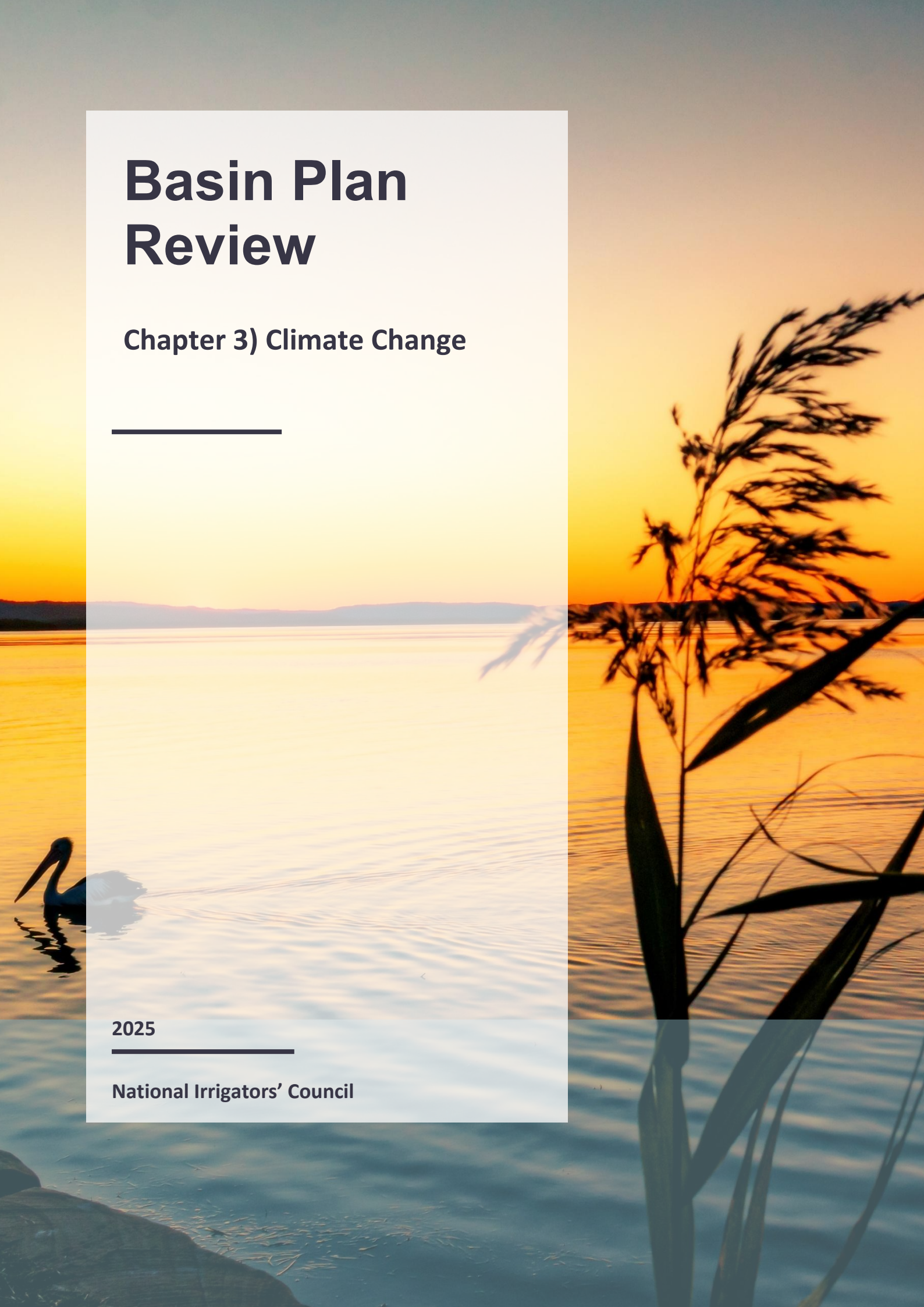


Basin Plan Review

Chapter 3) Climate Change

2025

National Irrigators' Council

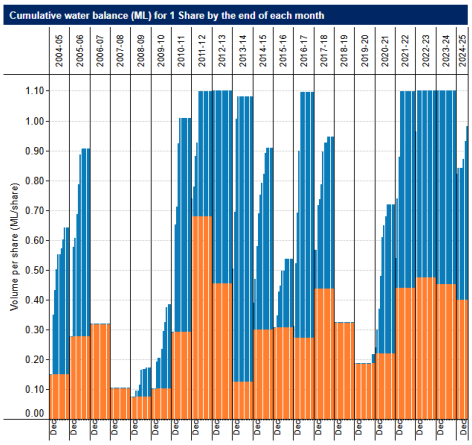
Chapter Overview

Key findings

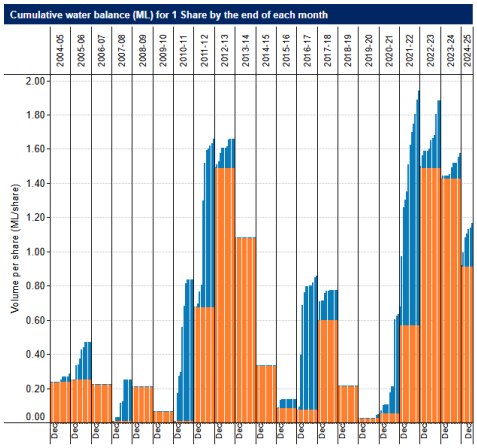
- Climate change is factored into water sharing. This is primarily via states' water sharing policies and practices such as via the making of water allocations, and in setting extraction limits.
- Data shows that consumptive water users receive less water during droughts (as well as HEW), with water allocations returning as water availability increases.

