and Stock [Stock]	25
Local Water Utility	159
Regulated River (GS)	174,702
Regulated River (High Security)	1,593
Supplementary Water	0

Licence category	Account usage (ML)
Total	176,809

Note 4 – Temporary trading/allocation assignments

This represents the temporary trading (allocation assignments) of water either between allocation accounts within the regulated Lower Darling system (internal trading), or trading between the southern connected valleys or the Murray–Darling Basin (external). External allocation assignments may be between another water source within NSW or another state.

Data type

Administration

Policy

Water Sharing Plan for the NSW Murray and Lower Darling Regulated River Water Sources 2016

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

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

- Murray–Darling Basin Agreement Protocol 2010
 - Schedule D – Permissible Transfers between Trading Zones
 - Part 6 – Restrictions on transfers

Available at www.legislation.gov.au

Data accuracy

A1 – Nil inaccuracy +/- 0%

Providing agency

NSW Department of Planning and Environment

Data source

- Water Accounting System

Methodology

The net internal trade for each licence category is zero for a water year. In order to display the trade information within the statements, an internal trade is represented as both a water liability decrease (seller of water) and the equivalent water liability increase (buyer of water).

External trading is represented by either increasing (trading into the Lower Darling from an external water source) or decreasing (trading from the Lower Darling to an external water source) the associated licence category liability.

Additional information

Table 17 presents the temporary trading figures between licence categories for the Lower Darling. All figures represent a volume in megalitres.

Table 17: Lower Darling regulated river temporary trade summary 2022-23

From NSW	To Lower Darling General Security	To Lower Darling High Security	To Murrumbidgee General Security	To NSW Murray General Security	To NSW Murray High Security	To Sth Australia Interstate transfer	Total
Lower Darling General Security	21,629		340	1,462	1,296		24,727
Lower Darling High Security	19,734	698		272		63	20,767
Murrumbidgee General Security		2,584					2,584
Murrumbidgee High Security		12,616					12,616
NSW Murray General Security	81,750	700					82,450
NSW Murray High Security	2,740						2,740
NSW Murray Conveyance	300						300
Total	126,153	16,598	340	1,734	1,296	63	146,184

Note 5 – Held environmental water

This represents environmental water that is held as part of a licensed volumetric entitlement. These licences are held within the same licence categories as all other water access licences, hence they are subject to the same operating 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 the water requirements of, specific environmental events or incidents.

Data type

Measured

Policy

- *Water Management Act 2000*
- Water Sharing Plan for the NSW Murray and Lower Darling Regulated River Water Sources 2016

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

Data accuracy

A – Estimated in the range +/- 10%

Providing agency

NSW Department of Planning and Environment

Data source

- Water Accounting System
- Available Water Determination Register: waterregister.waternsw.com.au

Methodology

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

AWD (including pro rata of AWD for new licences)

- Licensed extractions
- Forfeiture due to:
 - carryover rules
 - account spillage as a result of AWD
 - licence conversions
 - excess orders (where water order debiting is in place)
- Licence conversion
- Trade of allocation water between accounts.

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

Additional information

- Table 10 describes each balance component of the Table 18 summary.
- Table 18 summarises held environmental water for the reporting period.
- Table 19 shows the change in environmental water holdings since the last reporting period.

Table 18: Lower Darling environmental account summary. See Table 10 for explanation of headings.

Category	Share	Opening balance	AWD	Lic New	Lic Can	Asn In	Asn Out	Account usage	During-year forfeit	EoY Avail	EoY NA	EoY forfeit	Carry fwd
General Security	69,364	2,870	66,494	0	0	125,881	21,564	173,681	0	0	0	0	0
High Security	4,734	0	4,734	0	0	15,000	19,734	0	0	0	0	0	0
Supplementary Water	250,000	0	250,000	0	0	0	0	0	0	250,000	0	250,000	0

Table 19: Change in held environmental water

Category	Share 30 June 2022	Share 30 June 2023	Share Difference	No. Licences 30 June 2022	No. Licences 30 June 2023	No. Licence Difference
General Security	69,364	69,364	0	6	6	0
High Security	4,734	4,734	0	9	9	0
Supplementary Water	250,000	250,000	0	3	3	0

Note 6 – Environmental provisions

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

A long-term extraction limit is established in the water sharing plan to ensure that the potential for growth in diversions is contained and that 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 reduce the available water determinations until the average diversions are bought back under the required limit.

The plan also states the requirement for a Lower Darling Environmental Contingency Allowance (Lower Darling ECA). The volume of water credited at any time shall be zero if the volume stored in Menindee Lakes is below 480,000 megalitres, or if it has not risen above 640,000 megalitres since it last fell below 480,000 megalitres. Otherwise, after allowing for NSW licensed requirements, the account will be maintained at 30,000 megalitres, minus any usage that has occurred in that water year. The water is available to support management of blue–green algae and other associated water quality issues in the Lower Darling.

The plan also makes provisions for held environmental water, which has been previously detailed in Note 5 of this GPWAR.

