



Australian Government

Interim Inspector-General of
Murray–Darling Basin Water Resources

Impact of lower inflows on state shares under the Murray–Darling Basin Agreement





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made under subparagraph 44(3)(b)(i) of the
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Schedule 1 The Murray–Darling Basin Agreement

MURRAY-DARLING BASIN AGREEMENT

THIS AGREEMENT IS ENTERED INTO ON 2008 BY:
THE COMMONWEALTH OF AUSTRALIA (the "Commonwealth"),
THE STATE OF NEW SOUTH WALES ("New South Wales"),
THE STATE OF VICTORIA ("Victoria"),
THE STATE OF QUEENSLAND ("Queensland"),
THE STATE OF SOUTH AUSTRALIA ("South Australia"), and
THE AUSTRALIAN CAPITAL TERRITORY ("Australian Capital Territory").

THE PARTIES AGREE AS FOLLOWS:

PART 1—INTERPRETATION

1. Purpose
The purpose of this Agreement is to promote and co-ordinate effective planning and management for the equitable, efficient and sustainable use of the water and other natural resources of the Murray–Darling Basin, including by implementing arrangements agreed between the Contracting Governments to give effect to the Basin Plan, the Water Act and State water entitlements.

2. Definitions
In this Agreement save where inconsistent with the context:
"annual estimates" means estimates prepared under paragraph 74(1)(a).

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Acknowledgements

The authors thank interview and survey participants for their input.

Foreword

Late last year the former Minister for Water Resources, the Honourable David Littleproud MP, asked me in my role as the Interim Inspector-General of the Murray–Darling Basin to conduct an inquiry into:

- 1) The impact of changing distributions of inflows to the southern Basin on state shares under the Murray–Darling Basin Agreement; and
- 2) Any consequential impacts on state water shares resulting from the reserves required under the Murray–Darling Basin Agreement. This includes how these interact with state water allocation policies.

We set about that task by conducting eight ‘town hall’ meetings in various locations across the Basin, attended by approximately 1,000 people in total. We also interviewed 80 people and our website received 345 submissions.

The tight reporting timeframe meant that much of this consultation occurred over the typical summer holiday period. It was also a time when Australia faced the worst bushfires in our history, causing deaths, property destruction and stock and crop losses.

The stress and, at times, anguish is palpable when you meet with some of the people who help contribute substantially to the Australian economy through production of food and fibre, as well as recreation and tourism. Beyond the mental and emotional toll of severe and extended drought, many people are wondering about the viability of their businesses if current conditions continue.

Many are worried about the future for their families, feeling that they are failing previous generations who gave them the opportunity to be farmers and irrigators.

I would like to place on record my sincere appreciation to those who took the time to meet with us during this stressful period in their lives.

I would also like to thank our own staff, who worked through some heated and emotional meetings to properly understand the issues and faithfully report them to you.

This inquiry is a genuine apolitical attempt to offer possible solutions to some of the challenges identified.

The most telling finding is the dramatic reduction in inflows that has been experienced in the River Murray system over the last two decades or so. This remains the primary driver of reduced water availability, and there is little anyone can do to influence when and how much it rains.

Through this period—and since the establishment of the Murray–Darling Basin Agreement (the Agreement) more than a century ago—water-sharing arrangements have worked effectively, with flexibility to adapt to inevitable dry times. This includes modifications made to the Agreement following the Millennium Drought to better insure against very dry sequences. However, there is very little clarity and transparency about how this flexibility (especially

Impact of lower inflows on state shares under the Murray–Darling Basin Agreement

through Special Accounting) is delivered, or how much water States are being allocated each year under the Agreement.

There remain legitimate concerns amongst stakeholders about whether too much water is being lost in the operation of the River Murray system. However, it is evident that there are established arrangements and processes in place to support the system’s efficient operation and hold operators accountable. But improved transparency on river operations—and further work to investigate the impact of pressures such as expanding horticultural development downstream—must be delivered quickly to give greater confidence for the future.

While stakeholders had wide-ranging and often significant concerns, their views sometimes differed. It was also observable that stakeholder perceptions were frequently at odds with what the inquiry heard from States and agencies with responsibilities in the Basin.

This highlights the challenge that remains in communicating the right information to Basin communities effectively. Improving the transparency, accessibility and availability of information—as well as people’s ability to interpret and understand it—needs to be a focus.

The differing perceptions also point to a deficit in trust and confidence in Basin management. There is an opportunity for all parties to demonstrate greater unity and leadership, which will be essential if future challenges are to be met successfully.

Changing inflows emphasise the fact that water resources in the Basin are limited. It is not possible to transfer ownership of water to one party without affecting another, or to make more water available now without jeopardising what might be available next year.

We specifically avoided engaging on or addressing issues that are currently the subject of separate inquiries, though they are all inextricably linked.

M J Keelty AO
Interim Inspector-General of Murray–Darling Basin Water Resources
March 2020

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Introduction

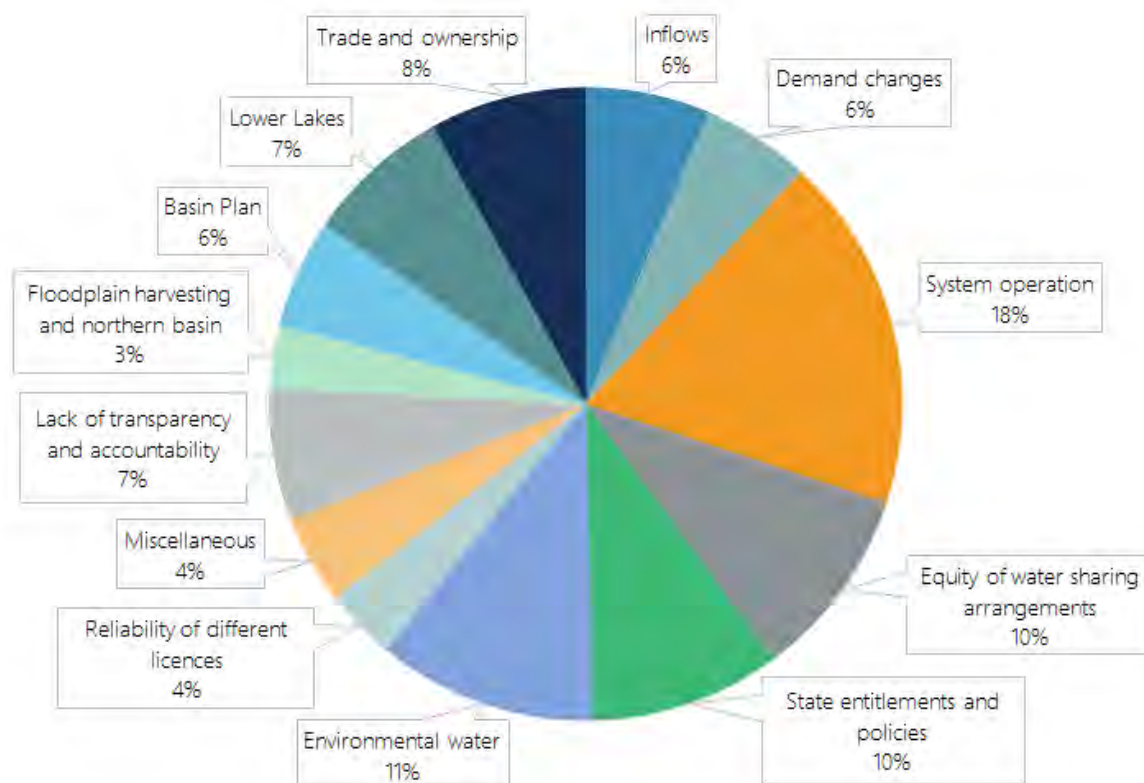
On 4 December 2019 the Hon. David Littleproud MP, former Commonwealth Minister for Water Resources, requested an inquiry into the:

- 1) Impact of changing distribution of inflows to the southern Basin on state shares under the Murray–Darling Basin Agreement.
- 2) Any consequential impacts on state water shares resulting from reserves required under the Murray–Darling Basin Agreement. This includes how these interact with state water allocation policies.

The inquiry heard from many interested and engaged people across the Murray–Darling Basin (the Basin). Their candour and commitment were greatly appreciated, particularly given the extremely trying circumstances that are affecting so many across the Basin.

The inquiry first sought input from submissions and an online survey exploring four themes: inflows and supply; water-sharing; delivery of water; and potential opportunities for enhancement of water-sharing arrangements. We received 345 online submissions from people in New South Wales (NSW) (203), Victoria (102) and South Australia (40). A snapshot of some of the broad issues identified through this process is shown in Figure 1.

Figure 1 Summary of issues raised by stakeholders during the inquiry, 2020 ^a



^a This is an indicative representation of the broad and key issues raised by each submission, many of which addressed multiple themes.

Source: Interim Inspector-General of Murray–Darling Basin Water Resources.

The inquiry held town hall meetings in eight locations (Map 1), attended by approximately 1,000 people. It also met with more than 80 people in 39 personal meetings across a range of stakeholder groups, including irrigators, community members, subject matter experts and environmental groups.

Map 1 Attendance at town hall meetings held by the inquiry, Murray–Darling region, 2020



Source: Interim Inspector-General of Murray–Darling Basin Water Resources.

The subsequent chapters of this report each respond to the major themes that emerged from the inquiry:

- changing inflows to the Murray
- water-sharing arrangements
- conveyance and delivery
- water for the environment
- leadership, communication and water literacy.

The Inquiry was assisted by Aither, and relevant Commonwealth and state government departments and agencies have been consulted during preparation of the report.

The Murray–Darling Basin Agreement

The origins of the Murray–Darling Basin Agreement date back more than a century, with the establishment of the River Murray Waters Agreement in 1914 (MDBA 2020b). This accord was a breakthrough at the time, following more than ten years of negotiations and four previous attempts to create an agreement between NSW, South Australia and Victoria on how to share the waters of the River Murray (Guest 2016).