The data

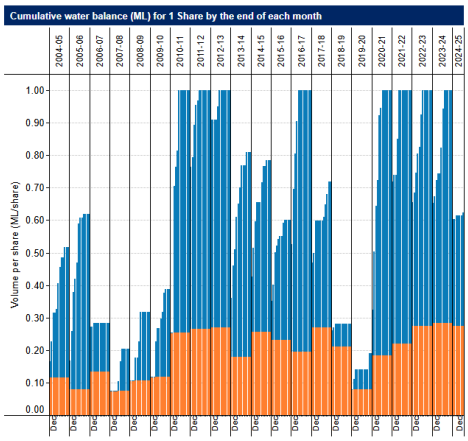
General security water allocations in four water sources, varying over time in response to climatic conditions (note: allocations in blue, carryover in orange).



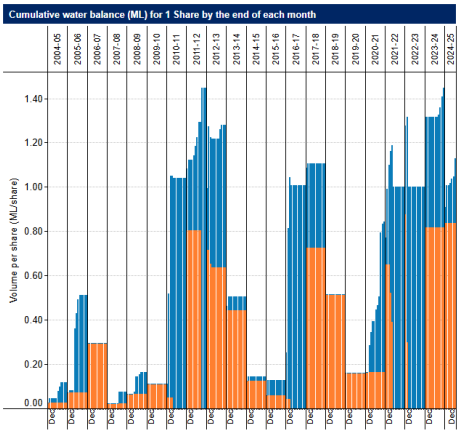
NSW Murray Regulated River Water Source (Reg river, GS)



Gwydir Regulated River Water Source (Reg river, GS)



Murrumbidgee Regulated River Water Source (Reg river, GS)



Macquarie Water Source (Reg river, GS)

What it means for the next Basin Plan

It will be integral that any review of the Basin Plan recognises the ways in which climate change is already factored into water management, as the starting point for the review. This is not to say 'everything will be fine', rather, to ensure an accurate information base of possible future scenarios (not just of water availability, but how this trickles down through water sharing frameworks to produce different outcomes for different users). NIC is concerned by a view that the Basin Plan and water management do not consider climate change – this is not correct.

Managing for climate change is not about ensuring a set of benchmark environmental outcomes in the Basin continue to be achieved. All users must share risks and opportunities. NIC agrees with the questions in the Early Insights Paper that:

> *"can these [achievement of Basin Plan environmental outcomes] be better mitigated and responded to, or will some desired environmental outcomes not be sustainable under climate change?"*

Climate change planning must also focus on water security for critical human needs (including First Nations), and water security for agriculture. Even under the most extreme climate scenarios, it will be important to maintain a viable agricultural sector. Under current management arrangements, where water allocations to consumptive users are lowest-priority, the irrigated agricultural sector will be hit first and hardest. NIC recommends that the review includes modelling of what water allocations for agriculture will look like under these various climate scenarios (including availability and affordability), and what this will mean for the industry. This will be important to: (i) understand the status quo; and (ii) determine if interventions (of some form) are necessary to improve water security for agriculture, to maintain production into the future. Indeed the water security limitations on Australian agriculture are a vital piece of information for Governments to ensure domestic food security and food sovereignty, as well as to maintain a strong export base.

In our view, focus must be on securing critical needs during droughts (including critical environmental needs, but foremost, critical human needs such as town water supplies). In extreme events, critical human needs are the highest priority. Integral to this, is recognizing that securing these high-priority needs cannot occur with the buyback of more licenses which are lower priority than those needs already. This will require a more comprehensive look at a range of solutions, including infrastructure (storage dams, weirs, pipelines, tanks), secondary supply sources, water recycling, desalination, or water-carting as a last resort. This will require working with local councils, who are primarily responsible for town water supply.

When referring to 'plausible climate futures', this must include both wetter and drier periods, as well as acknowledge the uncertainty in projections. There is a tendency for focus to only be on the drier.

Chapter 3: Climate Change

How is climate change already factored into water management?

Finding 3a) Climate change is already automatically factored into water sharing frameworks, through processes such as water allocations, which allocate water based on factors such as how much water is actually available, and according to a hierarchy of water users.

Climate change (and climate variability) is factored into water sharing and management frameworks, through a number of mechanisms. Collectively, we can call these 'Automatic Climate Response Mechanisms'. As water is managed by the States, these mechanisms are primarily embedded in State legislation and policies.

As part of the review, given the focus on climate change, it will be critical that the current arrangements / existing practices for all states are identified and communicated, including data to show the outcomes in practice.

NIC recommend States being asked to contribute these arrangements as part of the Review process, to demonstrate how this is done. This will be critical to counter a common myth that climate change is not factored into water management.

The below section will focus in detail on a case study of NSW. NSW was selected for this case study primarily due to public data availability, as well as the prevalence of lower-security entitlements (such as general security). Key data sources include the WaterNSW Water Insights portal[1], the NSW Government Water Dashboards[2], as well as state legislation and WSPs.

[1] https://waterinsights.waternsw.com.au
[2] Allocations dashboard | NSW Government Water

A further case study of South Australia is also explored below.

Case study: NSW[3]

(a) Water allocations vary with water availability

The volume of water that water entitlement holders can access is determined through an Available Water Determination (AWD), commonly known as a water allocation. Given water availability is variable, water allocations vary each year, based on the rules set out in the relevant Water Sharing Plan (WSP) and based on the water available, and forecast to be available, in the water source.

This means that a water entitlement does not guarantee a fixed volume of water, but rather, it is a share of what water becomes available to that entitlement category up to the volume specified in the entitlement. For example, whilst a farmer may have a 20ML water entitlement, a 25% allocation in a given year means they effectively can only take 5ML. If they have a 0% allocation, they cannot take any water and that entitlement is effectively 'switched off'.

AWDs are based on factors including:

- The condition of the catchment and river system river (wet/dry) and forecast inflows;
- Dam storage levels, including how much water unused from previous years is carried over in public storages;
- The estimated volume required to run the river, including end of system flows, transmission losses and evaporation losses; and,
- Other requirements, such as storage reserves and environmental water allowances.

