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NSW Annual Report on Water Resource Use for the 2021/22 Water Year

Submission to the MDBA Water Take Report

May 2023

NSW Annual Report on Water Resource Use for the 2021/22 Water Year

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1. Introduction

This report highlights key aspects of surface water and groundwater management and use in New South Wales (NSW) during the 2021/22 water year commencing 1 July 2021. This report is submitted to the Murray Darling Basin Authority (MDBA) by the NSW Department of Planning and Environment – Water, (DPE - Water), under section 71(1) of the *Water Act 2007* (Commonwealth), Schedule E of the Murray Darling Basin Agreement and Schedule 12, Matter 9.1 and 9.2 of the Basin Plan.

This report is a summary of the detailed data provided to the MDBA in the section71/Cap/Matter 9.1/ Matter 9.2 reporting spreadsheets.

All groundwater and surface water sources within the NSW Murray-Darling Basin (MDB) are managed under Water Sharing Plans (WSPs) and the NSW *Water Management Act 2000* (the Act). We did not have any accredited Water Resource Plans (WRPs) in place for the 2021/22 water year. As such, the 2021-22 s71 submission has been prepared in accordance with a bi-lateral agreement with MDBA and will be used as an interim register.

The Inspector-General of Water Compliance (IGWC) makes the final assessment of SDL compliance. However, they have stated that they are unable to do so when an accredited WRP is not in place[1]. As the NSW SDL compliance status is not being assessed for 21-22, we have not submitted any formal reasonable excuse claims where relevant. In addition, we note that there is no longer a framework for reasonable excuse claims. The IGWC is to consider any claim for reasonable excuse in making their compliance assessment. The MDBA had developed a framework however, since the compliance assessment responsibility has now transferred to the IGWC, that framework is redundant and a new framework has not been provided.

2. Section 71 reporting - SDL Compliance

3.1 Groundwater

As noted in Section 1, the following are interim results as SDL compliance is not being officially assessed in NSW for 2021-22.

All NSW groundwater SDL resource units are fully SDL compliant for 2021/22. Table 1 summarises the SDL compliance assessment results for the water year in each NSW groundwater SDL resource unit, using the best information available when preparing this report. All except one SDL resource units have a positive cumulative balance which means that the cumulative permitted take is larger than the cumulative actual take. Although Warrumbungle Basalt SDL resource unit has a negative cumulative balance, it is still compliant as the debit is smaller than the compliance trigger.

Groundwater extraction in 28 of the 44 NSW groundwater Sustainable Diversion Limit (SDL) resource units within the MDB is fully metered. These represent the majority of groundwater licensed entitlements (88%) in the NSW portion of the MDB. Extraction in the remaining 16 SDL resource units is currently only partially metered. The rollout of the non-urban metering framework in NSW by 2023 will improve the accuracy of extraction data in these systems over time.

All NSW SDL resource units received full groundwater allocation assignments for 2021/22.

During the 2021/22 water year, approximately 558.3 GL was extracted from the NSW groundwater SDL resource units within the MDB, including 360.4 GL of recorded and 6.1 GL of estimated licensed use and 191.8 GL of estimated use under basic landholder rights. The volume of licenced groundwater extraction is lower compared to the previous water year; down from 789 GL in 2020/21. This reflects higher than above average rainfall for large areas of the state for 2021/22, which has

[1] https://www.igwc.gov.au/sites/default/files/2022-08/igwc-2020-21-sdl-compliance-statement_0.pdf

alleviated some of the pumping pressure on groundwater while surface water availability remained high.

A total of 93.6 GL of groundwater was traded permanently within SDL resource units; there was no trade between groundwater SDL resource units during the water year. With the exception of trading between the NSW GAB Warrego Shallow and the NSW GAB Central Shallow SDL resource units, trading between SDL resource units is not permitted by the water sharing plans. Permanent trade includes sale of access licences (71M of the Act change in ownership) and transfer of shares (71Q of the Act assignment of rights between access licences).

A total of 144.5 GL of groundwater allocation was traded (commonly referred to as temporary trade) with most of this trade volume occurring within the Gwydir Alluvium, Namoi Alluvium, Macquarie-Castlereagh Alluvium, Lachlan Alluvium, Murrumbidgee Alluvium and Murray Alluvium WRP areas.

Table 1. Summary of 2021/22 groundwater SDL compliance for NSW

SDL Resource Unit	Cumulative Actual Take	Cumulative Permitted Take	Cumulative (permitted – actual)	Compliance trigger (-20% of the SDL)
	GL	GL	GL	GL
Adelaide Fold Belt MDB	7.83	20.7	12.87	-1.38
Bell Valley Alluvium	1.07	9.87	8.80	-0.66
Belubula Alluvium	3.96	8.64	4.68	-0.58
Billabong Creek Alluvium	9.66	22.50	12.84	-1.50
Castlereagh Alluvium	0.25	1.86	1.61	-0.12
Coolaburragundy–Talbragar Alluvium	4.96	10.41	5.45	-0.69
Cudgegong Alluvium	4.34	7.21	2.87	-0.51
Gunnedah-Oxley Basin MDB	39.03	382.5	343.47	-25.50
Inverell Basalt	4.40	12.45	8.05	-0.83
Kanmantoo Fold Belt MDB	24.90	56.10	31.20	-3.74
Lachlan Fold Belt MDB	248.38	777.00	528.62	-51.80
Lake George Alluvium	1.20	3.81	2.61	-0.25
Liverpool Ranges Basalt MDB	5.72	6.48	0.76	-0.43
Lower Darling Alluvium	2.35	6.69	4.34	-0.45
Lower Gwydir Alluvium	66.62	92.52	25.90	-6.60
Lower Lachlan Alluvium	289.82	313.20	23.38	-23.40
Lower Macquarie Alluvium	77.29	158.16	80.87	-10.54
Lower Murray Shallow Alluvium	19.79	245.70	225.91	-16.38
Lower Murray Deep Alluvium	194.67	266.66	71.99	-17.78
Lower Murrumbidgee Shallow Alluvium	40.37	80.70	40.33	-5.38
Lower Murrumbidgee Deep Alluvium	593.54	766.88	173.34	-54.72
Lower Namoi Alluvium	170.38	256.27	85.89	-17.66
Manilla Alluvium	0.24	3.69	3.45	-0.25
Mid-Murrumbidgee Alluvium	105.37	147.43	42.06	-10.70