Data type

Measured/Administration

Policy

- *Water Sharing Plan for the NSW Murray and Lower Darling Regulated River Water Sources 2016*
 - Part 4 Planned Environmental Water Provisions

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

Data accuracy

A1 – Nil inaccuracy +/- 0%

Providing agency

NSW Department of Planning and Environment

Data source

Not Applicable

Methodology

Not applicable

Additional Information

The accounting history for the environmental contingency allowance is in Table 20.

Table 20: Summary of ECA account balance (figures in ML)¹³

Water Year	Opening Balance	Water Credited ¹⁴	Usage	Forfeited ¹⁵	Balance End-of-year
2010-11	0	30,000	0		30,000
2011-12	30,000		0		30,000
2012-13	30,000		0		30,000
2013-14	30,000		0	30,000	0
2014-15	0	0	0		0
2015-16	0	0	0		0
2016-17	0	30,000	0		30,000
2017-18	30,000		0	30,000	0
2018-19	0	0	0		0
2019-20	0	0	0		0
2020-21	0	30,000	0		30,000

¹³ Figures amended from 2014-15 publication

¹⁴ Balance is credited with 30,000 ML when volume of Menindee Lake is more than 640,000 ML

¹⁵ Balance is forfeited when volume of Menindee Lake is less than 480,000 ML

Water Year	Opening Balance	Water Credited ¹⁴	Usage	Forfeited ¹⁵	Balance End-of-year
2021-22	30,000	0	0		30,000
2022-23	30,000		30,000		0

Note 7 – Surface water storage – combined Menindee system

This is the combined physical volume of water stored in Lake Menindee, Lake Pamamaroo, Lake Wetherell and Lake Cawndilla 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, volume below low-level outlet). We assume that the dead storage can be accessed if required via alternative access methods (for example, syphons).

The responsibility of operating Menindee Lakes is shared between WaterNSW and the Murray–Darling Basin Authority (MDBA). WaterNSW takes control of operations when the storage volume falls below 480,000 megalitres until such time as it rises above 640,000 megalitres. At that point it will be operated by the MDBA (until it 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 and Environment

Data source

- NSW Department of Planning and Environment – HYDSTRA

Methodology

Storage volumes are calculated by processing a gauged storage elevation through a rating table that converts it to a volume. Table 21 provides a breakdown of the storage capacities, dead storages, and the percentage of storage change for the reporting period. Figure 36 to Figure 39 provide the daily storage volumes and percentages for the reporting period.

Table 21: Capacity and dead storage summary table

Storage	Capacity (ML)	Dead storage (ML)	Volume 30 June 2022 (ML)	Volume 30 June 2023 (ML)	2022-23 Volume % change
Lake Menindee	629,488	71,190	705,478	455,466	a decrease of 40%
Lake Pamamaroo	277,725	31,730	313,135	279,042	a decrease of 13%
Lake Wetherell	192,621	11,800	195,787	177,564	a decrease of 10%
Lake Cawndilla	631,052	100,970	688,957	511,024	a decrease of 28%
Combined Lakes	1,730,886	215,690	1,903,357	1,423,096	a decrease of 28%

Figure 36: Lake Wetherell storage level and effective full storage capacity for reporting period