The lengthy process to secure the original agreement included compromises from the respective States, including Victoria agreeing to equally share flows at Albury if NSW would share the costs

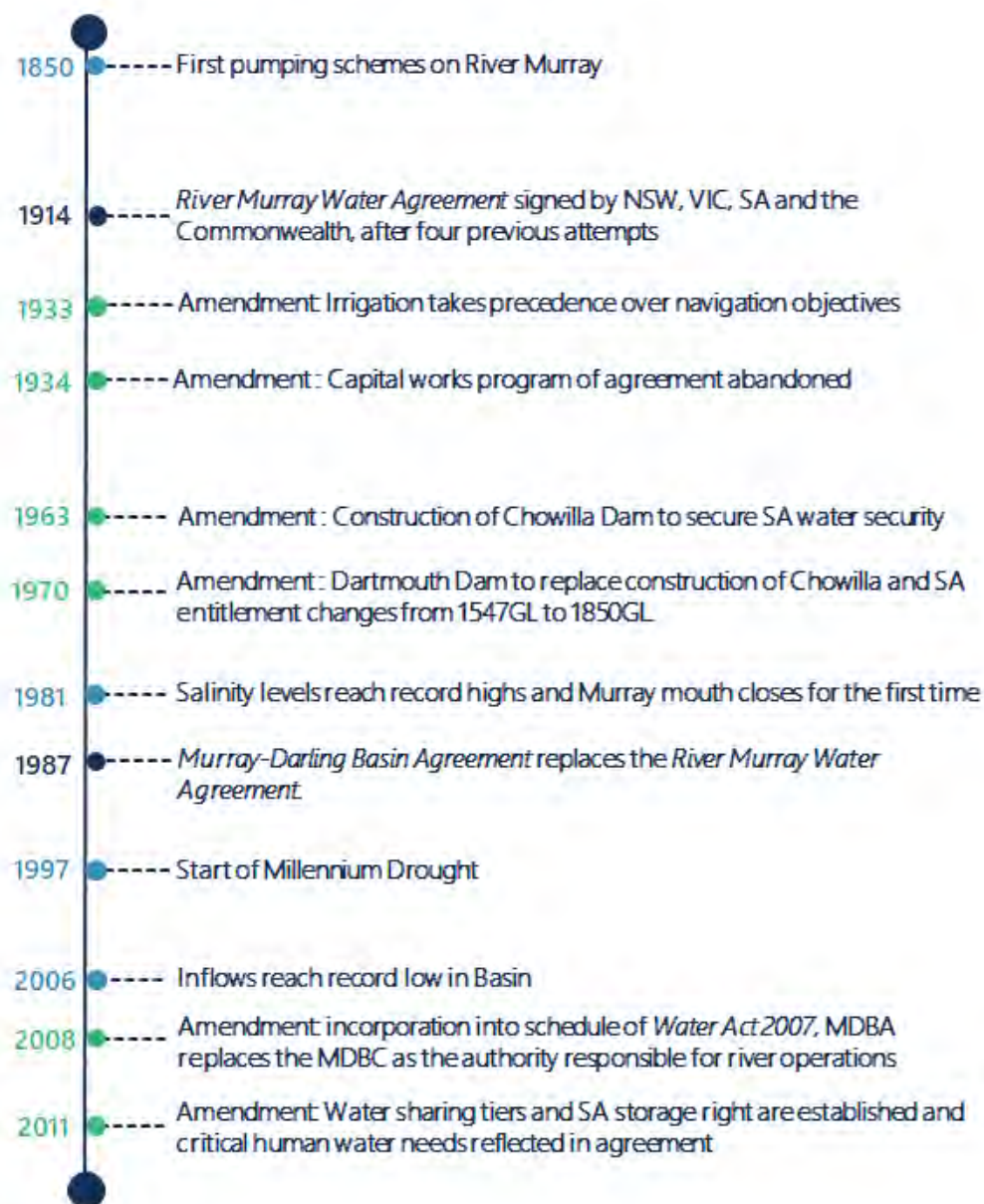
of constructing a storage in the Upper Murray. This accord, which led to the construction of Hume Dam, remains one of the key principles of the Agreement today (Guest 2016).

The broad water-sharing arrangements have remained the same since the original agreement was established in 1914. The only substantive change to overarching water-sharing between the States occurred in 1970. This again followed a ten-year period of negotiation, leading to an increase in South Australia's entitlement and the construction of Dartmouth Dam instead of the Chowilla Dam proposed by South Australia (Guest 2016).

The Agreement replaced the original River Murray Waters Agreement in 1987 (MDBA 2019c). Since then minor amendments have been made, primarily with the benefit of the experience of the Millennium Drought.

A highly abbreviated history of the Agreement is illustrated in Figure 2 History of the Murray–Darling Basin Agreement, 1850 to 2011. Over more than a century the fundamental water-sharing arrangements between Victoria, NSW and South Australia have remained unchanged. The Agreement's longevity does not mean it should be immune to interrogation and, if necessary, change. However, its durability is also a reflection of the fact that it has provided a consistent and largely agreeable basis for sharing water between the southern Basin States for many decades. The Agreement's evolution also provides a lesson about the time, effort and compromise required to negotiate amendment.

Figure 2 History of the Murray–Darling Basin Agreement, 1850 to 2011

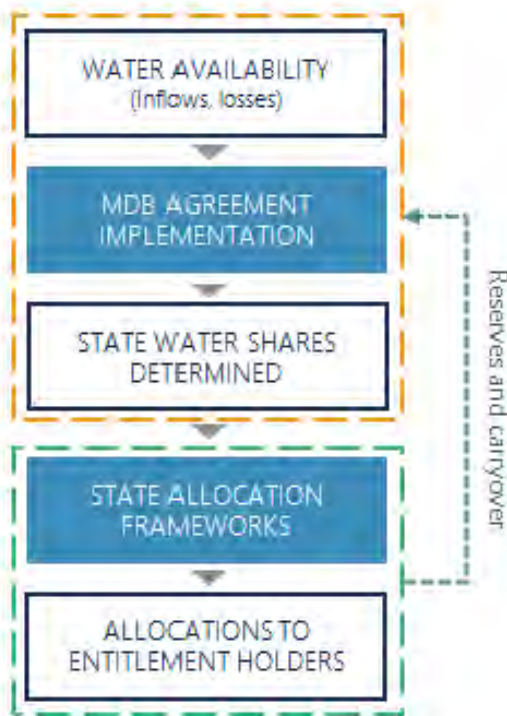


Source: Interim Inspector-General of Murray–Darling Basin Water Resources.

The Agreement sets out how water in the River Murray system is shared between Victoria, NSW and South Australia. It establishes how water available in the system each year is shared between States (their State share or bulk allocation).

As shown in Figure 3 How each state uses and distributes the water available to them under the Agreement is at their discretion. Each State has its own separate policies and allocation frameworks, which determine how water is then allocated to individual entitlement holders (DEW 2017a; DELWP 2019; DPIE 2020; MDBA 2019j).

Figure 3 How each state uses and distributes the water available to them under the Agreement



Source: Interim Inspector-General of Murray–Darling Basin Water Resources.

Although aspects of the Agreement are complex (to cater for the wet and dry conditions that are a natural feature of the Basin), the basis of water-sharing arrangements between the States is clear and straightforward:

- inflows upstream of Albury (into Hume and Dartmouth dams, and from the Kiewa River) are shared equally between Victoria and NSW
- tributary inflows to the River Murray downstream of Albury belong to the state in which they originate
 - NSW receives all flows from the Murrumbidgee River and Billabong Creek
 - Victoria receives all flows from the Ovens, Goulburn, Campaspe and Loddon Rivers
- inflows from the Darling River into the Menindee Lakes are shared equally between Victoria and NSW, except when the capacity of the lakes falls below 480 gegalitres (GL) (when NSW manages water for local needs until storage levels are above 640 GL again)
- South Australia is supplied equally by Victoria and NSW up to its maximum entitlement volume.

The Murray–Darling Basin Authority (MDBA) is responsible for operating the system upstream of the South Australian border, according to the rules of the Agreement and the orders for water it receives from States.

The MDBA’s role includes determining and allocating the share of available water to each State each year, managing delivery of water from the three major storages in the River Murray system

to the South Australian border, and overseeing construction, operation and maintenance of River Murray system assets (MDBA 2019i).

There is a minimum amount of water that must be set aside each year before any water can be allocated to the States for consumptive use. This water is necessary to ensure the river continues to flow (and thus water can be delivered to entitlement holders) and critical human water needs of communities can be met first (DEW 2017a; MDBA 2018a; MDBA 2019d). Available water is prioritised for:

- Conveyance, which is the net amount of water lost along the river (for example, to seepage and evaporation) that underpins delivery of consumptive water. The size of the conveyance budget changes from year to year based on climate conditions and delivery demands.
- Critical Human Water Needs (CHWN), which is the minimum amount of water required to meet basic human needs in dependent communities in the southern Basin.
- Conveyance reserve, which is the volume that would be required in order to be able to deliver CHWN in the next water year.
- State water shares, distributed according to the rules of the Agreement once the preceding allowances are met.

Inflows to the Murray

The key concern relayed to the Inquiry was about changing inflows to the Murray, and the resulting impact on water availability. Despite recent rain, the drought continues to affect communities and farmers across the Basin, many of whom are understandably worried about the immediate and future viability of their enterprises.

While some reflected on current conditions as a ‘man made drought’ that has been exacerbated by existing policies and arrangements, there is generally recognition of the way the climate is changing and concern about what this means for existing arrangements under the Agreement.

Stakeholder concerns are valid. Much of eastern Australia has experienced unusually dry conditions over the past three years. Climate statements from the Bureau of Meteorology indicate the severity of these conditions, including record temperatures combined with periods during which rainfall has been the lowest on record.

‘Inflows’ describe the water that flows into the system, generated by rainfall and catchment runoff. Annual inflows are for the twelve-month period from the start of July. When considering trends in inflows over time, the median inflow (that is, the volume of inflow that occurs in 50% of years in the record) tends to be more insightful than the average. This is because the average is influenced by ‘outlier’ extremes, particularly very wet years.

Inflows provide a measure of the total water supply available in a given year and over time within the River Murray system. However, they do not reflect the availability of that water to different States and entitlement holders, which is discussed subsequently.

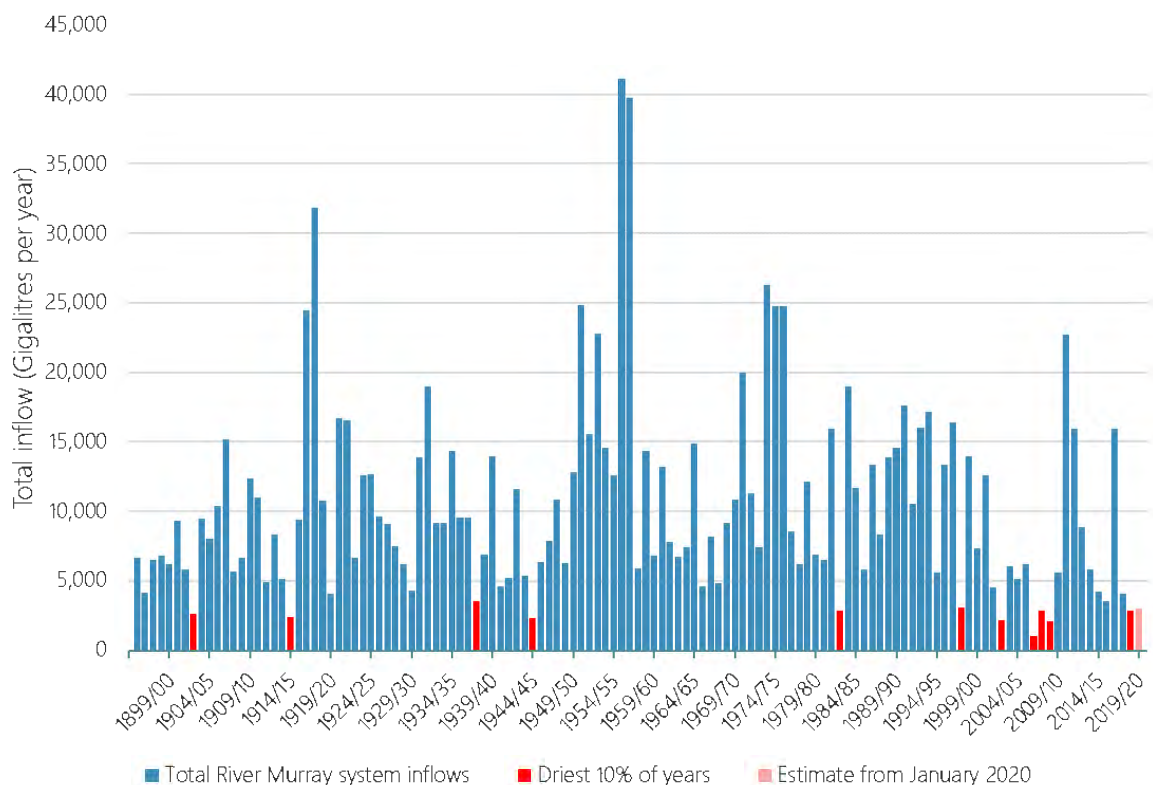
The data presented in this chapter was provided to the Inquiry by the MDBA.