SDL Resource Unit	Cumulative Actual Take	Cumulative Permitted Take	Cumulative (permitted – actual)	Compliance trigger (-20% of the SDL)
NSW Border Rivers Alluvium	16.17	25.20	9.03	-1.68
NSW Border Rivers Tributary Alluvium	0.48	1.23	0.75	-0.08
NSW GAB Surat Shallow	6.04	46.50	40.46	-3.10
NSW GAB Warrego Shallow	1.95	100.20	98.25	-6.68
NSW GAB Central Shallow	0.73	26.49	25.76	-1.77
New England Fold Belt MDB	65.04	165.30	100.26	-11.02
Oaklands Basin	0.00	7.5	7.50	-0.50
Orange Basalt	4.40	32.10	27.70	-2.14
Peel Valley Alluvium	10.94	26.22	15.28	-1.87
Sydney Basin MDB	6.49	57.30	50.81	-3.82
Upper Darling Alluvium	10.03	19.77	9.74	-1.32
Upper Gwydir Alluvium	1.00	2.16	1.16	-0.14
Upper Lachlan Alluvium	175.04	282.60	107.56	-18.84
Upper Macquarie Alluvium	42.23	47.52	5.29	-3.58
Upper Murray Alluvium	35.76	40.30	4.54	-2.82
Upper Namoi Alluvium	163.16	339.71	176.55	-24.68
Upper Namoi Tributary Alluvium	0.16	5.31	5.15	-0.35
Warrumbungle Basalt	1.66	1.65	-0.01	-0.11
Western Porous Rock	97.28	678.00	580.72	-45.20
Young Granite	5.37	21.33	15.96	-1.42

3.1 Surface Water

As noted in Section 1, the following are interim results as SDL compliance is not being officially assessed in NSW for 2021-22.

The interim results indicate that the SDL compliance trigger has been exceeded in the following SDL units; the Barwon Darling and Gwydir. For these, we have submitted the assessment as compliant with reasonable excuse. As noted in Section 1, there is currently no framework available to guide a reasonable excuse claim and we are not subject to a formal compliance assessment for 2021-22. For these reasons, we have not followed the prior format of reasonable excuse claims. Rather we have provided a simpler summary of reasons for the exceedance and actions we are undertaking in the Section 5.

The surface water SDL compliance assessment is based on the same methods which were agreed to under the 2020-21 bi-lateral agreement (Attachment 1). Attachment 2 provides a summary of the SDL compliance assessment calculations for surface water SDL units.

Table 2 summarises the SDL compliance assessment results for the water year in each NSW surface water SDL resource unit, using the best information available when preparing this report. This includes accounting for all forms of take as required under the Basin Plan. The cumulative balance has been adjusted for any disposal and acquisition of held environmental water. Additional detailed information is provided in the NSW section 71 reporting spreadsheets and/or the MDBA interim Register of Take once finalised for 2021/22.

The annual actual take (AAT) exceeded annual permitted take (APT), resulting in a negative cumulative balance in the following units: Barwon-Darling, Gwydir and Murrumbidgee. In addition, the AAT exceeded the APT in the Namoi however the cumulative balance remains positive.

If the cumulative balance is negative, the unit remains compliant unless there is a larger debit than the compliance trigger and no reasonable excuse is available. This trigger has been exceeded in the Barwon Darling and Gwydir.

- The cumulative balance in the Barwon Darling is -71 GL and the compliance trigger is -35GL. The cumulative balance represents negative 40% of the long-term average SDL.
- The cumulative balance in the Gwydir is -112 GL and the compliance trigger is -106GL. The cumulative balance represents negative 21% of the long-term average SDL.

Section 5 contains further information on the Barwon Darling and Gwydir.

For the Murrumbidgee, while compliant, there is now a significant debit. Some of this debit has known causes such as incomplete recovery and corrections required to actuals in prior years. However, these corrections are relatively minor. We have developed a new model which will be used for compliance assessments in future and this may alter outcomes. We also have an ongoing work program to investigate levels of licence activation in the Murray and Murrumbidgee systems which may also lead to improved understanding and assessments.

Table 2 Summary of 2021/22 surface water SDL compliance for NSW (rounded)

SDL Resource unit	Annual Permitted Take	Annual Actual Take	Cumulative Balance*	Compliance Trigger (-20% of SDL)	Cumulative balance as a % of SDL
	(GL)	(GL)	(GL)	(GL)	%
Intersecting Streams	119	119	-	-24	0%
Barwon Darling Watercourse	223	255	-71	-35	-40%
NSW Border Rivers	421	361	16	-64	5%
Gwydir	487	534	-112	-106	-21%
Namoi	409	420	32	-98	7%
Macquarie-Castlereagh	708	704	41	-127	6%
Lachlan	491	484	43	-116	7%
Murrumbidgee	1,903	2,064	-407	-442	-18%
NSW Murray	1,489	1,255	579	-302	38%
Lower Darling	30	9	13	-7	38%

* Balance has been adjusted for disposal and/or acquisition of HEW allocation in these SDL resource units during 2021/22, incomplete recovery in 2020/21 and model refresh adjustments.

Under the SDL compliance method, model results may be revised resulting in changes to prior years. Each year, models are updated with the best available climate and flow input data starting from 1 July 2019. In some cases, this input data may have changed which can lead to changes in model results for prior years. Results may also change if errors have been identified and corrected. Section

6 details these changes. The 2021-22 assessment also includes an adjustment for incomplete recovery in 2020-21 and this is also detailed in section 6.

Note that unregulated diversion estimates, except for the Barwon-Darling, are based on long-term average values as per previous submissions. Under the SDL accounting improvement strategy, we have committed to assessing how we can transition to using metered data for actual unregulated take. This may need to consider how gaps are managed, whether any changes to BDL are required and whether a variable APT method is required.