(b) Water use is based on a hierarchy of priority

State legislation (in NSW, the Water Management Act 2000) sets out a hierarchy or order of priority of water users for the purposes of making an AWD.

[3] For further information, see NSW Irrigators' Council Report: 2022-11-11-Climate-Change-Report-Final.pdf

Priority	Extreme events	Normal circumstances
Highest	• Critical human water needs	• Needs of the environment
High	• Needs of the environment	• Basic landholder rights
	• Stock • High security licences • Commercial and industrial activities authorised by local water utility • Water for electricity generation on a major utility licence • Conveyance in supplying water for any priority 3 take	• Local water utility access licences • Major utility access licences • Stock and domestic access licences
	• General security licences	• Regulated river (high security) access licences
Low	• Supplementary licences	• All other forms of access licences • Supplementary access licences

Source: Based on priorities table in *Macquarie-Castlereagh Surface Water Resource Plan: Schedule G—Macquarie-Castlereagh Incident Response Guide*

Under normal circumstances, the needs of the environment (i.e., water to ensure rivers run) are the highest priority, followed by basic landholder rights, town water supply and stock & domestic licenses, and then high security water licenses (typically for permanent plantings such as orchards or vineyards), and finally, last in line is lower security licenses (which are typically used for annual crops like cotton or rice).
During a declared 'extreme event' (such as droughts) critical human water needs (i.e. town drinking water) becomes highest priority, then the needs of the environment, followed by stock, high-security licenses, and still last in line (and only if any water is left over) are the lower security licenses like general-security.

The allocation process ensures that high priority water requirements for the next 24 months can be met (including carryover).

The purpose of showing this hierarchy is to clarify a common misconception that irrigators are 'competing' for water from high priority needs during drought – this is not the case. High priority needs must be secured prior to allocations being made to lower security license, such as general security.

Because of this, it can be said that the impacts of climate change are felt from the bottom of the hierarchy up – as those lower down in the hierarchy will experience fluctuations first and most significantly.

This also shows that – if the goal is to improve the resilience of critical needs under climate change (dry scenario) – rebalancing water shares offers limited utility as a solution.

(c) Data shows this variation of water allocation and use in practice

This variation of water allocations between wet and dry years can be shown by looking at the historical AWDs on the NSW Government Water Allocation Dashboard[4].

The below graphs, taken from this site, look at General Security entitlements in selected regulated water sources. These graphs do not show usages by account holders – rather - they show the cumulative water that is 'brought to the table' by means of water allocations. This includes the current year AWD (blue) and carryover where applicable (orange).

The water sources are selected to show a representation of the state (northern and southern): NSW Murray, Murrumbidgee, Gwydir and Macquarie. It is noted that each of these water sources have unique WSP rules, including carryover provisions, and accounting rules (i.e. cumulative accounting). The data covers the period from 2004-05 to present (2024-25).
Key observations from the below graphs are:

- AWDs are significantly reduced, or zero, in the dry years – for this period (2004-05 to 2024-25), the dry years include the Millenium drought (until 2009), and the Tinderbox drought (around 2019).
- AWDs return to be higher in years of higher water availability – see 2011-12, and 2021-22 for example.
- Water-use can be lagged following inflows and rainfall. Using stored water this way is more prevalent in northern catchments that have continuous accounting which enables the water user to manage their water availability risk but means a higher proportion of carryover water is used at the start of a dry period.

[4] Allocations dashboard | NSW Government Water

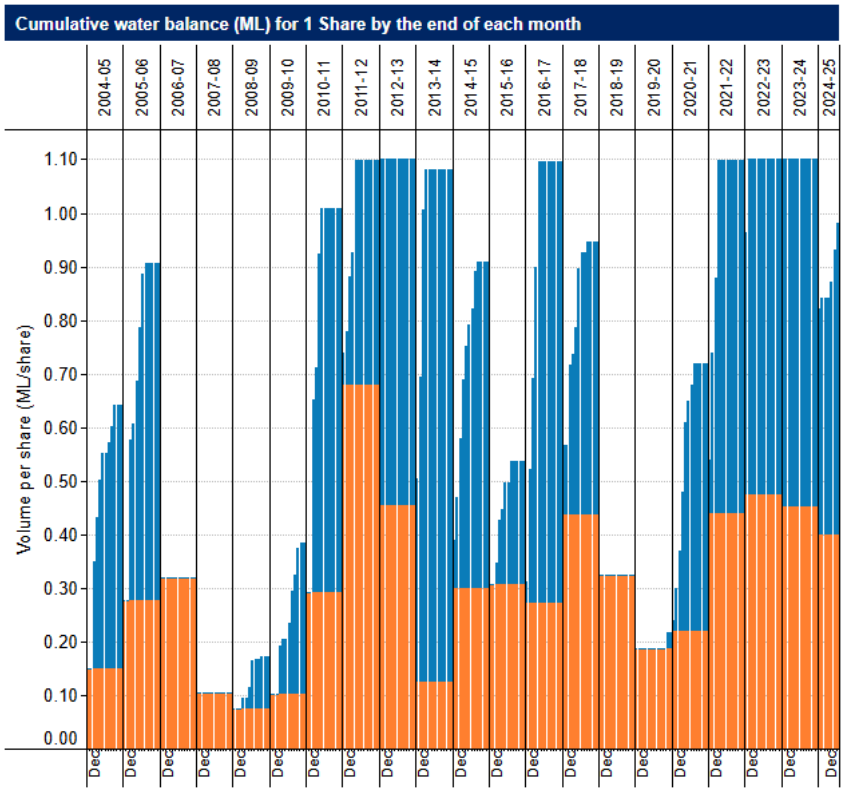


Figure 1 NSW Murray Regulated River Water Source (Reg river, GS)