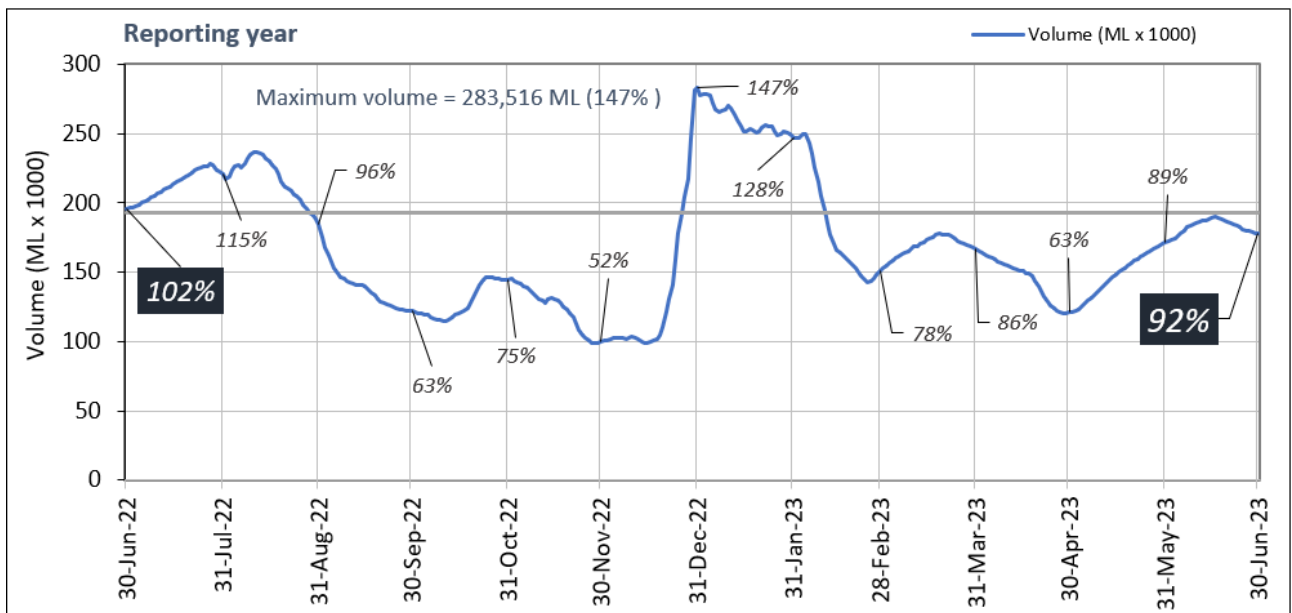


Figure 37: Lake Pamamaroo storage level and effective full storage capacity for reporting period

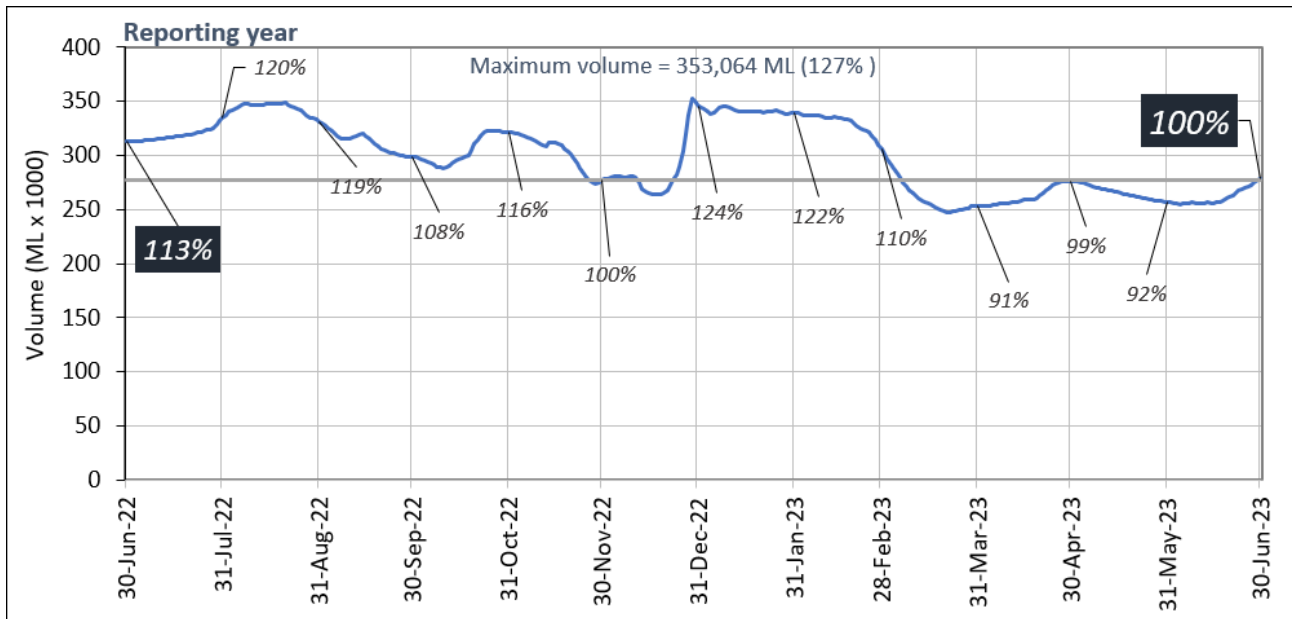


Figure 38: Lake Menindee storage level and effective full storage capacity for reporting period