3. Cap Compliance (surface water)

All valleys remained fully Cap compliant for 2021/22. Compliance with Cap does not apply to groundwater. Table 3 summarises the Cap results for the water year in each NSW valley where accounting against Cap under Schedule E of the MDB Agreement applies. Additional detailed Cap information is provided in the NSW section 71 reporting spreadsheets and/or the Cap Register once finalised for 2021/22.

Actual diversions were less than the Cap target (adjusted for trade and environmental use) in all valleys except the Murrumbidgee, Gwydir and the Barwon Darling. There are substantial cumulative Cap credits for all reporting units. Note that while the Barwon Darling has a debit, it is combined with Lower Darling for Cap auditing purposes and combined there is a significant credit.

Table 3 Summary of 2021/22 Cap results for NSW (rounded) (GL)

NSW Cap valley	Annual Consumptive Diversions 2021/22	Cap Target Adjusted for Trade and Environment (Adjusted)	Cumulative credit at end of year
NSW Intersecting Streams	6	N/A	N/A
NSW Border Rivers	107	163	953
Gwydir	279	266	361
Namoi/Peel	237	266	624
Macquarie/Castlereagh/Bogan	224	507	1,664
Barwon Darling*	225	116	-109
Lachlan	162	232	444
Murrumbidgee	1,557	1,276	3,428
Lower Darling*	3	229	714
NSW Murray	1,145	1,584	3,166

*The Barwon-Darling and the Lower Darling are treated as one valley for Cap auditing purposes.

4. Surface water resource summary by valley

The 2021/22 water year marked full recovery from severe drought experienced from late 2017 to early 2021 with notable improvements in state water resources. River operation focus shifted from drought recovery to flood risk management. The Barwon Darling River has been flowing consistently with large flows in some months resulting in the most significant inflow to Menindee lakes in almost a decade. All major rural storages have been near full; many spilling or releasing water for flood mitigation. Only Windemere and Split Rock dams failed to recover beyond 59% and 73% full respectively. The total volume of water held in major NSW storages increased from an average of about 62% on 30 June 2021 to around 97% of full capacity on 30 June 2022.

The 2021/22 water year has seen allocation to general security water users on several regulated river water sources reach their maximum limit. By December 2021, the allocation to general security entitlements on all major regulated systems, except the Lower Namoi, had reached at least 100% of entitlement. The Lower Namoi had received 70% and the smaller Belubula and Bega-Brogo regulated systems had received 50% and 83% allocation respectively. Note that these small systems had access to rain-induced events (uncontrolled flows), meaning there was no shortage of access to water despite the allocations.

Good rainfalls resulted in the maximum allocation to all other licence types on regulated rivers. The exception was supplementary users on the Border and Gwydir Rivers, who were limited to 75% and 50% allocation respectively as growth-in-use measures were triggered as required by implementing the long term average annual extraction limit in the respective water sharing plans (see: reduced supplementary FAQs for further info). Total supplementary usage remained less than the reduced limit in each valley indicating the reduced limits did not affect all users. In most of the rivers, there were many opportunities for supplementary take.

4.1 NSW Intersecting Streams

The NSW Intersecting Streams are unregulated systems, with take by water access licence holders not currently metered. Consumptive licensed diversions for 2021/22 have been estimated to total 5.8 GL in line with estimated take in the Intersecting Streams WRP. There is no Cap established for the Intersecting Streams.

4.2 NSW Border Rivers

The NSW Border Rivers catchment commenced the 2021/22 water year with all licence categories, except general security (A class), general security (B class) and supplementary, receiving their maximum (100%) allocations. General Security (A class) received a 37% opening allocation. General security (B class) did not receive an opening allocation as this only occurs once A Class reaches 100% allocation, in accordance with the water sharing plan. Supplementary access licences received a reduced allocation of 75% of entitlement for the 2021/22 water year due to implementation of growth-in-use rules as per the water sharing plan.

By late July 2021 Pindari Dam had recovered to its full supply volume and it remained full for the remainder of the 2021/22 water year. As a result, further allocation was made on 27 July 2021 to general security (A class) of 63%, bringing it up to its maximum allocation of 100% of entitlement for the 2021/22 water year. This allowed allocation to general security (B class) to commence with an allocation of 4.7% of entitlement.

In mid-August 2021, Pindari storage was full, and Glenlyon Dam was recovering well, which enabled a further allocation to general security (B class) of 95.3% of entitlement, bringing the total allocation for general security (B class) to 100% of entitlement. As per water sharing plan rules, general security (B class) can be allocated more than 100% of entitlement in a water year as space in general security (B class) individual accounts is created due to usage.

By late November 2021, Glenlyon Dam had also recovered to its full supply volume, and it remained full for the remainder of the 2021/22 water year. With healthy storages and inflows, general security

(B class) accounts were able to be topped-up as usage occurred. In late January 2022, a further 28% was allocated to general security (B class), with another 100% allocated in late March 2022 and another 100% allocated in late May 2022. However, it should be noted that for the last three allocations listed, it does not mean that the percentage allocated is the percentage of the entitlement volume that was allocated, rather, it means that in order to top-up the individual accounts that had space for further allocation, an available determination order of that percentage was required. General security (B class) ended the 2021/22 water year with a cumulative allocation of 328%.

4.3 Gwydir

The Gwydir River catchment commenced the 2021/2022 water year with all licence categories except general security and supplementary licences, receiving their maximum (100%) allocations. Copeton Dam storage volume at the beginning of the water year was about 48% of capacity. By 10 December 2021, Copeton Dam had recovered to its full capacity and remained about full capacity for the reminder of water year.

General security licences received a zero-opening allocation with about 57% carryover from the previous water year. As a result of recovering Copeton Dam storage volume, general security licences received further allocations and reached its maximum account limit on 7 December 2021 and remained about maximum account limit for the rest of the water year.