Total inflows in the River Murray system over time

Driven by cycles of flood and drought, the natural river flow regimes in the Murray–Darling basin are highly variable from year to year. However, the past two decades or so have seen a marked change in the volume of water available in the system. Analysis shows that the median annual inflow over the past 20 years is approximately half that of the preceding century. More significantly, the frequency of drier years is also much greater.

Figure 4 Total River Murray system inflows, 1895 to 2020 illustrates that more than half of the driest 10% of years in the historical record have occurred in the past two decades. The pattern of such dry years occurring back-to-back is also not observable to the same extent at any other time prior to 2000.

Impact of lower inflows on state shares under the Murray–Darling Basin Agreement

Figure 4 Total River Murray system inflows, 1895 to 2020

Source: Interim Inspector-General of Murray–Darling Basin Water Resources, based on data provided by the MDBA.

The changes in inflows have been especially stark in the context of the development of irrigated agriculture in Australia. Irrigation expanded rapidly in the period between the Second World War and the 1990s (Guest 2016), when dry years were infrequent and median inflows much higher than the period since. For many in the Basin, this is when memories of water availability were formed.

While there may be many factors contributing to the extent of observed inflow reductions, the lack of rainfall and runoff has been the primary driver for the conditions being experienced by many across the Basin in recent times. Implications for future trends—particularly arising from the impacts of climate change—remain uncertain. The MDBA has previously made available a discussion paper that sets out some of the current expectations and is also investigating the implications of climate change on long-term water availability and the continued applicability of policy settings.

The Inquiry heard concern from many people about whether existing arrangements under the Agreement remain appropriate under current and future conditions.

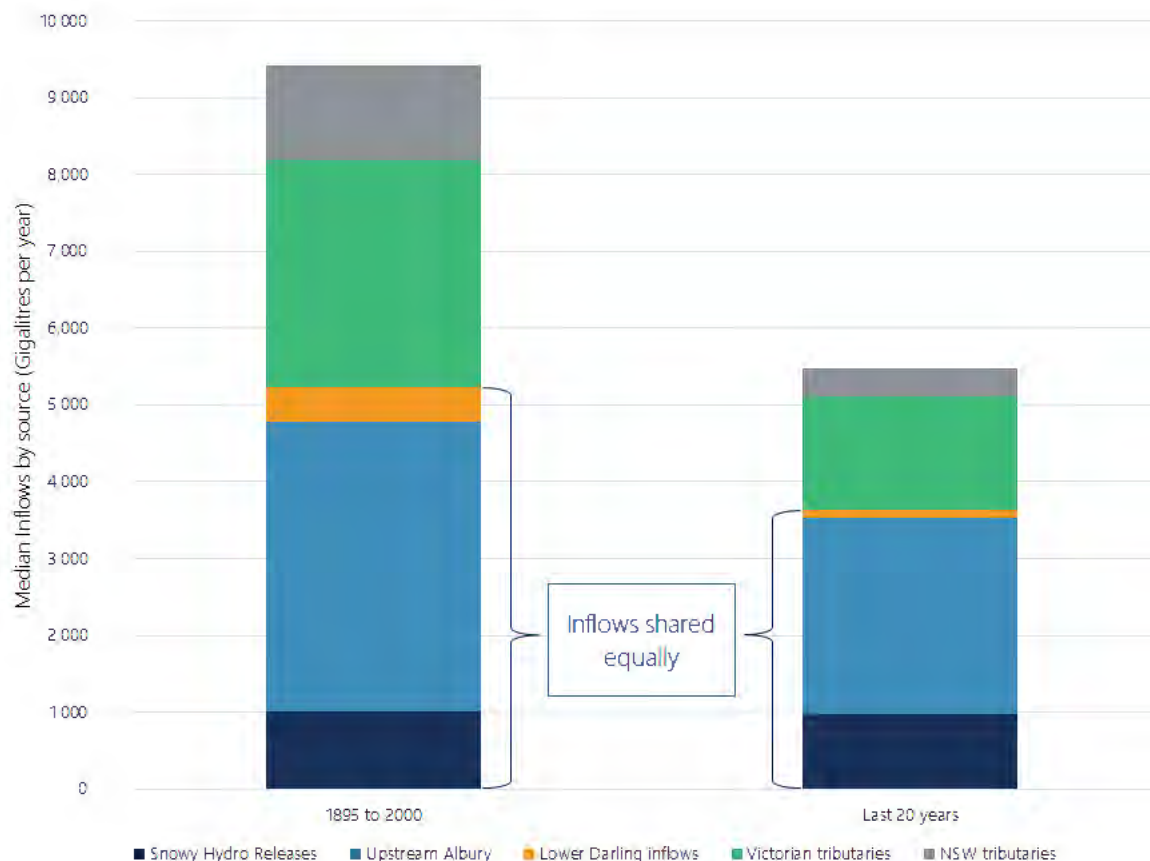
Given the marked decrease in inflows over the past two decades it is important that the appropriateness of existing arrangements is reassessed in the context of the changes that are occurring and a future that may be characterised by further extremes. Given that the Agreement can only be amended through negotiation and consensus, any proposal to change arrangements would need to be explored with all parties involved.

Changes to inflows from River Murray sources over time

Analysing the change to inflows from the Murray's different sources is also important because of the way these are shared under the Agreement. The contribution from different sources does vary widely from year to year, and data (refer to Figure 5) indicates that generally much more water tends to come from inflows upstream of Albury and the Victorian tributaries.

Figure 5 shows the median inflows in the past 20 years for each source, relative to the preceding historical record. It demonstrates that there has been a significant reduction across all sources. While inflows from the NSW tributaries and lower Darling have experienced the greatest proportional reductions, the volumetric change has been most pronounced from those sources that tend to contribute the greatest flows. More than two-thirds of the decline in median total system inflow volumes is attributable to changes in flows from the Murray upstream of Albury and the Victorian tributaries.

Figure 5 Change in River Murray system inflows relative to pre 2000



Source: Interim Inspector-General of Murray–Darling Basin Water Resources, based on data provided by the MDBA.

Inflows upstream of Albury (including to Hume and Dartmouth dams)

Inflows upstream of Albury provide the most substantial contribution to total water availability. Median inflows upstream of Albury have decreased by about one third in the past 20 years compared with the preceding century, while half of the driest years on record have occurred in the past 25 years.

Changes in temperatures, rainfall and catchment conditions are all driving the observed reduction (BoM 2019). The catastrophic bushfires that have been a backdrop to this Inquiry affected the Upper Murray catchment above Hume Dam, which will also have implications for catchment runoff and inflows in the future (MDBA 2020a).

NSW and Victorian tributary inflows

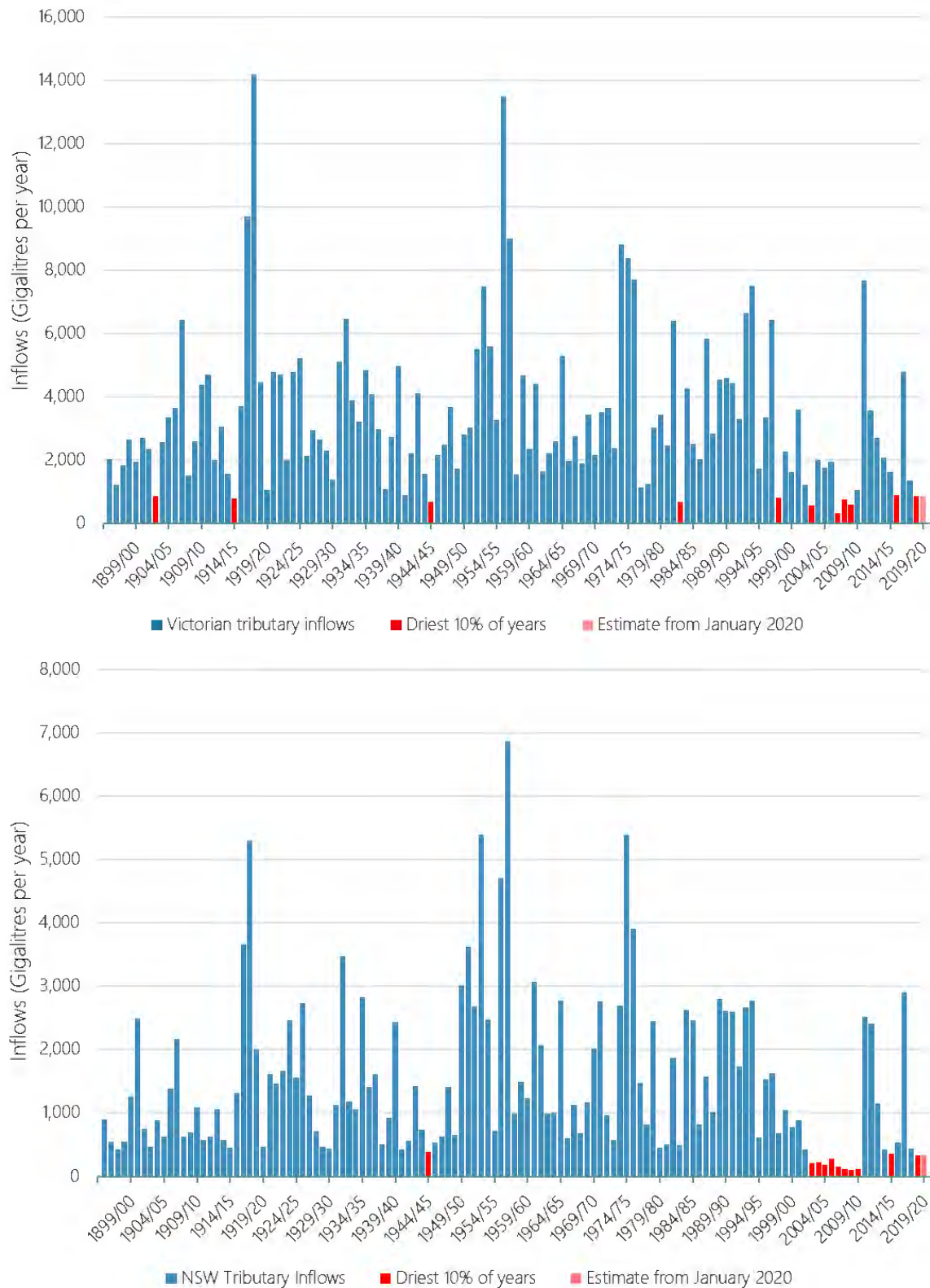
Although inflows from the Victorian and NSW tributaries broadly reflect similar trends to those observed for total inflows, some aspects have differed. These changes can help explain the impact of drought conditions on NSW irrigators.