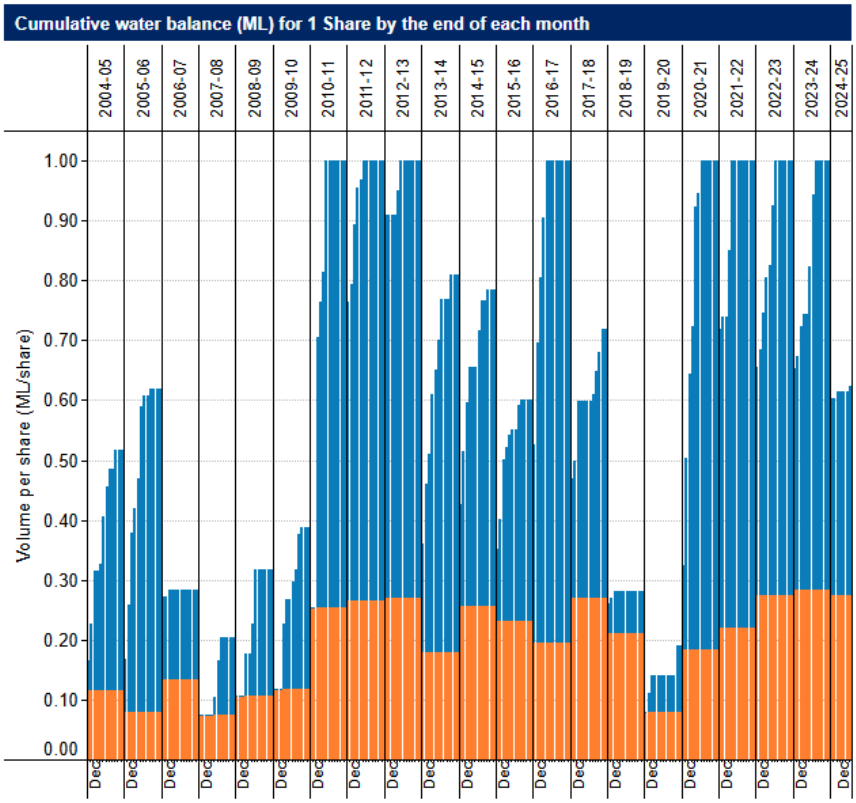


Figure 2 Murrumbidgee Regulated River Water Source (Reg river, GS)

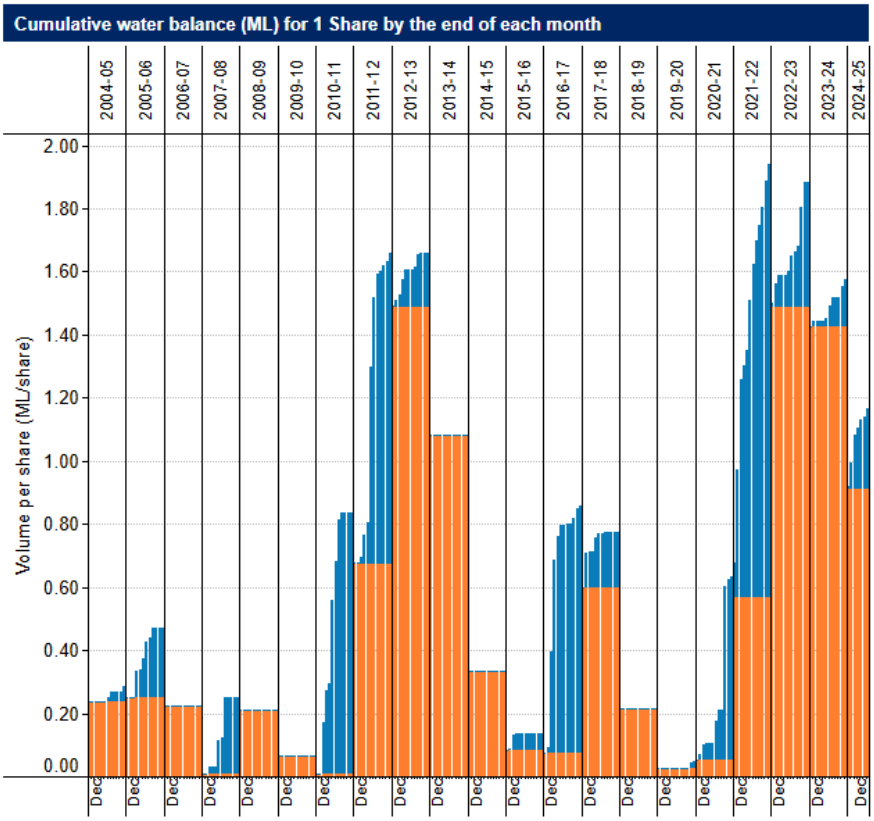


Figure 3 Gwydir Regulated River Water Source (Reg river, GS)