Environmental Contingency Allowance (ECA) also received the same percentage of general security allocations in accordance with the water sharing plan. ECA account is also reached its maximum account limit on 7 December 2021 and remained about maximum account limit for the rest of the water year.

Supplementary access licences received a reduced allocation of 50% of entitlement for the 2021/22 water year due to initial implementation of growth-in-use rules due to exceedance of the long-term average annual extraction limit.

4.4 Namoi / Peel

The combined Namoi-Peel valleys during the 2021/22 water year received the maximum allocation (100%) for all higher priority licence holders. Environmental contingency allowance (ECA) for Peel River valley also received a maximum of 5GL allocation for the water year. Chaffey dam storage volume at the beginning of the water year was about 80% of its capacity. By the end of July, it reached 100% of capacity and continued to be full for the entire water year due to the wet conditions over the catchment.

Split Rock Dam held 126 GL (31%), while Keepit dam held 334 GL (78%) on 1 July 2021. Due to continuous rainfall across the catchment, the dam volume increased up to 73% of the capacity for Split Rock and up to 99% of the capacity for Keepit dam on 30 June 2022. All water access license holders are full allocated except Lower Namoi general security. Lower Namoi general security accounts carried forward on average 172% of entitlement at the end of the water year.

Similar to the NSW Border Rivers and Gwydir valleys, a continuous accounting system is used for general security licences in the regulated section of the Lower Namoi valley. However general security licences are managed under an annual accounting system in the Peel and Upper Namoi regulated rivers.

For Namoi River valley, supplementary licence holders received their maximum 100% allocation for the 2021/22 water year.

4.5 Macquarie / Castlereagh

All higher priority licences received 100% allocation at the beginning of the water year, and general security received an opening allocation of 12% of entitlement. Total GS Carryover was relatively high after a wet summer (65% of entitlement in the Macquarie, and 137% of entitlement in the

Cudgegong). The Environmental Water Allowance (EWA) carried over approximately 80 GL (50% of the balance) and received a commensurate allocation with each increment to GS allocations.

Burrendong Dam entered the flood mitigation zone (FMZ) on 5 September and remained in the FMZ for the remainder of the water year, at times making large releases to create airspace. As per the rules in the water sharing plan, carryover was withdrawn from Macquarie GS accounts by the amount of inflow into Burrendong Dam while in the FMZ. By December 2022, inflows into Burrendong Dam were sufficient to withdraw all carryover from GS accounts, and all remaining GS, HS and EWA balances in both the Cudgegong and Macquarie were withdrawn and then reset to 100% of entitlement. Carryover from Cudgegong accounts was not withdrawn during this process and will be reduced when Windamere Dam spills.

While there was plenty of rainfall across the Cudgegong catchment, Windamere Dam experienced a slower drought recovery due to its location and catchment area being further up in the mountains. It started the water year at 34% capacity (127 GL) and ended the water year at 60% capacity (approximately 220 GL). Despite this, high rainfall led to translucent flows being triggered, which in combination with high tributary flows, causes road crossings to be flooded in communities downstream. Hence, the translucent flows were intermittently suspended throughout the water year. The water not released as translucent flows has been accruing in a separate account and will be paid back once the Cudgegong Environmental Water Allowance (EWA) replaces the current translucent flows when the new WSP commences in the 2023/24 water year.

4.6 Barwon-Darling

While all licence categories received 100% allocations for 2021/22, it should be noted that the Barwon-Darling is an unregulated system. That is, water is not held in a headwater storage and the opportunity to take water (other than when temporary restrictions are in place) is dependent on gauged flows in the river reaching licensed commence to pump/cease to pump triggers. There is an individual annual use limit of 300% of entitlement for unregulated A, B and C class licences in the Barwon-Darling, provided there is sufficient water carried over in water allocation accounts from previous water years.

During 2021/22, the Barwon Darling River started flowing consistently with large flows in some months resulting in the most significant inflow to Menindee lakes in a decade.

4.7 Lachlan

The Lachlan River catchment commenced the 2021/2022 water year with all licence categories except general security licences, receiving their maximum (100%) allocations. Wyangala Dam storage volume was about 75% of capacity at the start of the water year. By late August 2021, Wyangala Dam had recovered to its full capacity. Airspace management strategies took place from 18 July 2021 in line with rules in the water sharing plan and in consultation with water users, providing an 80% chance of the system being full by the start of the irrigation season in spring and summer.

General security licences received a zero-opening allocation with about 71% carryover from the previous water year. As a result of wet conditions throughout 2021/2022, general security licences received further allocations and its water availability from 9 August 2021 until the end of the water year was over 100%.

As mentioned previously, Lachlan storages continued to fill and spill under persistent wet conditions. Consequently, Clause 56 of the Water Sharing Plan had triggered in September 2021and March 2022, resulting in withdrawing all balances remaining in general security accounts, conveyance accounts and spillable high security sub-accounts. After the withdrawal of existing balances, all general security accounts had equalised with a new allocation and conveyance accounts had also equalised with a new allocation.

The Belubula River catchment commenced the 2021/2022 water year with all licence categories except general security licence, receiving their maximum (100%) allocations. Carcoar Dam storage volume was just at about 34% of capacity at the beginning of the water year. General security

licences received a zero-opening allocation with about 27% carryover from the previous water year. Carcoar Dam had recovered to its full capacity in late November 2021 and remained about full capacity for the reminder of the water year. As a result, general security licences received further allocations and its water availability (including carryover) reached over 100% on 10 December 2021 and remained over 100% for the rest of the water year. Water users in the Belubula did have access to uncontrolled flows and supplementary access for most of the 2021-22 water year.

4.8 Murrumbidgee

Combined storage volume in the major Murrumbidgee dams was around 2,564 gigalitres (GL) or approximately 96% full at the start of the water year on 1 July 2021. All higher priority entitlements received their full opening allocations as per the valley's water sharing plan (WSP) on 1 July 2021. General security users received an opening allocation of 30%. Access to carryover was fully available, estimated to be about 500 GL or 26% of general security entitlement on average on 1 July 2021, however this carryover was reconciled in September 2021 as 22% (about 415 GL). Conveyance entitlements also received full opening allocations as per the water sharing plan. Inflow conditions remained favourable throughout the water year leading to 100% effective allocation (including carryover) across all regulated entitlements by 1 November 2021, the maximum limit allowed under the WSP.