NSW tributary inflows have experienced the more significant proportional reduction of the two sources. Median inflows in the NSW tributaries have reduced by almost two-thirds over the past 20 years compared with the preceding century. The pattern of inflows in the NSW tributaries in the recent past also demonstrates much greater variability from year to year, with repeated dry years interspersed by much wetter years. Periods of higher inflows from the Murrumbidgee River and Billabong Creek tributaries have tended to arise from flood events, with limited ability to regulate flows once they reach the Murray (MDBA 2020, pers. comm. 14 February).

Victorian tributary inflows have experienced a greater volumetric reduction than the NSW tributaries because they make a much greater contribution to total flows. Figure 6 contrasts tributary inflows from the two states over time.

Impact of lower inflows on state shares under the Murray–Darling Basin Agreement

Figure 6 Total inflows from Victorian (top) and NSW (bottom) tributaries, 1895 to 2020



Source: Interim Inspector-General of Murray–Darling Basin Water Resources, based on data provided by the MDBA.

Inflows from the lower Darling (Menindee Lakes)

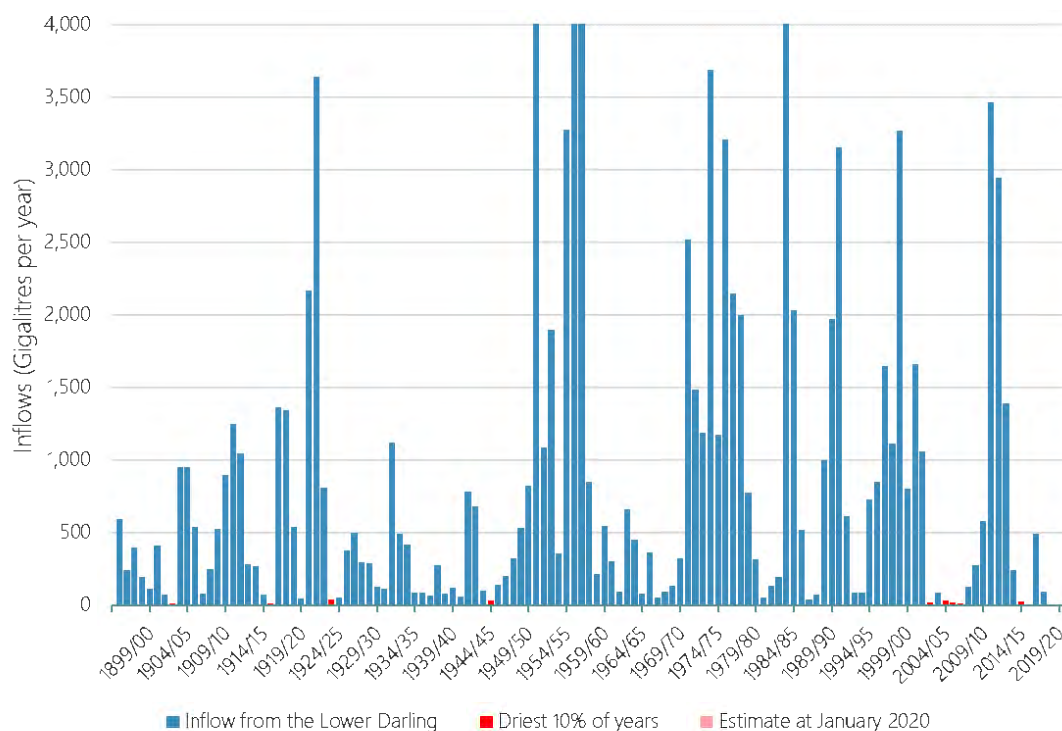
The inquiry heard great concern from those in the southern Basin about reduced inflows from the Darling into the Murray, and whether this means much greater reliance upon other sources to the Murray than has historically been the case.

The view reiterated to the Inquiry was that the reduction in inflows is primarily due to how the Darling system is managed. People are concerned that northern Basin issues, such as water theft, compliance, extraction rules and floodplain harvesting, are having a significant impact downstream.

Median inflows into the Menindee Lakes have reduced by about 80% in the last 20 years relative to the recorded period prior. Eight of the 13 driest years on record occurred in this period, most yielding zero or close to zero inflows. Although years of low inflows to the Menindee Lakes are common in the historical record, the dry years in the past two decades have been much more severe.

The frequency of wetter years with flows that reliably fill the Menindee Lakes has also reduced, with longer durations between wet years. This pattern has influenced the water that in turn flows from the Menindee Lakes into the Murray (Figure 7), given that higher inflows in the lower Darling boost lake levels, allowing water to flow to the Murray.

Figure 7 Inflows to the Murray from the lower Darling (Menindee Lakes), 1895 to 2020 ^a



^a The vertical axis has been limited to provide greater visibility of low flow periods. In those years where inflows appear at the maximum axis value, inflows have exceeded this value up to a maximum of around 7,700 GL.

Source: Interim Inspector-General of Murray–Darling Basin Water Resources, based on data provided by the MDBA.

While the annual inflows across the Basin have always been highly changeable from one year to the next, data examined during this Inquiry shows it has historically been uncommon that dry

conditions in both the Darling and Murray would coincide. The past two decades also suggest a greater frequency of extended periods of low inflow in both systems occurring at the same time.

Impacts of northern Basin inflows on state shares

Over the historical record, inflows from the lower Darling have only contributed an average of about 8% of water available in the River Murray system each year. Inflows both into the Menindee Lakes and from the Lakes to the River Murray have dramatically reduced in the last 20 years. There may be numerous factors contributing to this, including record low inflows in northern NSW, lower rainfall, higher temperatures, catchment modification (including farm dams), increasing development, floodplain harvesting, changes in extraction rules in water-sharing plans, and non-compliance. The Inquiry heard that understanding the relative influence of each of these factors is highly complex and has not been established.

Both the NSW and Queensland governments have been investigating and implementing opportunities to improve floodplain harvesting policy and management. NSW made changes to its 2013 floodplain harvesting policy in 2018, which it is continuing to implement to ensure all relevant licences and approvals are in place by July 2021.

An independent peer review into floodplain harvesting in northern NSW was also commissioned in 2018 (Weber & Claydon 2019). The review made a number of recommendations that the NSW Government accepted in full, responding with a Floodplain Harvesting Action Plan (DPIE 2019a).

This work aims to ensure that floodplain harvesting in NSW is licenced and brought within the allocation framework, and that NSW ensures that any floodplain harvesting is undertaken within sustainable diversion caps set under the Murray–Darling Basin Plan (the Basin Plan).

Recommendation 1

The MDBA should undertake further analysis of the causes of reduced inflows from the northern Basin and the extent to which this is affecting State water shares.

Inflows from the Snowy

The Inquiry found that there has been virtually no change in the median inflows from the Snowy Hydro scheme over the last 20 years. The limited change in inflows suggests water from the Snowy Hydro has a limited effect on changes in water availability in the River Murray system.

Water-sharing arrangements

This chapter addresses issues related to water-sharing arrangements that were raised with the inquiry. At their core, many of the issues raised go to the question of whether water-sharing arrangements under the Agreement are clearly understood and have been implemented as they should.

State water shares over time

The information presented in this chapter was provided by the MDBA and has not been independently audited or validated. Although it can potentially be inferred from different sources, information on states shares over time is not publicly available in an accessible and consolidated manner.

Given that the water-sharing framework in the Basin begins with the allocations of available water to the States, the absence of this information in the public realm is insightful in itself. Many of the concerns that the inquiry heard might have been redundant if individuals were able to readily see and understand the way available water has been shared over time.

Special Accounting and Critical Human Water Needs water-sharing tiers

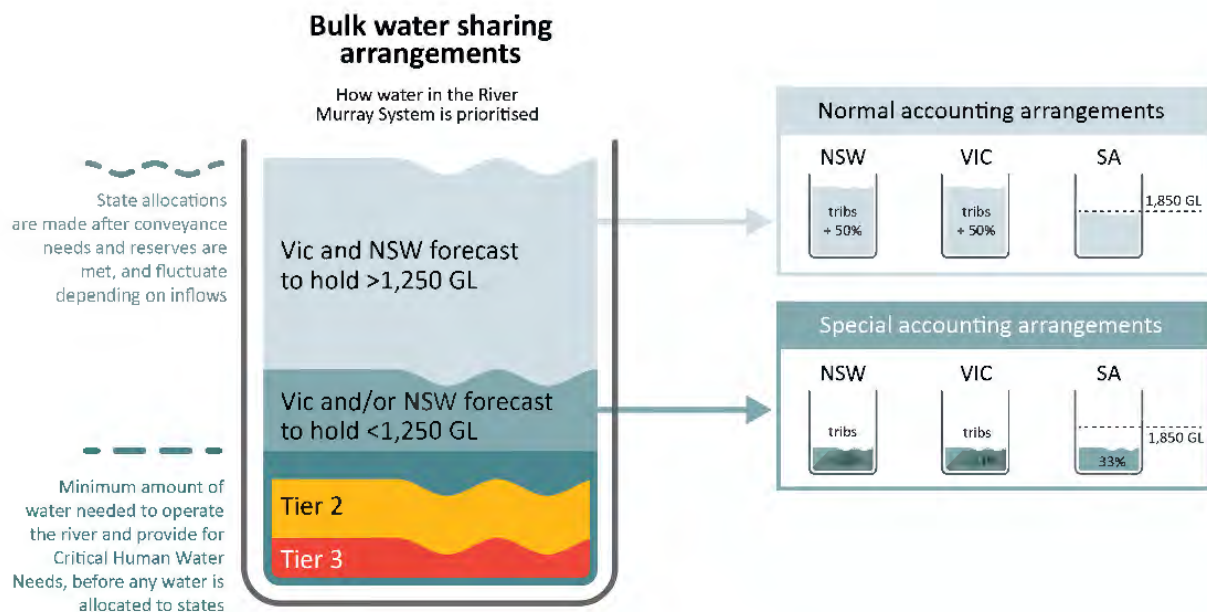
Prior to examining how water has been shared between States over the last few years, it is important to set out the conditions under which water-sharing is currently occurring.

The Agreement incorporates flexibility to manage available water as conditions become increasingly dry (Figure 8). In the first instance, declining water availability may trigger ‘Special Accounting’, which reduces the volume available to South Australia when water in storage is low. Special Accounting with South Australia is triggered with either NSW or Victoria if they are forecast to hold less than 1,250 GL in storage at the end of May. This results in South Australia receiving one third of the shared resource up to its maximum consumptive entitlement volume of 1,154 GL (*Water Act 2007*; NRMB 2019).

The Critical Human Water Needs and conveyance reserves were introduced following the Millennium Drought to mitigate the risk of towns and communities running out of water in similar circumstances (DEW 2017b; MDBA 2016). Water-sharing tiers—established as part of the Agreement and the Basin Plan—also exist to ensure critical human needs can be met in extremely dry conditions. Tier one describes normal water availability that spans very wet and very dry scenarios. Tier two describes very low water availability and ensures distribution of water to meet critical human needs. Water availability under Tier three would be insufficient to meet even those needs (MDBA 2013).

Tiers two and three have never been used. Had they been available during the Millennium Drought, tier two may have been triggered. Under these extreme conditions, the Basin Officials Committee (BOC) has the power to adjust water-sharing arrangements, including taking water from one state’s water share to help another state meet its critical needs.