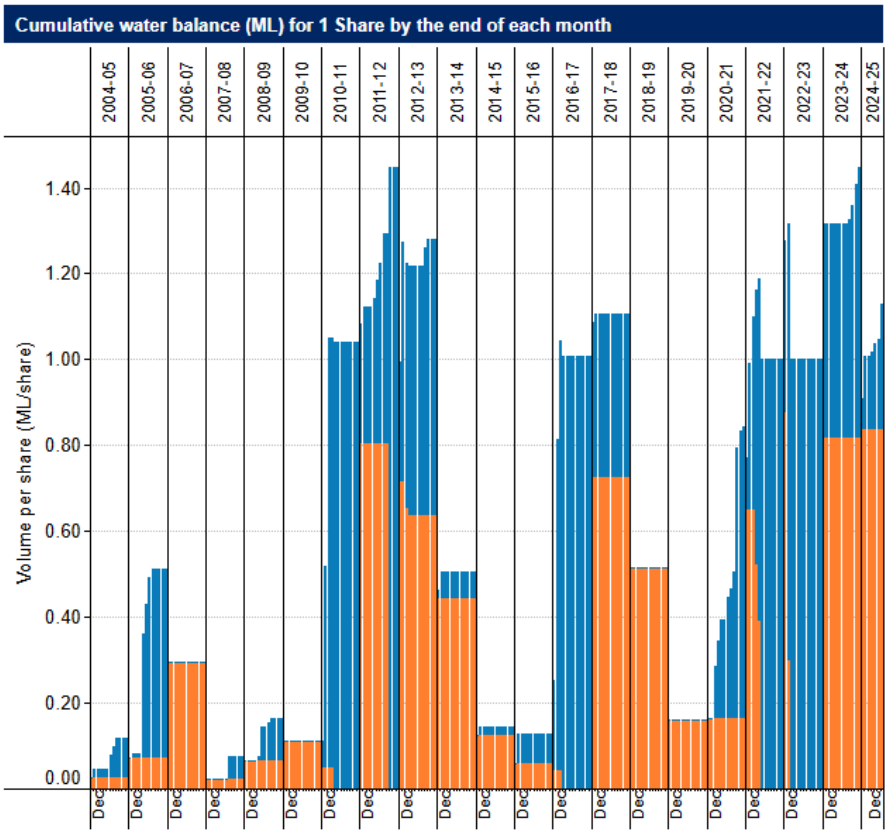
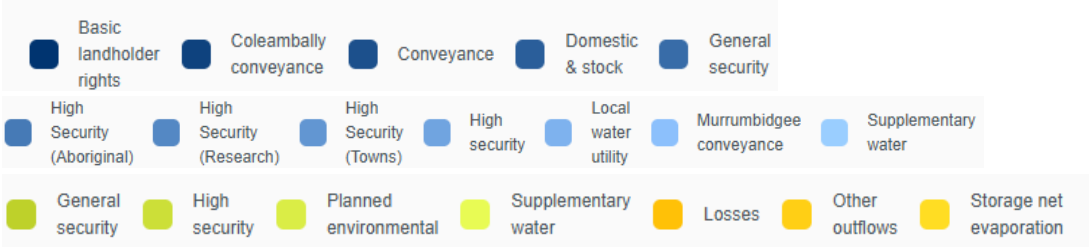


Figure 4 Macquarie Water Source (Reg river, GS)

While the above looks at AWDs, we also need to look at the full water balance, to view water usage of all other components (such as planned environmental water, or operational water) during wet and dry years. The below graphs are taken from WaterNSW Water Insights. This data covers the period 2010-11 to 2023-24. Note: in this instance, water 'usage' is used broadly, and also includes water used by the environment (such as PEW), losses, other outflows and evaporation.

The same 4 case study water sources are shown: NSW Murray, Murrumbidgee, Gwydir and Macquarie. The key is as follows:



Key observations from the graphs below are:

- During dry years:
  - water usage by all users decreased as total water availability decreased;
  - water usage by consumptive users significantly decreased;
  - there was some Planned Environmental Water maintained (i.e. water for the environment that is not on a license), but not as much as during a wet year;
  - water usage by the environment from licenses (i.e. Held Environmental Water) also decreased similar to consumptive users (as these licenses are subject to the same conditions and characteristics as licenses sued for consumption).
- During wet years:
  - water usage by all users increased, as total water availability increased;
  - the largest booms in wet years are from the environment (PEW) and operational water (losses, other outflows and evaporation shown in orange).
- During all years:
  - Consumptive use is a small proportion of the total water usage.