4.9 Lower Darling

With the Menindee Lakes System (MLS) above 640 GL and in Murray Darling Basin Authority (MDBA) control, all licences, including high priority licences and general security, were allocated 100% at the start of the water year. Average general security carryover was 2% of entitlement. The Menindee Lakes System (MLS) was holding around 1,060 GL (61% of capacity) at the start of the water year. On 14 September 2021, the MLS had filled for the first time since 2012, holding around 1,760 GL (102%). MLS remained above full capacity for most of the water year except for a brief period between mid-December and mid-February where it dipped slightly below. In late September 2021, water started being released from Lake Cawndilla to provide a flow down the Great Darling Anabranch, the first flow in almost five years. This flow was widely anticipated by the community and provided environmental benefits for fish migration, vegetation and feeding ground for waterbirds. Unregulated conditions provided access to supplementary flows throughout much of the year and were also used to meet Additional Dilution Flow requirements to South Australia, as required by the Murray Darling Basin Agreement.

4.10 NSW Murray

Combined storage volume in the major River Murray storages was around 4,920 gigalitres (GL) or around 65% of capacity at the start of the water year. All high priority entitlements received a full opening allocation in accordance with the water sharing plan. This included all local water utility (100%), domestic and stock (100%), and high security licences (97%). Access to general security carryover was fully available, some 720 GL, or about 43% of general security entitlement on average. General security was given an opening allocation of 3% of entitlement. Uncontrolled flow access was available without debit until general security allocations reached 60%, however was debited from accounts when general security allocations reached 60% on 15 October 2021 as required by the water sharing plan.

The Barmah Millewa Environmental Water Allowance (BMEWA), around 300 GL, was fully borrowed on 1 July 2021 to underpin opening allocations. When general security allocations reached 30% on 16 August 2021, payback to the account began. Resources improved quickly through the water year, enabling the BMEWA to be paid back by 15 September, and general security to be given full (110%) allocations and high security an additional 3% allocations to reach maximum 100% allocations by 15 October 2021. For the remainder of the water year, reserves for second year high priority needs were built and the water year ended with a healthy reserve to begin the 2022/23 water year. There was full allocation to supplementary access entitlements.

5. SDL exceedances and make good actions

5.1 Barwon-Darling

The Barwon-Darling was found to be non-compliant with the SDL in the 2019/20 assessment. A series of make-good actions were agreed to with the MDBA in 2021 and we continue to progress these (Table 4).

We have identified in previous reasonable excuse claims that the main reasons for the exceedance are due to model limitations and the Commonwealth's incomplete recovery for the environment in the Barwon Darling, which is beyond NSW's control. You can read more about these issues in our 2019-20 reasonable excuse claim and also in the our 2020-21 claim.

The make good plan includes tasks to address model limitations. This relates to the first two tasks in Table 4. Task two is still in progress and requires an update to the permitted take method, as it was developed based on older less accurate metering. We estimate that this is the main reason for exceeding the compliance triggers in 2021/22. A method to address this model limitation has been included in the Water Resource Plan which has been informally submitted to the MDBA.

Table 4 Update on Barwon-Darling Make Good Tasks

Task	Status update
Remove historic embargo behaviour and inclusion of current restrictions in Barwon-Darling model	**Complete** Barwon-Darling Watercourse (BDW) APT has been updated to represent current temporary restrictions. This revised model has been used to revise the 19-20 assessment as well as for 20-21 APT (see Section 8).
Metering Recalibration project adjustment of Barwon-Darling models project	**In progress** The project has not advanced due to flooding over the previous 12 months and telemetry issues in the Barwon Darling region. This has meant the required information for water year 21/22 is unavailable. A decision on the next steps for the project will be made over the next six months.
Implement systems enabling reporting of SDL compliance data by due date	**In progress** There was some delay to the surface water submission due to our reliance on other jurisdictions to provide model inputs – MDBA granted an extension for the SW submission to 16th December 2022. We continue to work with MDBA on creating a more efficient s71 framework however the serial modelling method is likely to continue to create delays until a more automated approach can be implemented.

Task	Status update
Assessing compliance with long-term average annual extraction limit (LTAAEL)	**Complete** The assessment of compliance with the Barwon-Darling Unregulated River Long-term Average Annual Extraction Limit (LTAAEL) was completed and a report provided to MDBA. This assessment used model results over the period 1/7/1895 to 30/06/2020 to compare long term average diversions under current conditions with the limit, which in the Barwon Darling is defined by the Murray Darling Basin Cap. This showed compliance with the limit. An updated LTAAEL compliance assessment will be published on our website each year.
Accreditation of Barwon-Darling WRP	**In progress** The plan has been informally submitted to MDBA for review
Upgrade of Barwon-Darling watercourse model to the Source platform	**In progress** The Barwon-Darling Source model is at an advanced stage of development and targeted for completion in 2022/23 water year. This development is happening in parallel with finalising floodplain harvesting in the existing IQQM model, which when completed will be transferred directly into Source as we did for existing irrigation farms. The floodplain harvesting work is further valuable as it materially improves the provenance and accuracy of farm-based data, important for stakeholder acceptance. Resource constraints have meant that the project is tracking behind planned timeframes as specialist staff were prioritised to completing the floodplain harvesting program. The floodplain harvesting work has wound down in the last quarter of 2022 and the Source model build has picked up pace again accordingly.
Other broader ongoing programs: Implementation of Barwon-Darling WRP Regulation of floodplain harvesting Measurement of floodplain harvesting take Monitor compliance by individual entitlement holders Mandate and enforce the take up of AS4747 meters Compliance response according to clause 36 of the water sharing plan, if required	DPE continue to work toward all these regulation changes and together with NRAR deliver implementation and enforcement. Regulation of floodplain harvesting is currently awaiting commencement of regulations to enable the issuing of licences and application of measurement requirements. Metering compliance is published on our state of play website.