Figure 8 Water-sharing arrangements under dry conditions



Source: Interim Inspector-General of Murray–Darling Basin Water Resources.

Recommendation 2

To increase trust in and transparency about water-sharing, the MDBA should provide clear and easily accessible information about Special Accounting measures, including the circumstances under which they are applied and how they are used to determine State allocations.

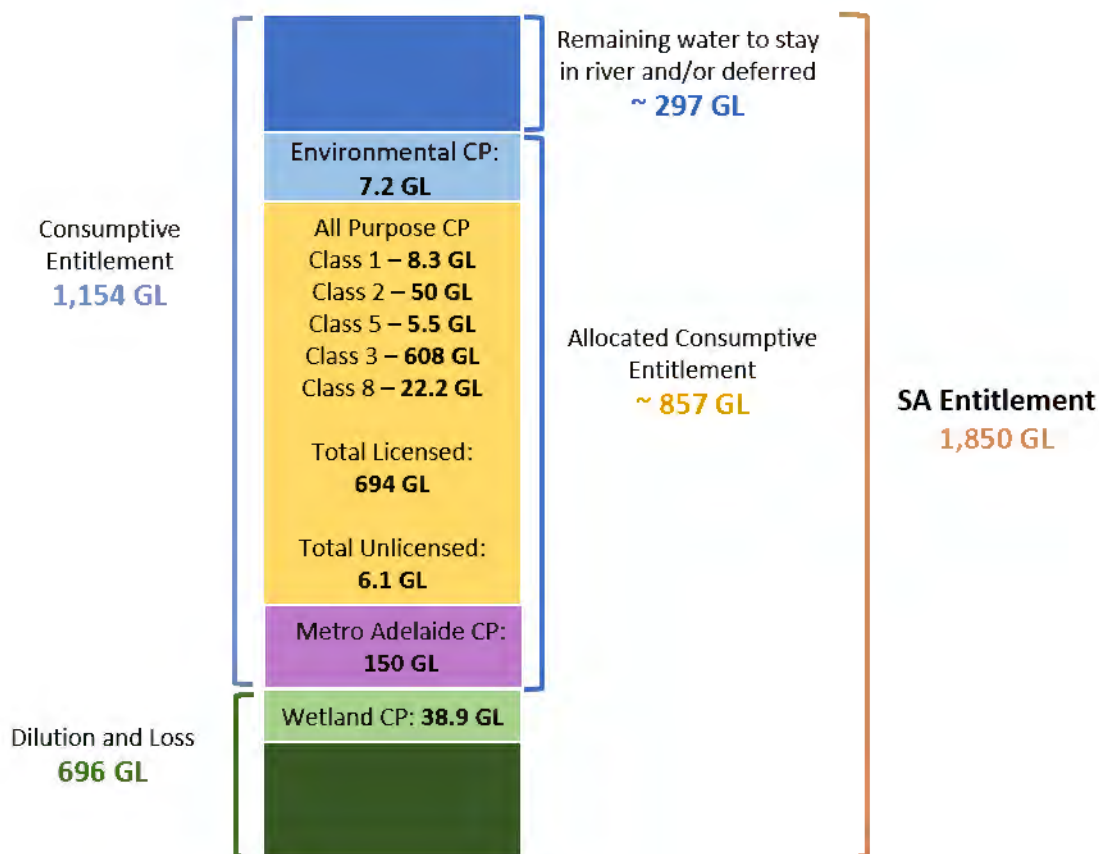
Allocation of South Australia's state share

South Australia's water shares were a focus for many upstream irrigators who questioned whether South Australia receives a guaranteed full allocation at the expense of the upstream States. Many suggested South Australia is not sharing the risk of drought equally, or at all.

Many of the views about the way in which South Australia receives and uses its water allocation can be addressed directly. As shown in Figure 9 South Australian entitlement and breakdown of use, under the Agreement South Australia's entitlement comprises:

- 58 GL per month Dilution and Loss entitlement (totalling 696 GL per year), which is South Australia's conveyance water, and
- a schedule of monthly flows totalling 1,154 GL per year for consumptive use,
- resulting in a total volume of no more than 1,850 GL per year.

Figure 9 South Australian entitlement and breakdown of use ^a



^a CP in diagram refers to consumptive pool.

Source: NRMB 2019, Water Allocation Plan for the River Murray Prescribed Watercourse, South Australian Murray–Darling Natural Resource Management Board, Adelaide.

South Australia's 2019-20 shares and flows into South Australia

Arrangements under the Agreement mean that South Australia is not guaranteed its full allocation of 1,850 GL every year. When Special Accounting is initiated, South Australia's allocation against their consumptive entitlement is reduced (Figure 10 South Australia agreement shares and water made available through allocations to entitlement holders, 2000 to 2020).

For the 2019-20 water year to date, South Australia's allocation is 1,595 GL. This amount includes the 696 GL of water prioritised for conveyance (Dilution and Loss), leaving 899 GL for consumptive purposes (compared with its entitlement of 1,154 GL). Special Accounting was also used during the Millennium Drought. During this time South Australia did not receive its full allocation of 1,850 GL for four years.

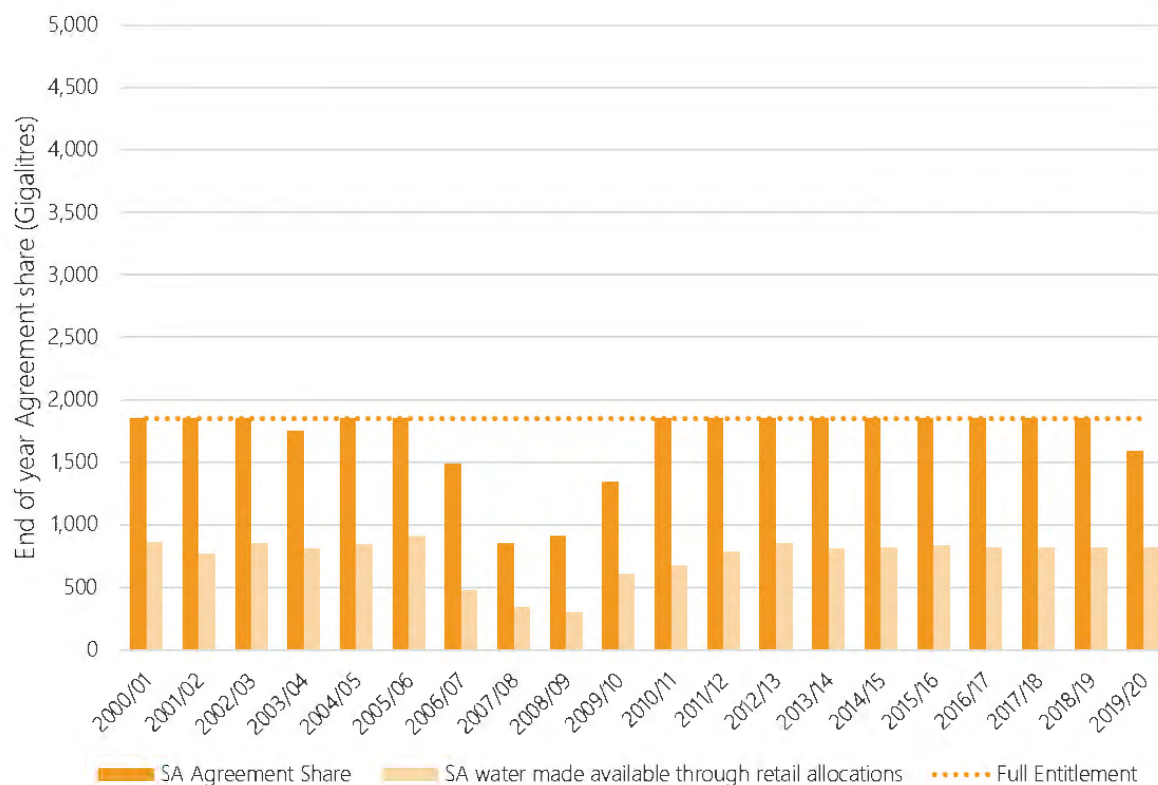
South Australian irrigators are currently on 100% allocation for the 2019-20 water year (DEW 2019). This is not because more water has been allocated to or prioritised for South Australia, but because of the policies that the State has adopted.

As far back as the 1960s, the South Australian government elected to take a conservative approach to sharing the State's allocation amongst individual entitlement holders (DEW 2017a). They did this by limiting the volume of entitlements available to around 857 GL (NRMB 2019). This guarantees entitlement holders that their allocation will be at or close to 100% in most

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years, which is more closely comparable with NSW High Security, or Victoria’s High Reliability Water Share entitlements. This approach can be seen in Figure 10, which shows South Australia’s State shares over time, as well as the volumes of water made available to entitlement holders. It should be noted that the Agreement share volumes shown in Figure 10 include both consumptive and conveyance water, which makes for a larger difference between the Agreement share and water made available through retail allocations.

Figure 10 South Australia agreement shares and water made available through allocations to entitlement holders, 2000 to 2020



Source: Interim Inspector-General of Murray–Darling Basin Water Resources, based on data provided by the MDBA.

South Australia’s conservative approach to issuing retail allocations does mean that in some years it receives some 300 GL that is not allocated directly for consumptive use (NRMB 2019). A key principle underpinning the Agreement is that it is up to States to decide how to use their respective share. South Australia advises they have made the decision to use this water flexibly to ensure they maintain high security for entitlement holders and can maintain water quality and other environmental outcomes. South Australia can choose to defer this water to meet consumptive requirements in the future, use it to supplement conveyance requirements or to contribute to environmental objectives.

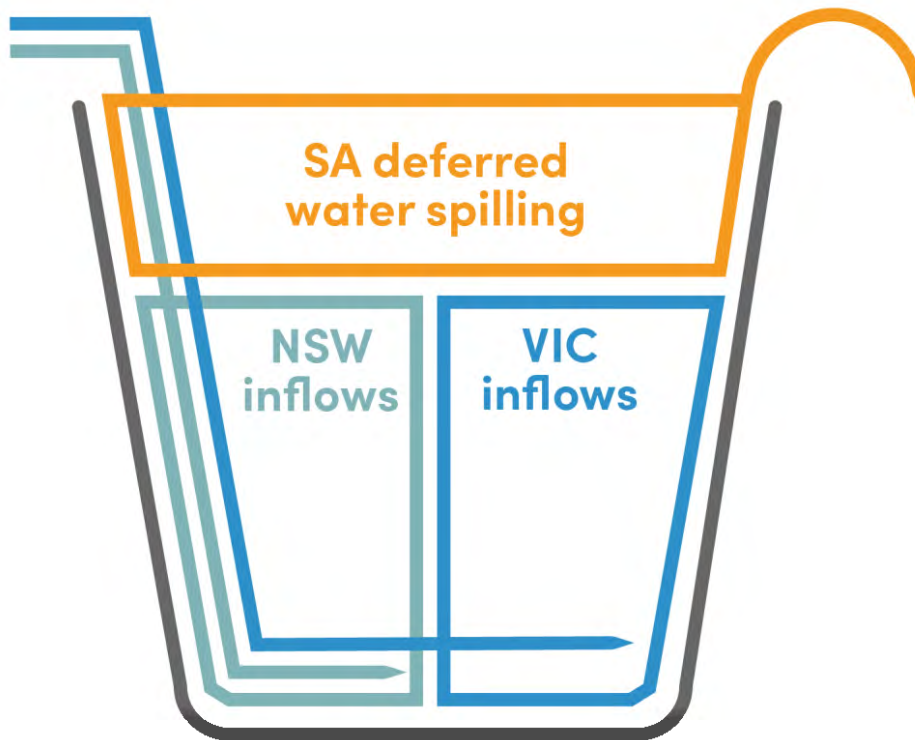
Some people have queried whether there were extra unregulated flows going to South Australia. The data examined in this inquiry shows that this only occurs when there are unregulated flows upstream that cannot be captured in Lake Victoria. When this occurs South Australia is unable to use this water for consumptive purposes and it flows through as planned environmental water.