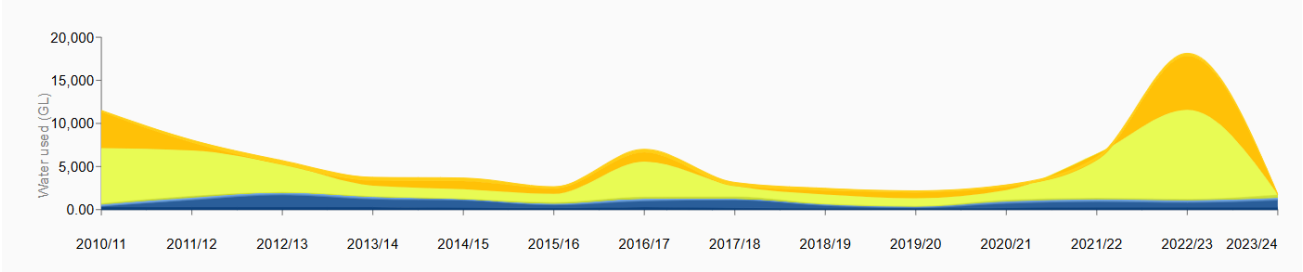


Figure 5 NSW Murray Reg Water Usage

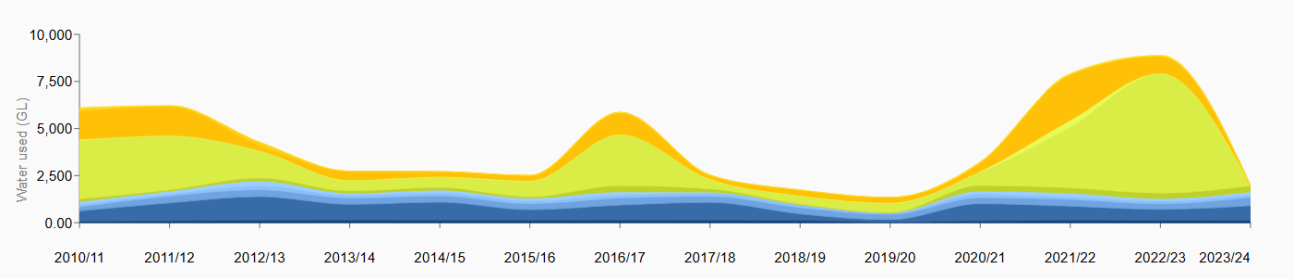


Figure 6 Murrumbidgee Reg Water Usage

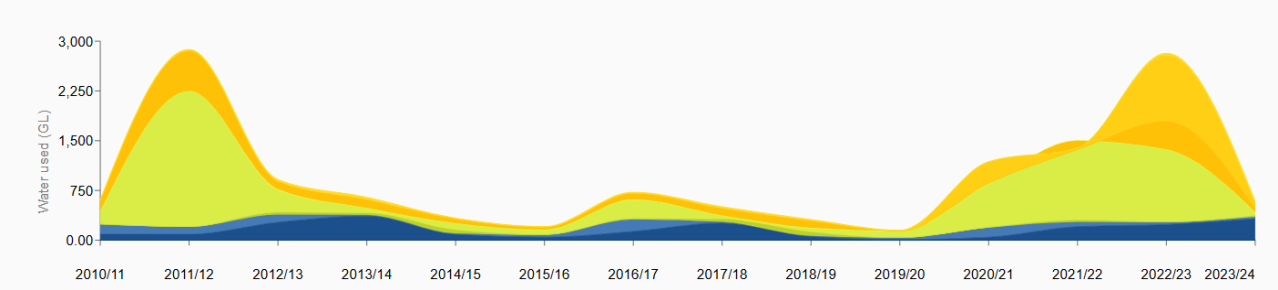


Figure 7 Gwydir Reg Water Usage

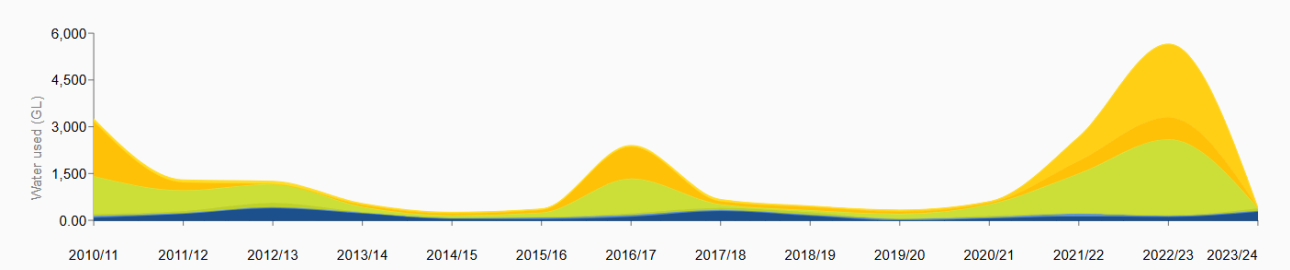


Figure 8 Macquarie and Cudgegong Reg Water Usage

(d) Climate data is used in water planning and setting extraction limits

Finding 3b) The setting of extraction limits is based off all available climatic information.

Water Sharing Plans (WSP), which are the primary instrument for water planning and sharing decisions in a water source, are based on the full available climate record. This includes determining the Long-Term Annual Average Extraction Limit (LTAAEL) and the priorities according to which allocations must be adjusted if extraction limits are exceeded.

Case study: NSW Border Rivers WSP

Since this is based on a water source scale, a case-study is used – NSW Border Rivers. This case study was selected as it has been a WSP subject to significant discussion (and legal challenge) on whether/how climate change is factored in.

Note: judicial review was brought forward by the NSW Nature Conservation Council (NCC) but was later discontinued.

Extracts from that WSP are shown below.
Section 13 shows how climate variability is recognized in the WSP:

13 Climatic variability

This Plan recognises the effects of climatic variability on river flow in the water source through provisions contained in Part 6 that:

(a) manage the sharing of water within the limits of water availability on a long-term basis, and

(b) establish priorities according to which water allocations are to be adjusted as a consequence of any reduction in the availability of water due to an increase in extraction against the long-term average annual extraction limit or the long-term sustainable diversion limit, and

(c) manage the sharing of water between categories of access licences on an annual basis through available water determinations.

Note. Other statutory tools are available to manage climatic variability within a water source, for example, temporary water restrictions under section 324 of the Act.

This reflects the mechanisms discussed above.

Further, the WSP species that the calculation of the LTAAEL is based on the full climatic record available.

Division 2 Long-term average annual extraction limit

27 Calculation of the long-term average annual extraction limit

(1) Following the end of each water year, the Minister must calculate the long-term average annual extraction limit for the water source in accordance with this clause and clause 26.

(2) The long-term average annual extraction limit is the lesser of the following:

(a) long-term average annual extraction calculated based on the following:

(i) the water storages and water use development that existed in the 2001/2002 water year, excluding that which is the subject of subclause (v),

(ii) the basic landholder rights and access licence share components that existed on 1 July 2009,

(iii) the rules set out in the *Water Sharing Plan for the NSW Border Rivers Regulated River Water Source 2009* as at 1 July 2009,

(iv) the level of development for plantation forestry that existed on 1 July 2009,

(v) the level of development for floodplain harvesting that existed in the 2001/2002 water year in connection with extractions from a regulated river in the water source, as assessed by the Minister,

(b) long-term average annual extraction calculated under Cap baseline conditions as agreed under the Murray-Darling Basin Agreement that was in place at the commencement of the *Water Sharing Plan for the NSW Border Rivers Regulated River Water Source 2009*.

Note. ***Murray-Darling Basin Agreement*** is defined in the Dictionary.

(3) For the purposes of subclause (2), the long-term average annual extraction limit is to be calculated over the duration of available climate records using the plan limit hydrological computer model approved by the Minister.

Notes.

1 Under section 8F of the Act the long-term average annual extraction limit is to be varied by any change to licensed environmental water, excluding water committed under section 8C of the Act.

2 The long-term average annual extraction limit recognises the effect of climatic variability on the availability of water in accordance with section 20 (2) (c) of the Act, as historic climate and river flow information is used in its determination.

It is a common misconception that climate change is not factored in to setting extraction limits. Whilst WSP may not explicitly say, this is how we consider climate change it is incorrect to say they do not factor it in.