5.2 Gwydir

The exceedance in the Gwydir is predominantly from growth in floodplain harvesting. This growth has been estimated through the use of models, and accounts for around 85% of the SDL debit.

We have assessed the long-term outcomes from growth in floodplain harvesting and put in place management actions. The Gwydir Regulated River Water Sharing Plan was amended on the 29th July 2022 to include rules for floodplain harvesting and the licences became fully operational on the 15th August 2022. You can read more about this work on our website. The licences have been designed to remove growth in total diversions. This has been described in the model scenarios report and also in a subsequent report assessing compliance with the long term average annual extraction limit.

No further compliance action is required at this stage. The WRP has set out how floodplain harvesting extractions will be accounted for in future, as metered data becomes available.

6. Model refresh and incomplete recovery adjustments

The opening cumulative balance for 21-22 is based on the closing balance for 20-21. The SDL compliance approach allows for updates to prior year estimates for:

- APT modelling
- modelling for floodplain harvesting AAT.

In the 2020-21 submission, these types of corrections were applied via an update to the 19-20 s71 workbook and an update to the opening balance in the 20-21 workbook. We now have a new, more efficient approach, as follows:

- The opening cumulative balance is not changed and there is no need to submit multiple s71 workbooks
- A modelling workbook is used to calculate the changes in APT values in all prior years. It also records the modelled estimate for floodplain harvesting AAT and any changes in prior years.
- The total change in prior years is transferred to the s71 workbook as a single debit or credit for each SDL unit
- This total adjustment value also includes any changes in the estimate for incomplete recovery

Table 5 summarises the total adjustment for prior years.

In addition to correcting for updated modelling, the 21-22 SDL compliance assessment takes into account a credit for incomplete recovery (where applicable). The correction is always based on the incomplete recovery that occurred in the previous year. An estimate for this was submitted in the 2020-21 workbook and this value is recorded in the 21-22 workbook. This estimate and any estimates for prior years may change however, due to updated modelling. As noted above, these changes are included in the total adjustment credit or debit in the s71 workbook. The refreshed values for incomplete recovery are shown in Table 6.

The adjustment for incomplete recovery is calculated using the registered water recovery data held by MDBA. The calculation for this year has been based on data for 30th June 2021. The adjustment is based on modelled APT results. This means that the annual estimate will vary depending on conditions, rather than using a long-term average estimate as recorded in the water recovery data.

Table 5 ***Model refresh adjustments for prior years (APT, FPH AAT and incomplete recovery changes)***

SDL resource unit	Model refresh adjustments (GL)	Key reasons for changes
Barwon Darling Watercourse	26.5	Primarily due to SILO data updates, in particular for evapotranspiration.
NSW Border Rivers	-6.6	Corrections to storage inflow derivation for Glenlyon and also correction to initialisation procedure
Gwydir	-4.7	Primarily due to SILO rainfall data being update, which caused an increase in rainfall runoff harvesting (both APT and AAT).
Namoi	-5.6	Updated flow data, in particular for 419029, resulted in reduced supplementary take.
Macquarie-Castlereagh	-27.0	Rainfall data was update in SILO, in particular at 51037 at Nevertire. This led to an increase in rainfall runoff harvesting (in both APT and AAT). There was also a subsequent decrease in other diversion categories.
Lachlan	1.2	Minor changes due to climate and flow data updates and also due to different rounding in prior years. Was in GL with 1 decimal place but is now to nearest ML.
Murrumbidgee	81.9	Model was double counting the effects of the Snowy Water Savings. The model had a representation of the use of this water by taking it directly from Blowering Dam. However, post 2010 the observed inflows to Blowering Dam already are reduced by the water allocated to the Snowy Water Savings. This problem was issue 9 in *Murrumbidgee Issues Status as in March 2022* (MDBA, unpublished).
NSW Murray	51.5	Revised MDBA modelling - increased estimate for 2020-21 likely due to higher internal spills simulated from Victoria to NSW
Lower Darling	-3.4	Revised MDBA modelling

Table 6 Adjustment for incomplete water recovery (GL)

SDL Resource unit	Adjustment for incomplete recovery (refreshed 20/21 values and included in 21/22 balance)	Adjustment for incomplete recovery (21/22 values to be included in 22/23 balance)
Intersecting Streams	0	0
Barwon Darling Watercourse	2.05	1.96
NSW Border Rivers	1.49	5.49
Gwydir	0	0
Namoi	4.81	6.01
Macquarie-Castlereagh	0	0
Lachlan	0.43	0.59
Murrumbidgee	7.48	8.17
NSW Murray	17.37	22.01
Lower Darling	0	0

7. Environmental water

7.1 Held environmental water

Recorded usage of held environmental water in NSW surface water SDL units totalled 1124 GL during 2021/22.

Table 7 shows the 2021/22 HEW use recorded for each surface water SDL resource unit in NSW. Entitlement volumes shown below are the equivalent in GL of entitlement shares at the end of the water year on 30th June 2022.

Table 7 Summary of 2021/22 held environmental water use (surface water) in NSW (GL)*

SDL resource unit	HEW Entitlement	HEW Use
Barwon-Darling Watercourse	30	46
Gwydir	136	37
Intersecting Streams	18	0

SDL resource unit	HEW Entitlement	HEW Use
Lachlan	127	20
Lower Darling	324	98
Macquarie-Castlereagh	187	14
Murrumbidgee	1,163	642
Namoi	15	0
New South Wales Murray	673	267
NSW Border Rivers	4	0

* Incudes unregulated river HEW entitlement

No HEW usage was recorded in 2021-22 in the groundwater SDL units in NSW where environment licences are held. The entitlement and usage remains the same as for 2020-21 (Table 8).