South Australia's storage right

Some people raised issues with a current South Australian proposal to change its retail carryover policy, due to the impact it may have on NSW and Victorian storage capacity. The South Australian government can carryover any of its bulk State share if it chooses to take a conservative approach to allocations in dry times. At the bulk scale this is referred to as 'deferred water', which is stored in dams in the upper River Murray under South Australia's storage right. This enables water to be stored for critical human needs and private carryover (NRMB 2019).

A condition of the storage right is that it must not adversely impact NSW or Victorian water availability. Should the storages fill, South Australia's deferred water is the first to spill, ensuring NSW and Victoria can utilise full dam capacity in the upper River Murray. This is depicted in Figure 11.

Figure 11 South Australia's storage right and deferred spilling policy



Source: Interim Inspector-General of Murray–Darling Basin Water Resources.

This condition underscores the fact that South Australia's carryover policy and storage rights have no impact on allocations to NSW and Victoria, and subsequently to entitlement reliability in those States. Given that South Australia bears the risk of losing water when deferring or carrying it over, it would not do so unless prudent and based on an informed position on water availability.

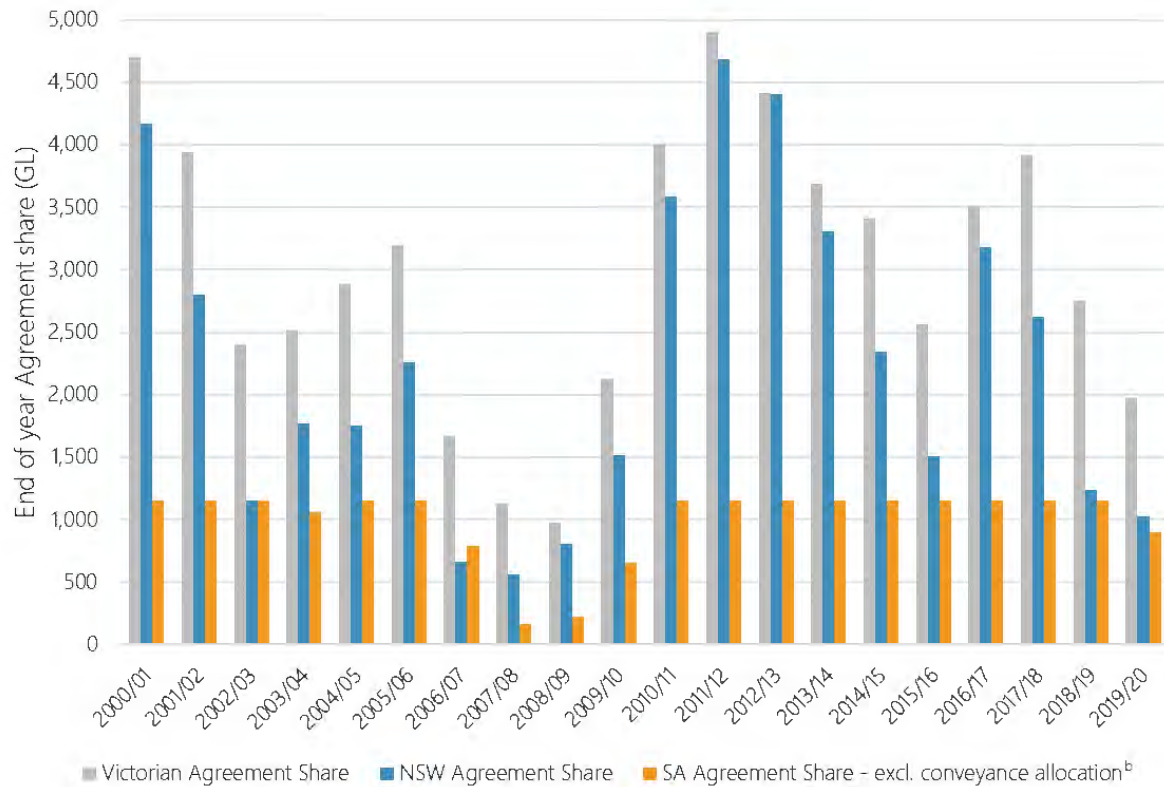
Recent state shares

To address concerns raised about water-sharing between states it is also useful to examine how the usable component of state shares under the Agreement have changed over time, as well as how Victorian and NSW retail allocations (water allocated against individual entitlements) have changed over time. Figure 12 shows how each State's bulk usable shares have changed under the

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Agreement in the last twenty years. Both Victoria and NSW have more water made available to them in wet years compared to South Australia's capped consumptive allocation of 1,154 GL. The lower share for NSW in recent years reflects the reduction in NSW tributary inflows that has been experienced.

Figure 12 State shares under the Agreement, 2000 to 2020^a



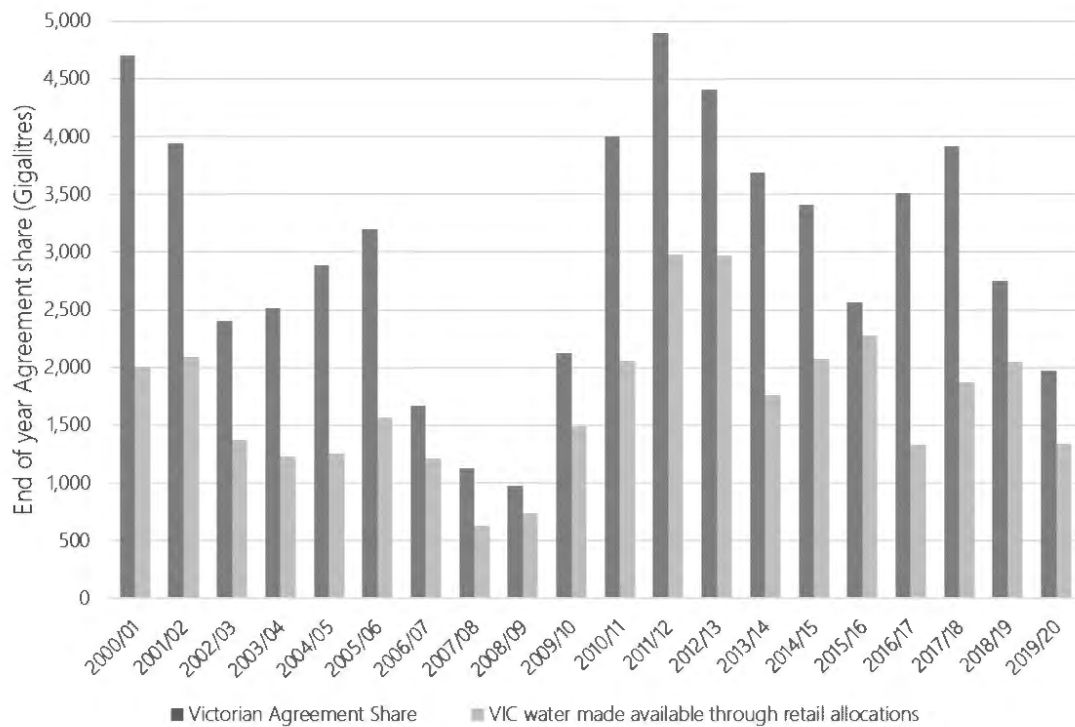
^a For the purposes of comparing the consumptive water made available to the states, South Australia's Agreement share in this graph only shows water made available for use by entitlement holders. ^b The SA conveyance allocation (Dilution and Loss entitlement) has been subtracted from the overall amount, as conveyance water for the River Murray upstream of the SA border is set aside before Victorian and NSW state shares are allocated.

Source: Interim Inspector-General of Murray–Darling Basin Water Resources, based on data provided by the MDBA.

Figure 13 and Figure 14 show Victoria and NSW's state shares over time and the amount of water that the state has made available to entitlement holders.

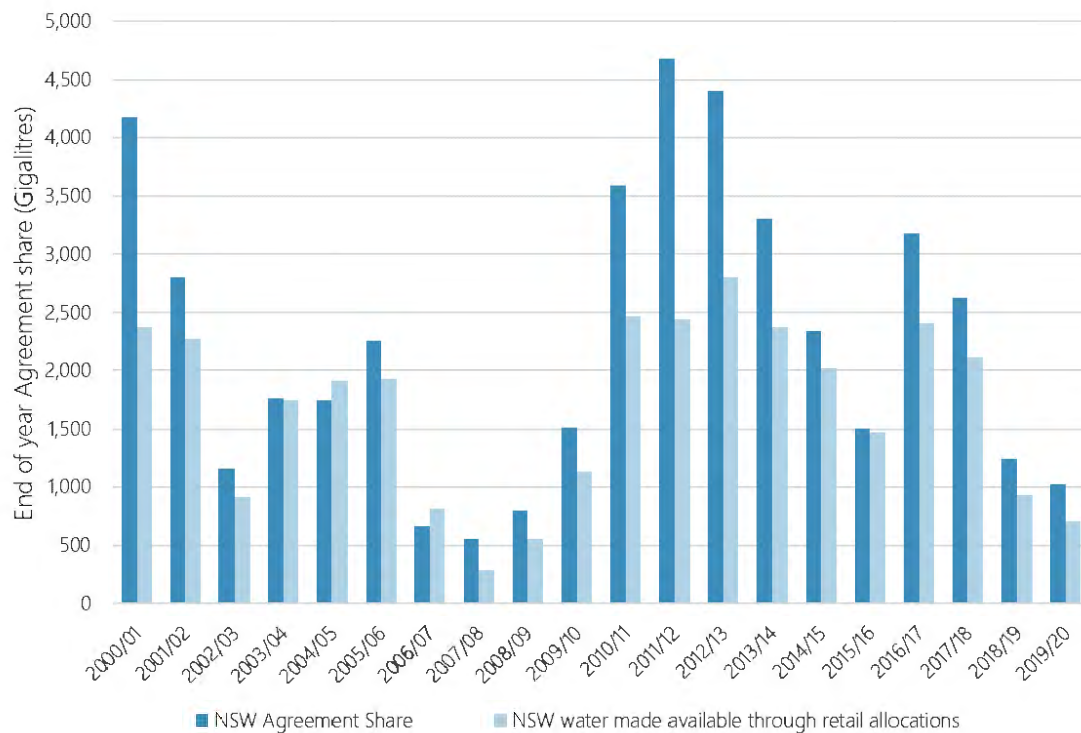
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Figure 13 Victorian Agreement share and water made available through retail allocations, 2000 to 2020



Source: Interim Inspector-General of Murray–Darling Basin Water Resources, based on data provided by the MDBA.