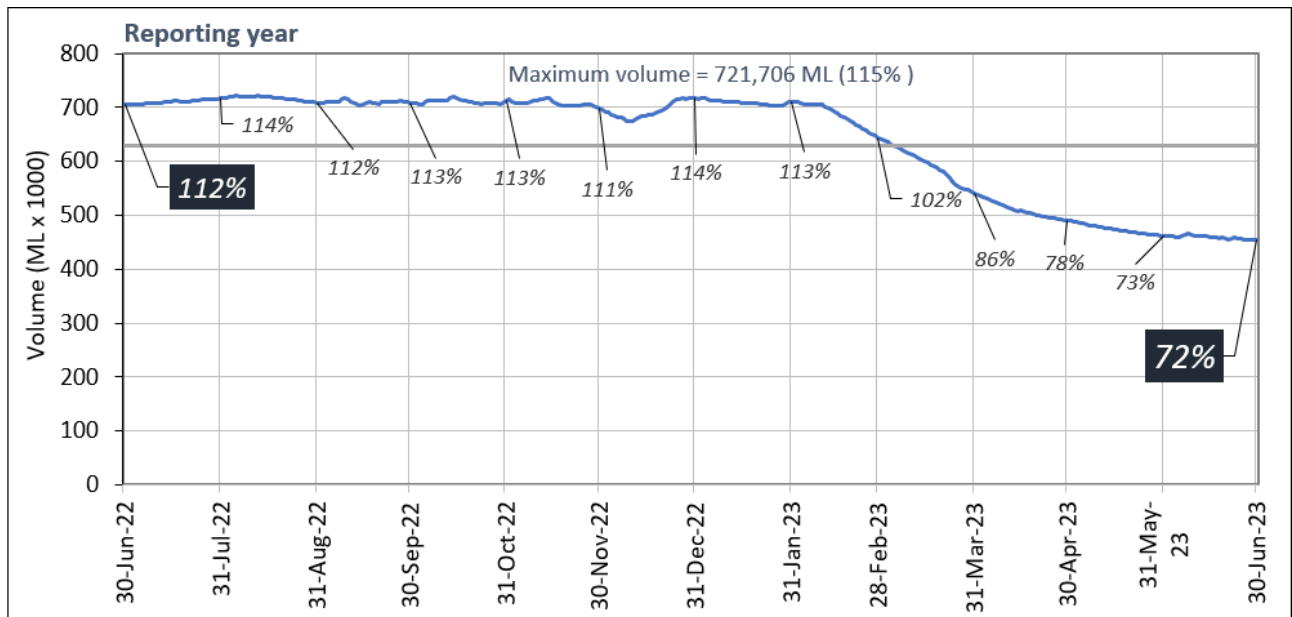
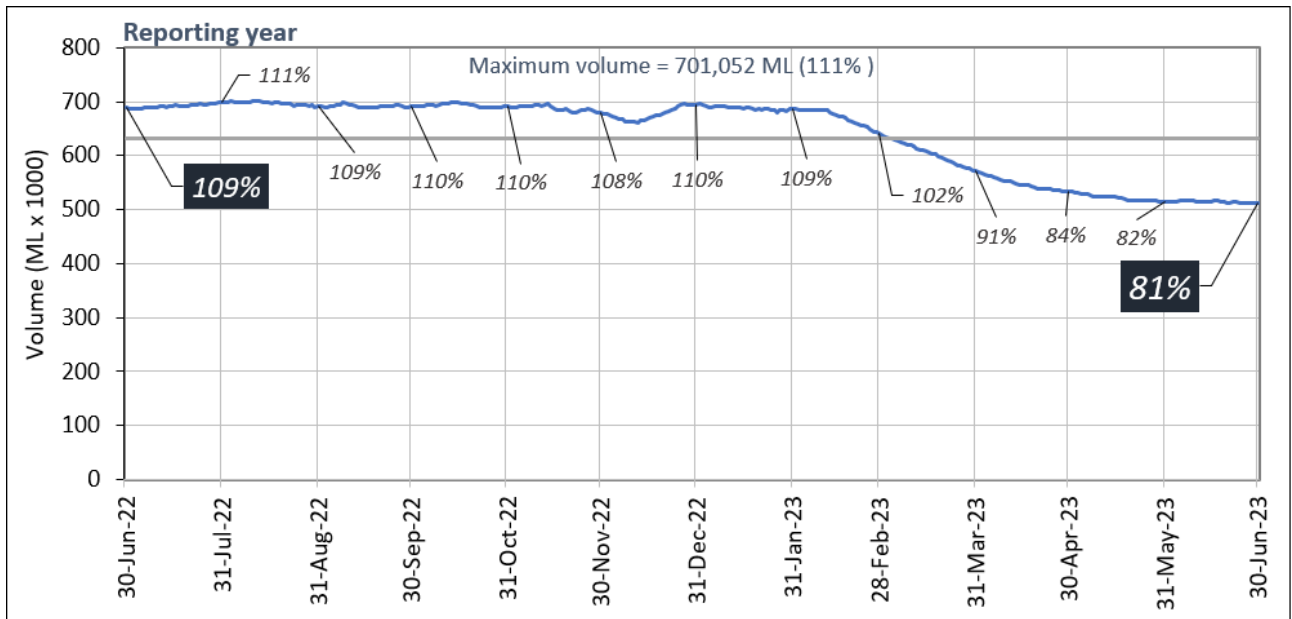


Figure 39: Lake Cawndilla storage level and effective full storage capacity for reporting period



Note 8 – River channel storage

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

Policy

Not applicable

Data type

Derived from measured data

Data accuracy

B – Estimated in the range +/- 25%

Providing agency

NSW Department of Planning and Environment

Data sources

- HYDSTRA
- CAIRO

Methodology

For each river section i :

$$V_i = Q_i \times T_i$$

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

$$\text{River channel storage} = \sum_i^n V_i$$

The formula components are defined in Table 22.

Table 22: Summary of river storage calculation components

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

Assumptions and approximations:

- Travel times are estimated to the nearest day.
- Daily flow change between gauging sites is assumed to be linear. Volume in the final reach between Burtundy and Wentworth is estimated as 90% of the flow at Burtundy.

Note 9 – Storage inflow – combined Menindee system

Storage inflow refers to the volume of water flowing into the major headwater storages, the combined Menindee system.