Table 8 Summary of 2021/22 held environmental water use (groundwater) in NSW (GL)

NSW groundwater SDL resource unit	HEW Entitlement	HEW Use
Billabong Creek Alluvium	0.029	0
Lachlan Fold Belt	0.029	0
Lower Lachlan Alluvium	0[a]	0
Lower Murrumbidgee Alluvium (Deep)	6.905	0
Lower Murray Alluvium (Deep)	1.323	0
Lower Murray Alluvium (Shallow)	0.033	0
Upper Murray Alluvium	0.137	0

[a] This is a zero-share water access licence

7.2 Planned environmental water

In NSW planned environmental water (PEW) may be either rules-based or managed in a specified account similar to water accounts for other (licensed) water users. Examples of rules-based PEW include end of system flows, translucency/transparency rules and environmental share of supplementary events.

In several surface water regulated valleys, Environmental Water Advisory Groups (EWAGs) advise on the management and use of account-based PEW such as environmental contingency allowances (ECA), environmental water allowances (EWA) and water quality allowances (WQA). Specific environmental assets such as the Gwydir Wetlands, Macquarie Marshes, Lowbidgee Floodplain or the Barmah-Millewa forest are generally targeted. Releases from stimulus flow accounts, such as in the NSW Border Rivers, usually target a specific reach of the river or an environmental benefit downstream of the storage.

Table 9 outlines the volume of account-based PEW available and used in each surface water regulated river valley/SDL resource unit where PEW accounts or allowances exist. The relevant regulated river WSP details the rules around the management and use of PEW accounts. Account-based PEW use for NSW totalled approximately 151 GL for 2021/22.

Table 9 Summary of 2021/22 planned environmental water use (account-based) in NSW surface water regulated rivers (GL)

SDL resource unit name	Volume of PEW available	Use of PEW
NSW Border Rivers	7.6	0
Gwydir	101.5	11.5
Namoi	5.0	0
Macquarie-Castlereagh	160.0	57.8
Lachlan	40.0	14.1
Murrumbidgee	94.8	19.9
NSW Murray	245.7	47.9
Lower Darling	30.0	0

8. Progress of water reform

NSW implemented new rules and management practices in three northern inland valleys, and completed key work on HEW in the Intersecting Streams in 2020/21. Active management, the resumption of flows rule and individual daily extraction components (IDECs) were all implemented in the Barwon-Darling, while active management was implemented in the unregulated portions of the lower Gwydir and Macquarie systems. These rules seek to protect key flows for environmental and critical human needs and delivered on NSW's commitment to put enduring solutions in place to protect held environmental water from extraction. In 2020/21, a total of 103.5 GL of environmental water was protected in the unregulated Barwon-Darling and Macquarie-Bogan water sources. In 2021/22, a total of 85.1 GL of environmental water was protected in the unregulated Barwon-Darling and Macquarie Bogan water sources.

NSW also collaborated with Queensland on a new accounting process for recognising HEW when it flows across the Queensland-NSW border. This was a commitment in the Intergovernmental Agreement on Implementing Water Reform in the Murray Darling Basin (the IGA). NSW and Queensland worked to develop a process for identifying/notifying the presence of crossing the Queensland-NSW border and a transparent accounting method to calculate the volume. To complete the program of work, NSW and Queensland co-signed a letter to provide an enduring formal commitment to the method and ongoing work to ensure environmental water crossing the border is recognised. Now NSW is progressing to recognise this water through actively managing IDEC on Barwon Darling River. A survey of water users was completed in November 2022 to understand appropriate action on protection of environmental water.

NSW is implementing the recommendations of Claydon Review 2021 into resumption of flow rules. The department released a draft Western Regional Water Strategy with a strong focus on connectivity. WaterNSW has updated its flow forecast models for the northern tributary enabling

protection of environmental water. In the southern Basin, NSW is continuously improving implementation of pre-requisite policy measures (PPMs). During 2020/21, about 60 GL of environmental water was returned to SA border from Lower Darling, Murrumbidgee and Edward-Wakool systems. NSW progressed loss accounting and return flow calculations from the more conservative assumed use to proportional and incremental losses in the Lower Darling and Murrumbidgee Rivers respectively. The first annual evaluation of PPMs implementation was also completed and has been published. Lessons learned from the review will inform continuous improvement.

The licensing framework of floodplain harvesting in NSW Border Rivers and Gwydir Valleys commenced on 15 August 2022. Licensing will bring floodplain harvesting into line with other forms of take, enabling monitoring and management and providing certainty in the provision of water required for the environment and other water users.

Attachment 1. Bi-lateral surface water SDL compliance methods agreement

The surface water SDL compliance assessment is based on the same methods which were agreed to under the 2020-21 bi-lateral agreement. MDBA-NSW bilateral agreement – improved methods for 2020-21 water year is published on the MDBA website. The agreed methods are summarised below.

These agreed methods for APT and AAT should be used to retrospectively update data for 2019-20, as well being applied for 2020-21 and 21-22, consistent with New South Wales and MDBA bilateral agreement 2021-22 agreement, NSW action 1.4, and with s3.2.4 of the MDBA's 2018 SDL reporting and compliance framework[1].

Part of the agreement included reporting on temporary water restrictions. This information was included in the 2020-21 narrative and is also published on our website. No further s324 restrictions applied in 2021-22. Reduced supplementary access allocations were in place however for the Border Rivers and Gwydir in 2020-21. The APT method for the Barwon Darling already accounts for temporary water restrictions. For other SDL units, these methods will be established through water resource plans and implemented once accredited.