Figure 14 NSW Agreement share and water made available through retail allocations, 2000 to 2020



Source: Interim Inspector-General of Murray–Darling Basin Water Resources, based on data provided by the MDBA.

When allocating their state shares to entitlement holders, the states must balance how much water to make available in the current year with how much they should keep in storage as a reserve for future years. This is a risk-based decision, which requires the states to consider the likely scenarios for future inflows.

Figure 14 shows that NSW received high volumes of state shares in 2016-17 and 2017-18 and made most of this water available to irrigators. This can be compared to Victoria's allocations in 2016-17 and 2017-18 (Figure 13) that show a much smaller proportion of water was made available to irrigators, in favour of deferring it to be used in the following years. These graphs reflect that NSW has made a much higher proportion of their state shares available to irrigators over the last 20 years, compared to Victoria and South Australia.

Victoria and South Australia's more conservative allocation policies therefore mean they have more water to allocate to irrigators in dry times. The volume of water made available to irrigators in NSW and Victoria over this period is about the same.

Impacts on NSW General Security and Victorian Low Reliability water share entitlements

While the focus of the inquiry is on the Agreement, many of the issues raised related to the impact of water-sharing arrangements that operationalise the Agreement. Some irrigators believe that entitlement reliability has changed over time as a result of changes in irrigator behaviour, compliance and state policies. Some point to the fact that allocations were higher than at present under similar conditions experienced during the Millennium Drought.

This issue is compounded by many in the Basin suffering from poor historical strategic business decisions—decisions that many who spoke to the inquiry acknowledged. These ranged from missed opportunities to convert NSW General Security to High Security entitlements, selling water entitlements and choosing to rely on the allocation market, as well as decisions about financing, expansion and crop choice. Some expressed the view that there is no other Australian industry subject to as much risk as those reliant on the Murray–Darling Basin.

Holders of NSW General Security and Victorian Low Reliability water share entitlements feel they have been disproportionately affected. There is a high likelihood that historical expectations of reliability are no longer accurate because climatic conditions have changed. Underpinning many irrigators' frustrations is also the fact that there is very little data available about the long-term reliability of different entitlement types. This is undermining confidence in the water allocation process.

Historical decisions by individual states about how they have decided to approach water-sharing—in consultation with irrigators—are part of the reason for current outcomes. Information provided to the inquiry reveals:

- Victorian High Reliability water share entitlements have higher reliability because Victoria decided on a water management approach that limited how many entitlements are issued and enacts conservative reserve policies. These decisions were made by the Victorian government to better suit the reliability demands of irrigators in that state, where reliability is important for permanent plantings.
- NSW made decisions to issue greater volumes of General Security entitlements with less reliability. These decisions were guided by the preferences of irrigators and aligned with prevalent agriculture (such as rice and cotton) and conditions (including rainfall patterns)

at the time. The outcome of these decisions is that, in protracted dry periods, there is less water to provide to General Security entitlements as the lowest priority in NSW.

This is how the system is intended to work, but it means that lower reliability entitlement holders are those that are most substantially affected by reduced water availability. Nonetheless, some of these entitlement holders may have, or have been given, a different impression about the reliability of their entitlement products, whether due to a lack of accurate information or as a result of modelling based on historical inflows. Given recent trends in much lower inflows, the long-term reliability of these products is being brought into question.

State carryover policies

People expressed concerns about the impacts of State carryover policies on allocations. Carryover is an arrangement that allows irrigators and environmental water holders to keep their unused water allocations in dams from one water year to the next, allowing them to mitigate risk across water years (DELWP 2020; DEW 2020).

The Inquiry frequently heard that the introduction of carryover has adversely affected entitlement reliability. Equally, many people expressed high levels of support for carryover as an important risk management tool for their businesses.

The Australian Competition and Consumer Commission (ACCC) is currently undertaking an Inquiry into Murray–Darling Basin water markets (ACCC 2019). The Terms of Reference for the Inquiry include the role of carryover arrangements. The final report is due to be provided to the Treasurer by 30 November 2020, with an interim report due in May 2020. As the ACCC is currently investigating this matter, this Inquiry has chosen not to explore or make comment on carryover in detail.

At a high level, it is likely that the implementation of carryover has changed the perceived availability of water over time. Before carryover was available, and before water trading became prominent, many irrigators would forfeit any unused water in their account at the end of the water year, which would go back into the pool of water able to be allocated the following year. Irrigators now maximise use of their allocations through use, trade or carryover. These changes may be perceived as having a detrimental impact on some entitlement holders, but they are effectively arising because people are no longer benefitting from the ‘socialisation’ of water that was historically forfeited by others. This ‘socialisation’ would typically have resulted in higher bulk allocations to States at the start of each water year.

However, eliminating carryover would be unlikely to result in increased forfeitures. With higher levels of water scarcity and market prices (compared to 20 years ago), people with any unused water would likely use the water themselves or sell it to someone who could use it, to avoid forfeiting the water.

Other water-sharing concerns

Underuse of allocations

Some submissions raised concerns that there has been significant underuse of allocations that has gone unnoticed in water accounting, which may be contributing to systemic underuse relative to the Sustainable Diversion Limit (SDL) under the Basin Plan. The Inquiry heard this is negatively affecting irrigators and contributing to increased flows to South Australia. At the

request of the former Minister for Water, the Honourable David Littleproud, the MDBA is currently investigating this issue.

Recommendation 3

The MDBA should clearly communicate the results of its examination of underuse of allocations and compare them with the submissions made to this Inquiry so that accurate feedback can be provided to the community.

Voluntary contributions

Concerns were raised with the Inquiry about the ongoing nature of what was considered to be a one-off voluntary contribution by NSW High Security entitlement holders.

Other submissions refuted these claims and stated that this ‘voluntary contribution’ was not a one-off contribution and was negotiated with and understood by irrigators at the time to be a permanent decision.

When approached about this issue, the NSW Government advised that water users agreed that provision needed to be made for environmental water, and this agreement was achieved through the negotiation of rules when Water-sharing Plans were being made in the early 2000s. These negotiations occurred through River Management Committees that comprised a cross-section of water users and stakeholders in the community.

The NSW Government claimed that the ‘voluntary contribution’ is a delay in High Security irrigators reaching full allocation, rather than an absolute reduction in their entitlement. This does however mean that High Security entitlements will only reach 100% allocation in very wet years.

General Security conversions

Concerns were also raised about the NSW Government’s administration of an historic program that allowed irrigators to convert General Security to High Security entitlements.

While this is a matter that relates to State allocation policies the Inquiry sought clarification from the NSW Government given the level of concern. The NSW Government confirmed that there is a provision in NSW Water-sharing Plans to convert one entitlement type to another using a conversion factor. The conversion factor is based on long-term modelling that allows conversion between entitlement types without having a reliability impact on third parties.

After some uptake of the program by irrigators in the Murrumbidgee in the early 2000s, the program was halted. No significant conversions occurred in the NSW Murray during this time. Of the conversions that occurred in the Murrumbidgee, approximately 140 GL of General Security entitlements were converted to around 80 GL of High Security entitlements.

The Inquiry heard from a number of stakeholders that this issue was in some cases compounded by historical strategic business decisions.

The NSW Government was not able to clarify the extent to which the same conversion opportunities were provided to entitlement holders in both the Murray and Murrumbidgee. They advised that while there was some uptake in the late 2000’s in the Murrumbidgee, NSW

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formed the view that the process was undesirable and could potentially impact third parties. Conversions have therefore not been supported in the past 5 to 10 years.

Conveyance and delivery

The Inquiry consistently heard issues related to the volume of conveyance water and operational losses, and the impacts of downstream development and environmental water deliveries on river operations. Some people feel that river operators are not operating the system efficiently, while others are concerned that there is a lack of accountability for river operators.

Conveyance water

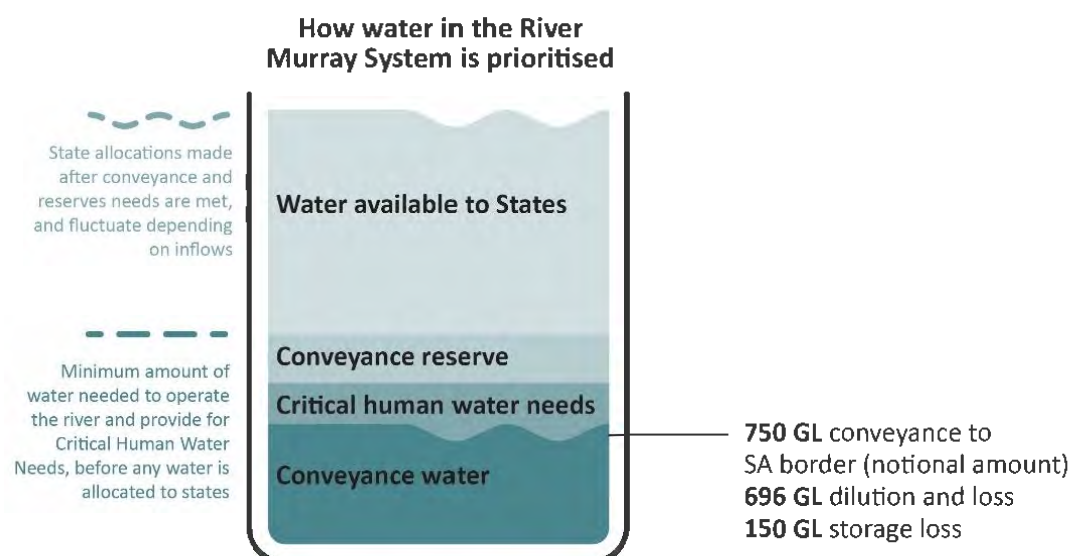
Along the course of any river, flows are reduced by natural processes such as seepage, evaporation and evapotranspiration (water consumed by vegetation). These losses are part of the natural water cycle and represent the volume that is required to convey water downstream.

In a regulated system such as the Murray, conveyance water describes the water that must be set aside to ensure that users along the length of the river can access their water allocations. Without conveyance, there would not be enough water in the river for users to access their water.

Under the Agreement, conveyance water is allocated first each year, before all other uses (see Figure 15). The MDBA recommends a conveyance ‘budget’ annually to the States. The size of the budget changes from year to year based on an assessment of inflows, climate conditions and expected water delivery for the coming year. The factors that affect operational losses are described in the MDBA’s *Losses in the River Murray System 2018-19* report (the Losses Report) (MDBA 2019d).

The conveyance budget is monitored through the year and adjusted according to conditions. For example, if rainfall increases then conveyance requirements could decrease. If this occurs, the conveyance budget is reduced and State shares are increased (MDBA 2019d).