Where that misconception comes from is a policy decision in 2014 - *Water Management Amendment Act 2014 (cl 28 [1] of Schedule 2)* which amended all NSW Basin WSPs in force in 2014 to maintain reserves based on the "*worst period of low inflows into this water source (based on historical flow information held by the Department when this Plan commenced)".* The reason for this decision was primarily to lock-in the existing bulk sharing arrangements between high-security and general-security entitlement holders (i.e. to avoid transferring between the two types of security, particularly during a drought).

The effect of this is that 'reserves' (the water set aside for critical needs before allocating water to lower priority users) is set based on 'assumed inflows' of the lowest inflow sequence when the WSP commenced. Given all these water sources experienced very severe droughts prior to WSP commencement, these assumed inflows are very low – i.e. it takes a very

conservative approach by assuming an exceptionally dry year, every year, when setting reserves, to ensure sufficient water is made available.
This practice of planning ahead (based on a highly conservative assumption of a very dry period) means that allocations for general security entitlements can be made earlier in the water year (without waiting for inflows to arrive). This is critical for prior planning for all water users, environment and irrigators alike.

For farmers, prior notice of water allocations is critical to make decisions around summer crops. For environmental water holders, (noting the large portfolio of entitlements now held for environmental purposes, in addition to environmental water not on an entitlement, such as Planned Environmental Water, which in many water sources is linked to the GS allocation), this similarly means that water can be made available earlier, to be used in earlier months of the water year if required, and to inform planning efforts.

The concerns with this practice relate to a rare (but plausible) scenario in which the actual inflows that year are lower than the worst period of low inflows prior to the WSP commencing, and the question of whether the reserves set aside will be sufficient. It is entirely plausible for this to happen, but importantly, there are a number of interventions in place if inflows are not tracking above this scenario during the water year as well as other levers available to act if needed. These include: allocations made throughout the year can be made more conservatively (AWDs are made at the start of the water year but are adjusted periodically throughout the year as more information comes to hand about water availability that year), the Minister can make a temporary water restriction, or suspend the Plan.
The setting of the LTAAEL is a largely separate process to this, and is based on the full available climatic record.

Case Study: South Australia

Other jurisdictions also manage for climate variability (and thus change) in their water allocation processes (albeit with different terminology, and slightly difference processes). For example, the operation of variable water allocations based on water availability in South Australia can be seen below, across three scenarios. This is based on the volume of water available to South Australia, with the allocations for irrigation being High-Security entitlements.

As background, the Murray-Darling Basin Agreement defines the rules for how water in the River Murray is shared between NSW, Victoria and South Australia. South Australia receives a maximum entitlement of 1850 GL under the Agreement. This is reduced when conditions are dry and water availability is limited. SA's River Murray Entitlement is shared in

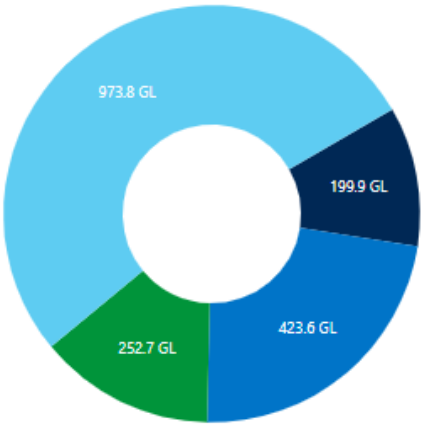
accordance with the requirements of the Water Allocation Plan for the River Murray Prescribed Watercourse.[5]

Key	Description (as per website)
Water to 'run the river' (light blue)	*This includes water set aside to meet the conveyance requirements to "run the river", as well as water that "remains in the river" to contribute to environmental outcomes. Conveyance water is required to deliver Critical Human Water Needs and water for all River Murray water users.*
Environment (green)	*This water is held by the Commonwealth Environmental Water Holder and the South Australian Government for environmental purposes. Water for the environment benefits wetlands and floodplains along the length of the River Murray and supports the health of the Lower Lakes and Coorong.*
Critical human water needs and town water supply (navy blue)	*This water is used to support critical human water needs in both urban and rural areas across South Australia. This water underpins the water security of the majority of South Australians, including those in metropolitan Adelaide.*
Irrigation (mid blue)	*This water is used to support productive irrigation businesses and communities in South Australia.*

Scenarios of water available for irrigation in SA, based on water availability

1850 GL: Allocations for irrigation 100%

[5] Home - River Murray Water Allocation Calculator



Volume available 1850 GL

Irrigation

This water is used to support productive irrigation businesses and communities in South Australia.

All Purpose – Class 3
High Security 100%
All Purpose – Class 8
Environmental Land Management 100%

Critical human water needs and town water supply

This water is used to support critical human water needs in both urban and rural areas across South Australia. This water underpins the water security of the majority of South Australians, including those in metropolitan Adelaide.

All Purpose – Class 1 & 5
Stock, Domestic, Industrial 100%
Metropolitan Adelaide – Class 6
Urban Water Supply 100%
All Purpose – Class 2
Country Towns 100%

Environment

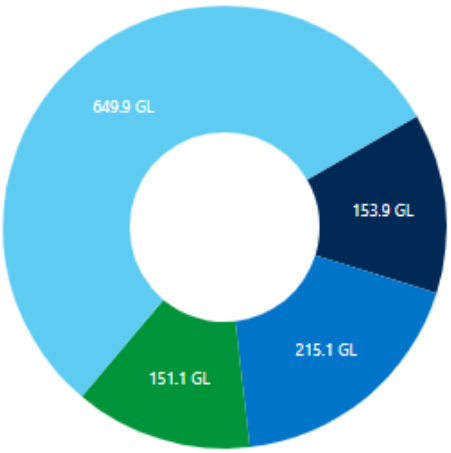
This water is held by the Commonwealth Environmental Water Holder and the South Australian Government for environmental purposes. Water for the environment benefits wetlands and floodplains along the length of the River Murray and supports the health of the Lower Lakes and Coorong.