Policy

Not applicable

Data type

Derived from measured data

Data accuracy

A – Estimated in the range +/- 10%

Providing agency

NSW Department of Planning and Environment

Data sources

- HYDSTRA
- WaterNSW – Menindee Lakes Storage Monthly Sheets

Methodology

Storage inflows is usually obtained from a mass balance approach (based on balancing the change in storage volume) where inflow is the only unknown. However, for the Menindee Lakes a more reliable calculation of inflow was obtained using a modelled approach with the flow at Wilcannia being modelled downstream to produce the Menindee Lakes inflow. As the calculation of the evaporation for the lakes is unreliable, this parameter has been derived by using it as the unknown in the mass balance approach. The mass balance formula is shown below. The formula components are defined in Table 23.

$$E = I - \Delta S - Se - O + R$$

Table 23: Components for back-calculation of inflow

Symbol	Variable	Unit
I	Inflow	ML/year
ΔS	Combined Menindee change in storage volume	ML
O	Combined Menindee Outflow (see Note 13 for more detail)	ML/year
Se	Seepage	ML/year
R	Combined Menindee rainfall (see Note 10 for more detail)	ML/year

Symbol	Variable	Unit
E	Combined Menindee evaporation (see Note 10 for more detail)	ML/year

Assumptions and approximations:

- Seepage was assumed to be zero.

Note 10 – Storage evaporation and storage rainfall

This refers to the combined volumetric effective on Lake Wetherell, Lake Pamamaroo, Lake Menindee and Lake Cawndilla that is either lost as a result of evaporation or gained as a result of rainfall.

Data type

Derived from measured data

Policy

Not applicable

Data accuracy

B – Estimated in the range +/- 25%

Providing agency

NSW Department of Planning and Environment

Data source

- HYDSTRA
- WaterNSW – Menindee Lakes Storage Monthly Sheets

Methodology

The calculation of the effect of rainfall and evaporation is carried out by using the following formulas.

$$\text{Rainfall Volume (ML)} = \text{Rainfall (mm)} \times \text{Area (Ha)} / 100$$

$$\text{Evaporation} = \text{Inflow} + \text{Rainfall Volume} - \text{Outflow} - \text{Change in Storage (all figures in ML)}$$

The formula for rainfall was applied on a daily time step with rainfall data applied across the combined Menindee Storage surface area. However, with a model being adopted to establish the Menindee storage inflow and the inaccuracy of the evaporation figures, the evaporation figure has been calculated as the balancing factor for the daily storage balance.

Note 11 – River evaporation and river rainfall

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

Data type

Derived from measured data

Policy

Not applicable

Data accuracy

C – Estimated in the range +/- 50%

Providing agency

NSW Department of Planning and Environment

Data source

- HYDSTRA
- ARCGIS
- QLD Department of Natural Resources: SILO

Methodology

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

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

In the formula, W is the daily width determined from the gauging cross sections and L is the length as determined through ArcGIS analysis. The formula components are defined in Table 24.

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

Rainfall:

$$V = \sum_{i=1}^n \left(\frac{R_i \times A_i}{10^6} \right)$$

Evaporation:

$$V = \sum_{i=1}^n \left(\frac{ETO_i \times A_i}{10^6} \right)$$

Table 24: 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 (Mortons shallow lake evaporation)	mm/day
n	Total number of days accounted for the water year	-

Note 12 – Talyawalka Creek inflow

This represents the inflow into the Lower Darling regulated river from Talyawalka Creek (downstream of the Menindee lakes storages). This inflow estimate has been obtained from modelled data as no gauged data is available.

Policy

Not applicable

Data type

Measured data

Data accuracy

B – Estimated in the range +/- 25%

Providing agency

NSW Department of Planning and Environment

Data sources

- Spreadsheet model

Methodology

The flows are obtained by running a model for upstream of Menindee Lakes, starting at Wilcannia. The model estimates the volume of flow leaving Talyawalka Creek at Railway Bridge and also the return flow entering the Darling River downstream of the Lakes, which is the volume that is assumed as Lower Darling inflow in this GPWAR.

Additional information

Historical estimates of flow entering the Lower Darling system from Talyawalka Creek is shown in Table 25.

Table 25: Summary of Talyawalka Creek at Railway Bridge inflow

Water year	Volume (ML)
2015-16	2,108
2016-17	0

Water year	Volume (ML)
2017-18	0
2018-19	0
2019-20	0
2020-21	789
2021-22	37,316
2022-23	894,833

Note 13 – Dam releases, river inflow from dam releases

This refers to the volume of water released from Wetherell, Pamamaroo, Menindee and Cawndilla storages, into the accounted river extent of the Lower Darling.

In the AWAS1 accounting process for Lakes Wetherell, Pamamaroo and Menindee, this release is represented as both a decrease in asset (of the dams) and an equal increase in asset (of the river).

For Lake Cawndilla, the release that goes to the Great Darling Anabranch is considered as a decrease in outflow only (the anabranch is not included as part of the accounted river extent for this GPWAR).