Table 10 Agreed 2021-22 surface water SDL compliance methods

SDL resource units	Forms of Take	BDL	APT	AAT
Barwon–Darling Watercourse	Watercourse (unreg)	APT report submitted June 2020.	• annual model result from updated model *DarlAPT01_20 4th version.sqq*, as submitted 30 Sept 21 which reflects section 324 restrictions and removes old representation of embargo multiplied by the reg river scaling factor[2] (note this includes an amount for Miralwyn unreg use). Model run using IQQM version v7.96.0, and Darl-APT-v02_21.run to extract diversions from the scenario.	• Metered + Estimated (*licensed S&D, unmetered irrigation takes*) • Miralwyn unreg use is to be accounted for in BDW: Geera licence water be considered as AAT (noting that it aligns with the diversions included in the Barwon-Darling APT). This is calculated using metered diversions minus net allocation trades IN. •
	FPH	14.3 GL/y (rather than 16.5 GL/y in the BDL report).	• annual model result from updated model *DarlAPT01_20 4th version.sqq* multiplied by the FPH scaling factor[3]	• Use annual output (unscaled) from the APT model *DarlAPT01_20 4th version.sqq* as a representation of current conditions (and hence AAT)

SDL resource units	Forms of Take	BDL	APT	AAT
	Basic Rights	long-term average estimate (0.826 GL/y)	• long-term average estimate (0.826 GL/y) • scaling factor to be adjusted to demonstrate total use meet the SDL.	long-term average estimate (0.826 GL/y).
Border Rivers, Gwydir, Macquarie	Reg take	APT report submitted June 2020.	• annual model result from proposed APT model of June 2020 ie *BorderRivers_2019_10_30.rsproj; SDL-014.sqq* (for Gwydir); and • *MacqP110.sqq* • Each multiplied by the relevant reg river scaling factor[2]	• Metered + Estimated as per past practice. • No change in Macquarie unreg estimates i.e. long-term average estimate continues to be used for APT and AAT.
	FPH	APT report submitted June 2020.	• annual model result from proposed APT model of June 2020 *BorderRivers_2019_10_30.rsproj; SDL-014.sqq* (for Gwydir); and • *MacqP110.sqq* • Each multiplied by the relevant FPH scaling factor[3]	Annual output current conditions model submitted on 30 September 2021 *BorderRivers_2020_09_02.rsproj; CC_v27-8_2020.sqq* (for Gwydir)*; MACQ_CC_preFPH_20210422.sqq)*
Namoi	Reg take	APT report submitted June 2020.	• annual model result from proposed APT models of June 2020[4] • *NamoS003.sqq; PeelS001.sqq;* multiplied by the reg river scaling factor[2]	Metered + Estimated as per past practice.
	FPH	BP 2012 estimate (14.0 GL/y)	BP 2012 estimate (14.0 GL/y) (improved model not available).	BP 2012 estimate (14.0 GL/y) (improved model not available).
Lachlan	Reg Take	APT report submitted June 2020.	• annual model result from the updated APT model *(LachAPT123_2021.sqq)* submitted October 2021 multiplied by the corrected reg river scaling factor[2] and Belubula_47010562_APT_2021.rsproj (input set = PBP). • incorporates unmodelled HEW and other fixes	Metered + Estimated as per past practice.

SDL resource units	Forms of Take	BDL	APT	AAT
Murrumbidgee, NSW Murray, Lower Darling, Intersecting Streams	as per proposed WRPs submitted in June 2020			

Notes:

1. *Note that the* MDBA's 2018 Sustainable Diversion Limit Reporting and Compliance Framework (mdba.gov.au) *is currently being updated, to the reflect the change in roles subsequent to the creation of the Inspector-General Water Compliance in July 2021. Development and publication of the Register of Take remain the responsibility of the MDBA, and these aspects of the framework are unlikely to change*.
2. *Reg river scaling factor = [reg river BDL - required recovery] / [reg river LT APT]*
3. *FPH scaling factor = [FPH BDL] / [FPH LT APT]*

   Where reg river BDL and FPH BDL are long term averages as per column 3; the 'required recovery' is the sum of the local reduction amount and the SDL resource unit shared reduction volumes, less the SDL adjustment amount; and reg river LT APT and FPH LT APT are long-term averages from the models specified in column 4.

   Scaling factors to be provided in a separate s71 spreadsheet by NSW.
4. *The intent under the bilateral agreement was to undertake this modelling for the 2020-21 reporting period however NSW have subsequently advised that this is not achievable. MDBA agrees that this can be deferred to 2021-22, if in the interim some brief text is included in the narrative, which indicates the extent of the restrictions that applied in 2019-21. This would include a description of the period of time that they applied and nature of the event(s) for all valleys, where applicable.*

Attachment 2. Surface Water SDL compliance calculations

Key Terms & Acronyms

C = consumptive. Data relating to water uses other than held environmental water (HEW)

E = environment. Data relating to HEW

E2E = environment to environment ie. trades between HEW licences (and similarly C2C, C2E and E2C)

S71 compliance method

Adjusted Cumulative Balance = [Adjusted Cumulative Balance at start of year] + ([Annual Permitted Take] – [Annual Actual Take] + [HEW Disposal (E to C)] – [HEW Acquisition (C to E)]) + [Adjustment for under-recovery]

Where,

[Annual Permitted Take] represents how much can be taken under the SDL from all forms of consumptive take. It varies from year to year based on climate, inflows and water resource plan rules. It is calculated in accordance with the method published in the APT report attached to the WRP. This includes an adjustment to increase the APT for water traded in and decrease for water traded out based on trades between consumptive licence holders[2].

[Annual Actual Take] represents how much water was used in the water source from all forms of consumptive take, excluding water traded out and including water use from water traded in. It includes a mix of metered and estimated usage.

[HEW Disposal (E to C)] represents allocation trades from a HEW account to consumptive user. This includes trade from any HEW in or outside the SDL resource unit to consumptive licences in the SDL resource. e.g. Trade from HEW in Murray to consumptive in Murrumbidgee will result in a balance credit for the Murrumbidgee.

[HEW Acquisition (C to E)] represents allocation trades from a consumptive user to HEW. This includes trade from consumptive licences in the SDL resource to any HEW in or outside the SDL resource unit. e.g. Trade from consumptive in Murrumbidgee to HEW in Murray will result in a balance debit for the Murrumbidgee.

[Adjustment for under-recovery] where HEW is less than required recovery in the preceding year. This adjustment is normally completed by MDBA after formal sign off process.

[2] Allocation and tagged trades. Not permanent licence trades. Currently the interstate adjustment in the Border rivers is NET interstate usage only for both Cap and APT. It includes usage from permanent tagged works.