All Purpose – Class 1
Stock, Domestic, Industrial 100%
All Purpose – Class 3
High Security 100%
Class 9
Wetland / Environment 100%

Running the river

This includes water set aside to meet the conveyance requirements to "run the river", as well as water that "remains in the river" to contribute to environmental outcomes. Conveyance water is required to deliver Critical Human Water Needs and water for all River Murray water users.

1170 GL: Allocations for irrigation 50%



Volume available 1170 GL

Irrigation

This water is used to support productive irrigation businesses and communities in South Australia.

All Purpose – Class 3
High Security 50%
All Purpose – Class 8
Environmental Land Management 50%

Critical human water needs and town water supply

This water is used to support critical human water needs in both urban and rural areas across South Australia. This water underpins the water security of the majority of South Australians, including those in metropolitan Adelaide.

All Purpose – Class 1 & 5
Stock, Domestic, Industrial 100%
Metropolitan Adelaide – Class 6
Urban Water Supply 77%
All Purpose – Class 2
Country Towns 68%

Environment

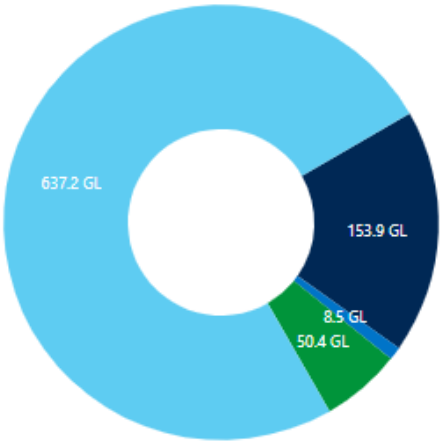
This water is held by the Commonwealth Environmental Water Holder and the South Australian Government for environmental purposes. Water for the environment benefits wetlands and floodplains along the length of the River Murray and supports the health of the Lower Lakes and Coorong.

All Purpose – Class 1
Stock, Domestic, Industrial 100%
All Purpose – Class 3
High Security 50%
Class 9
Wetland / Environment 100%

Running the river

This includes water set aside to meet the conveyance requirements to "run the river", as well as water that "remains in the river" to contribute to environmental outcomes. Conveyance water is required to deliver Critical Human Water Needs and water for all River Murray water users.

850 GL: Allocations for irrigation 2%



Volume available 850 GL

Irrigation

This water is used to support productive irrigation businesses and communities in South Australia.

All Purpose – Class 3
High Security 2%
All Purpose – Class 8
Environmental Land Management 2%

Critical human water needs and town water supply

This water is used to support critical human water needs in both urban and rural areas across South Australia. This water underpins the water security of the majority of South Australians, including those in metropolitan Adelaide.

All Purpose – Class 1 & 5
Stock, Domestic, Industrial 100%
Metropolitan Adelaide – Class 6
Urban Water Supply 77%
All Purpose – Class 2
Country Towns 68%

Environment

This water is held by the Commonwealth Environmental Water Holder and the South Australian Government for environmental purposes. Water for the environment benefits wetlands and floodplains along the length of the River Murray and supports the health of the Lower Lakes and Coorong.

All Purpose – Class 1
Stock, Domestic, Industrial 100%
All Purpose – Class 3
High Security 2%
Class 9
Wetland / Environment 100%

Running the river

This includes water set aside to meet the conveyance requirements to "run the river", as well as water that "remains in the river" to contribute to environmental outcomes. Conveyance water is required to deliver Critical Human Water Needs and water for all River Murray water users.

Chapter Conclusion

What this shows is:

- States' water sharing policies and practices account for climate variability, and represent that jurisdictions assessment of risk and thus climate change.
- This includes via the making of water allocations, and in setting extraction limits.
- Data shows that consumptive water users receive less water during droughts (as well as HEW), with water allocations returning with water availability.

It is important to note that all Basin states have similar arrangements in place. As part of the review, the MDBA should compile this for all States to demonstrate current arrangements. This will be critical to help communicate current arrangements, and correct the perception that "climate change is not factored in".

Planning for climate change is essentially a conversation about risk - including the trade-offs, management and mitigation options. There are real risks of being both too conservative, or too ambitious, in risk appetite. Essentially, state water sharing planning arrangements enable a risk sharing arrangement between different priorities of water users, but also inherently consider the jurisdictions appetite for risk. If this does not go to plan, there are mechanisms

to intervene, if the likelihood of a risk (of limited supply) is occurring, beyond what was planned for.

In response to the question posed in the Early Insights Paper: NIC is unsure of the purpose and form of establishing thresholds and triggers to make clear when attention is needed between 10-yearly reviews, such as the example of when an environmental system is trending towards an undesirable state. The drivers for an environment to be in an undesirable state are various. What would be more appropriate would be a look at securing critical needs during droughts (including critical environmental needs, but foremost, critical human needs such as town water supplies). In extreme events, critical human needs are the highest priority.

Integral to this, is recognizing that securing these high-priority needs cannot occur with the buyback of more licenses which are lower priority than those needs already. This will require a more comprehensive look at a range of solutions, including infrastructure (storage dams, weirs, pipelines, tanks), secondary supply sources, water recycling, desalination, or water-carting as a last resort. This will require working with local councils, who are primarily responsible for town water supply. It is integral to look at the full range of mechanisms available to respond to climate change, outside of just water sharing. This will be increasingly important to improve resilience of critical human needs, given these existing frameworks which prioritize those needs.

It will be important to consider what the jurisdiction / remit of the Commonwealth / MDBA is in this space, in terms of dictating/shaping how states chose to manage risk. The role of the Commonwealth may relate more to funding critical infrastructure to improve town water security.

Part of looking at climate change will be examining the impacts on the water security for irrigated agriculture, particularly given these existing mechanisms, which directly impact irrigated agriculture (particularly lower security entitlements). This should link to the development of the National Food Security Strategy, where water security for agriculture must be a key component.