Policy

Not applicable

Data type

Measured data

Data accuracy

A – Estimated in the range +/- 10%

Providing agency

NSW Department of Planning and Environment

Data sources

- HYDSTRA

Methodology

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

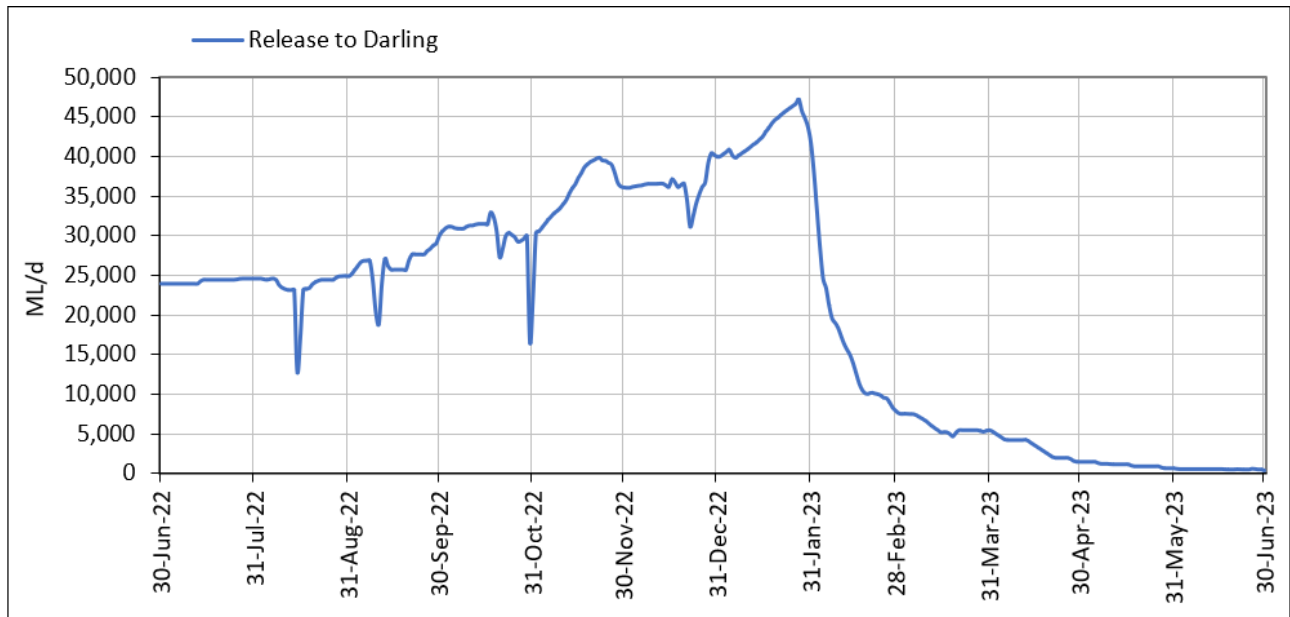
Additional information

Releases from the lakes for this reporting period is summarised in Table 26. The charts show the total daily releases to Darling River (Figure 40) and to the Darling Anabranch (Figure 41).

Table 26: Summary of releases for reporting period

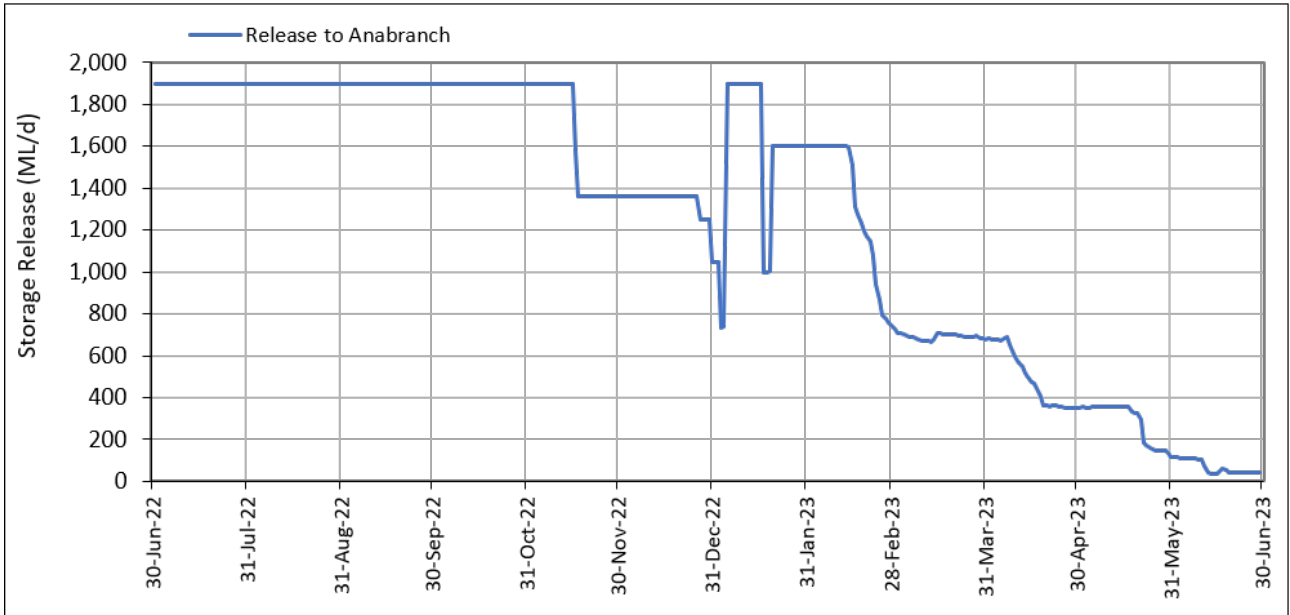
Storage	Release (ML)
<i>Lake Cawndilla</i> ¹⁶	460,770
Lake Pamamaroo	564,231
Lake Wetherell – Outlet	373,629
Lake Wetherell – Main Weir	5,892,476
Lake Menindee	690,540
Total Lower Darling river releases (excluding Lake Cawndilla anabranch releases)	7,520,876

Figure 40: Daily releases from Menindee Lakes to Darling River



¹⁶ Lake Cawndilla release does not contribute to the accounted river extent of this water account

Figure 41: Daily releases from Lake Cawndilla to Darling Anabran



Note 14 – End of system flow

This refers to flow that leaves the entity and does not return to the entity. The line item excludes water leaving the defined accounting extent for replenishment purposes, or water leaving the defined extent for environment purposes supplied from allocated licenced environmental water (these have been accounted for in separate line items). While the end of system for this GPWAR is considered to be Wentworth, there is no appropriate data available at this site and therefore the data from Burtundy has been used as a substitute. In some years during high flows water also leaves the system at via the Great Darling Anabranch south of Menindee below weir 32. This water enters the Murray at Bulpunga (425011)

Data type

Derived from measured data

Policy

Not applicable

Data accuracy

A – Estimated in the range +/- 10%

Providing agency

NSW Department of Planning and Environment

Data source

- HYDSTRA

Methodology

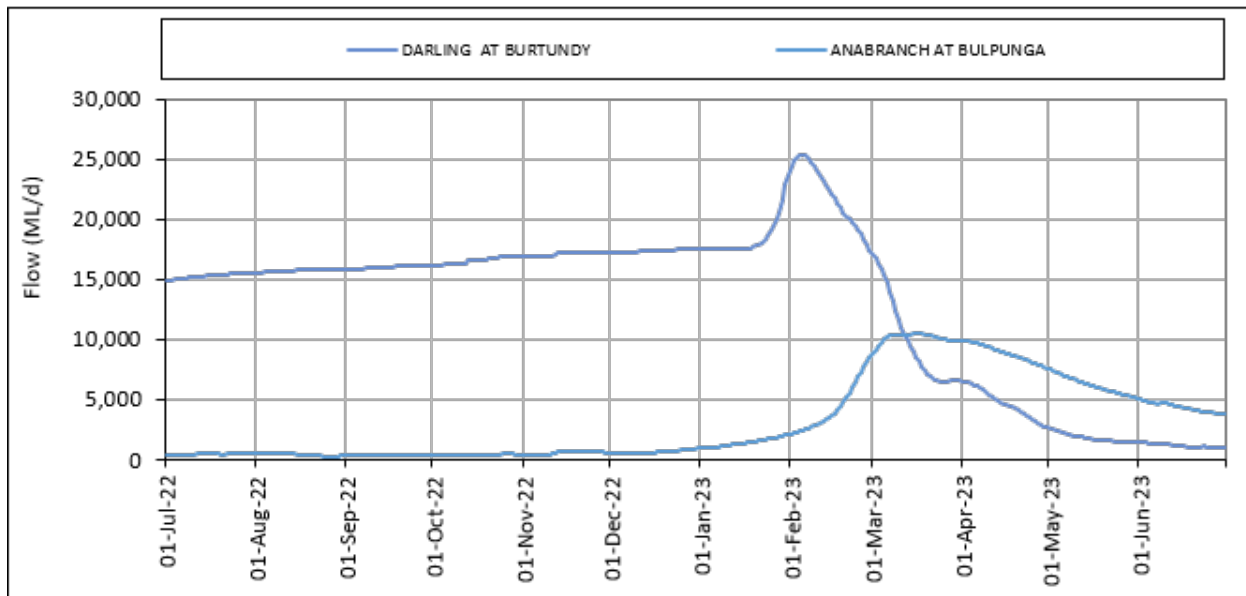
The end-of-system flow is calculated by adding the flows at the specified end of system gauging stations and then subtracting the proportion of this outflow that can be attributed to either replenishment flow or held environmental water. The following table summarises the calculation used to assess the end-of-system flow for the Darling River reporting entity.

The end-of-system flow for the reporting period is summarised in Table 27 and illustrated in Figure 42.

Table 27: End-of-system flow summary table

System	Gauging Station	Volume (ML)
Lower Darling	425007 Darling River at Burtundy	4,738,907
	425011 Great Darling Anabranh At Bulpunga	690,173
Total		5,429,080

Figure 42: End-of-system flow for Darling River 2022-23



Note 15 – Extractions from river

This is the actual volume of water directly pumped or diverted from the Lower Darling 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. Additionally, water is used outside of the accounted river extent (that is from the Great Darling Anabranch). As such, the volume reported to be physically extracted from the accounted river is not equal to the amount of water debited against accounts for usage, which has been described in Note 3. The figure stated for extractions from river excludes basic rights extractions, which is reported as a separate line item and detailed in Note 16.

Data type

Measured data

Policy

Not applicable

Data accuracy

A – Estimated in the range +/- 10%

Providing agency

NSW Department of Planning and Environment

Data source

- Water Accounting System

Methodology

The extraction from the river is considered to be the total volume metered and debited to the allocation accounts minus any water that can be identified as being used within the system, ordered to be passed through the system, or taken from the Great Darling Anabranch.

Additional information

Extraction from the river for this reporting period is summarised in Table 28.

Table 28: Reconciliation of extraction from river to account usage for reporting period

Item	Volume (ML)
Extractions from River	3,128
Instream usage (not diverted)	173,681
Licensed water ordered to leave system	0
Environmental use – Great Darling Anabranch	0
Consumptive use – Great Darling Anabranch	0
Licence Account usage	176,809

Note 16 – Basic rights

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

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

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

Data type

Estimated

Policy

- *Water Sharing Plan for the New South Wales Murray and Lower Darling Regulated Rivers Water Sources 2016*
 - Part 5 Requirements for water
 - Division 2 Requirements for water basic landholder rights
 - Clause 18 Domestic and Stock Rights

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

Data accuracy

C – Estimated in the range +/- 50%

Providing agency

NSW Department of Planning 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 estimates for water usage, stocking rates, population and property shape based on local knowledge to calculate riparian

(stock and domestic) requirements in megalitres per year. The annual extraction for Domestic and Stock rights in the water accounts is assumed to be the estimated figure stated in the *Water Sharing Plan for the New South Wales Murray and Lower Darling Regulated Rivers Water Sources 2016* (445 megalitres).

Note 17 – Unaccounted difference

In theory, if all the processes of a water balance could be accurately accounted for, the unaccounted difference would be zero. In reality, because of the large uncertainties in many of the volumes presented in the accounts, the various sources from which the data has been obtained and the fact that not all processes of the water cycle have been accounted, the statements are not balanced at the end of the accounting process.

In order to balance the accounts a final balancing entry is required, and this is termed the unaccounted difference. Increased investment in the monitoring of the water balance (infrastructure), and improved estimation techniques (also highly dependent on the former) would reduce the relative significance of this accounting component. Information to date indicates adopted methods cumulatively result in over quantification of inflow in dry to medium years, under quantification in wet years (Table 29).

Data type

Not applicable

Policy

Not applicable

Data accuracy

D – Estimated in the range +/- 100%

Providing agency

Not applicable

Data source

Not applicable

Methodology

For surface water, 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 8.

Surface water unaccounted difference

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

Where:

- **UD** = 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, dam releases)

Additional information

The unaccounted difference for the reporting year and previous reporting years is provided in Table 29. Additionally, the volume as a percentage of inflow is presented to provide some perspective of magnitude. As can be seen in drier years, the proportion of unaccounted volume increases, potentially highlighting the omission of groundwater exchange and other loss processes within this GPWAR. A summary of the historical unaccounted differences since reporting under AWAS1 commenced is provided in Table 29.

Table 29: Unaccounted difference summary

Water year	Unaccounted volume	System inflow ¹⁷	Proportion of system inflow ¹⁸
2013-14	(42,488)	235,939	(18)%
2014-15	13,667	70,890	19%
2015-16	5,052	28,957	17%
2016-17	(6,042)	518,753	(0)%
2017-18	32,259	154,226	21%
2018-19	25,520	55,368	46%
2019-20	15,112	68,122	22%

¹⁷ Releases passing Menindee lakes system plus rainfall on regulated Darling River plus inflow from Talyawalka Creek

¹⁸ Negative indicates more system inflow required to achieve mass balance

Water year	Unaccounted volume	System inflow ¹⁷	Proportion of system inflow ¹⁸
2020-21	38,561	195,718	20%
2021-22	632,819	3,478,670	18%
2022-23	2,906,921	8,406,481	35%

Note 18 – Account corrections

This is a line item that is used to correct 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 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

No account adjustments were to be applied to the water accounts for the reporting period.

References

- Green D., Shaikh M., Maini N., Cross H. and Slaven J. 1998, *Assessment of environmental flow needs for the Lower Darling River*. Report to the Murray–Darling Basin Commission by the Department of Land and Water Conservation, Centre for Natural Resources, July 1998.
- WASB 2012, Australian Water Accounting Standard 1 Preparation and Presentation of General Purpose Water Accounting Reports (AWAS 1), Bureau of Meteorology