Figure 15 Prioritisation of allocation of available water under the Agreement

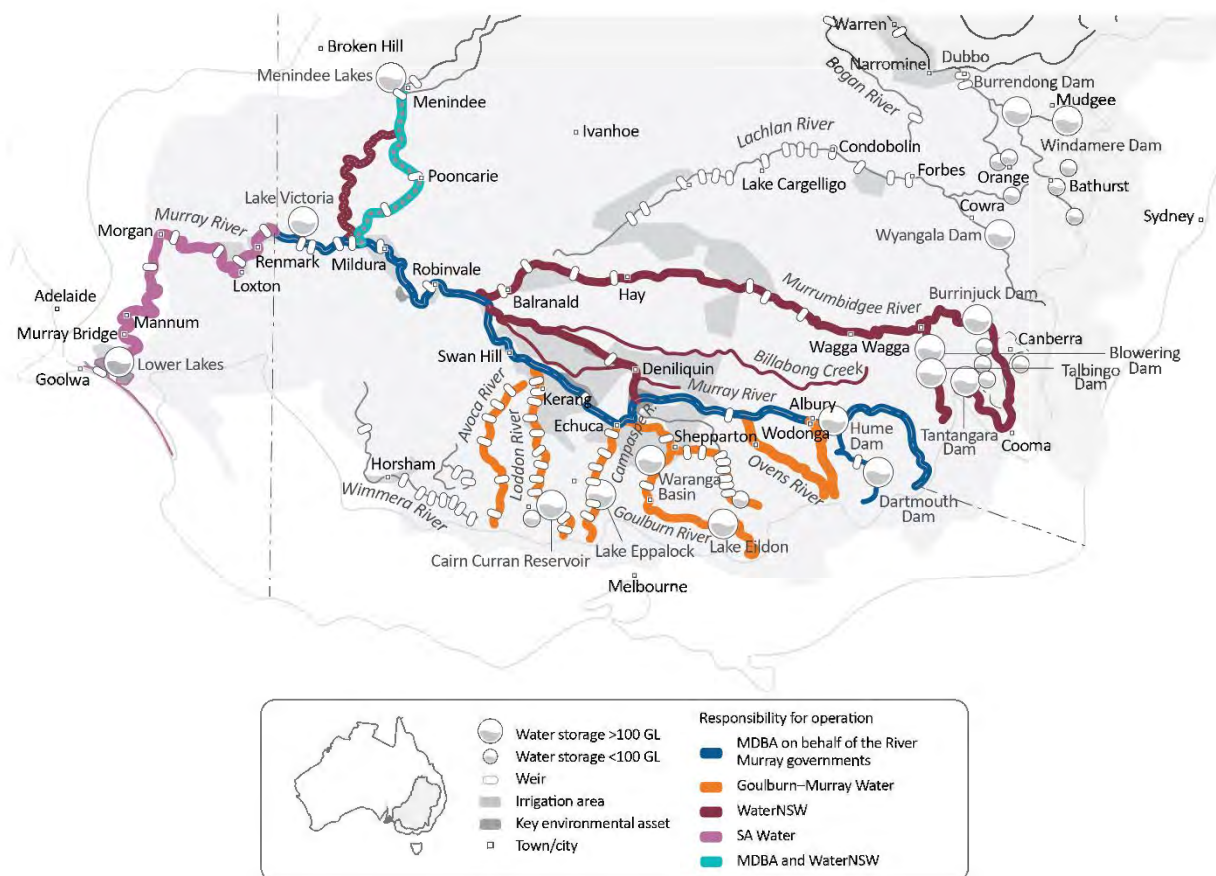


Source: Interim Inspector-General of Murray–Darling Basin Water Resources.

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NSW and Victoria share equally the amount of conveyance water needed to deliver water as far as the South Australian border. From the South Australian border to Wellington, conveyance water is met from South Australia's entitlement, which includes an amount specified in the Agreement for dilution and losses of 696 GL. This is part of South Australia's total maximum State share of 1,850 GL and despite the different name, has the same purpose as conveyance water upstream of the border (DEW n.d.). Map 2 shows the areas that different operators are responsible for and the different irrigation districts in the southern Basin.

Map 2 River operations in the southern Basin



Source: Interim Inspector-General of Murray–Darling Basin Water Resources.

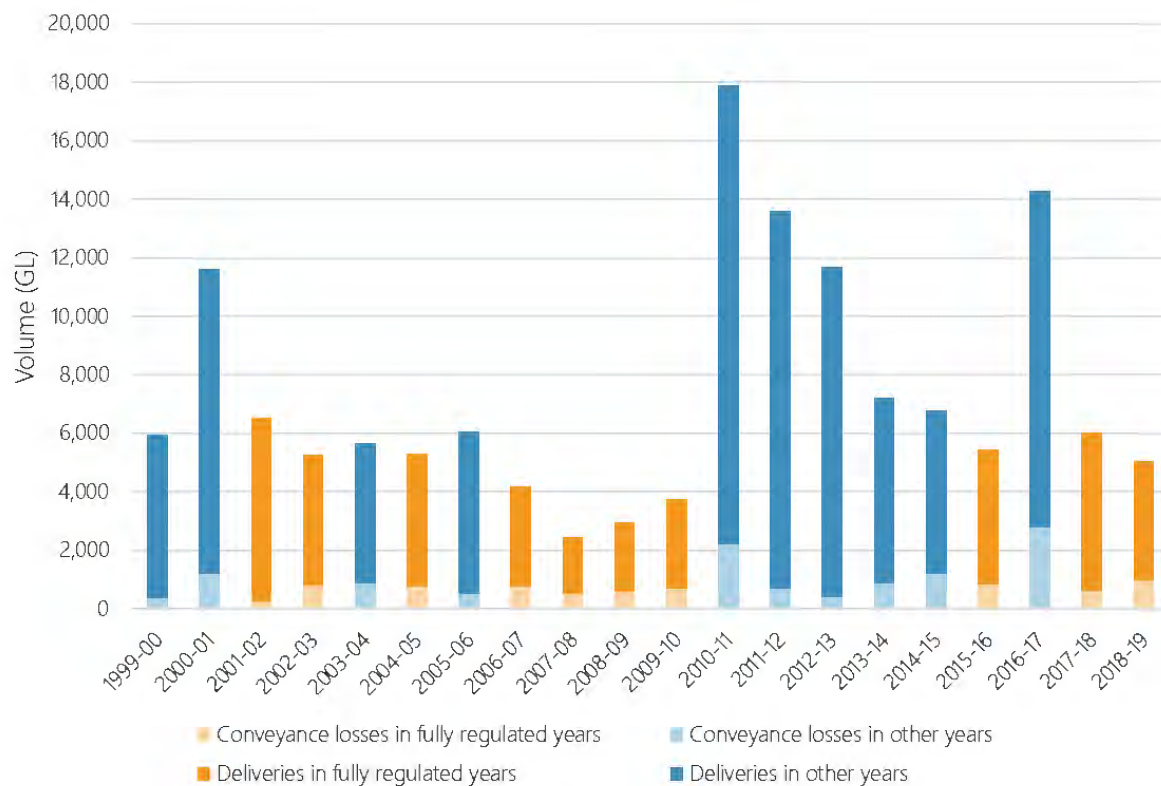
Different rules apply for the conveyance of water owned by environmental water holders. When the use of environmental water contributes to increased losses, these losses are taken out of environmental water holders' allocations (MDBA 2019d). This ensures that conveyance for environmental water delivery has no impact on consumptive use. The Inquiry found that the 'loss' incurred by environmental water holders is not widely understood or accepted.

Figure 16 is an updated figure from the Losses Report provided to the Inquiry by the MDBA which shows conveyance losses over time. This demonstrates that last year's conveyance requirements are similar to other years with high demands and low rainfall. The evidence shows that the proportion of losses is comparable with similar dry years during the Millennium Drought, despite a greater volume of water being delivered. In 2018-19 losses accounted for 25% of the water delivered, which is similar to the period from 2006-07 to 2009-10 where losses averaged 25%.

Impact of lower inflows on state shares under the Murray–Darling Basin Agreement

In Figure 16, wet years have very high levels of conveyance. However, this is actually unregulated flows down the system.

Figure 16 Delivery volumes and conveyance losses, 1999 to 2019

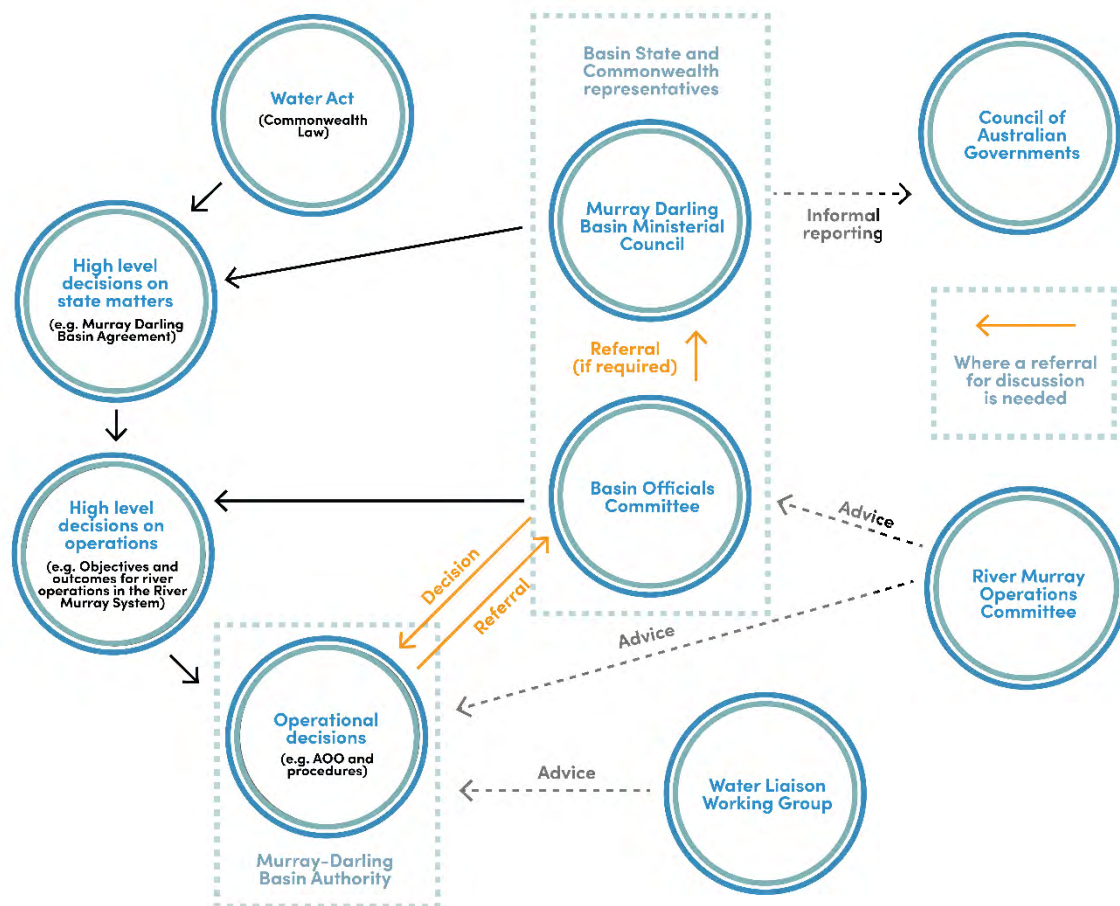


Source: Interim Inspector-General of Murray–Darling Basin Water Resources, based on data provided by the MDBA.

Accountability and governance arrangements

The Inquiry consistently heard concerns that river operators face little to no accountability for minimising losses, and that there is no transparency in how they manage the river.

These claims can be assessed with reference to the established governance arrangements, agreements and processes in place for operating the River Murray system. These agreements and processes demonstrate that, while MDBA river operators operate the river from day-to-day, they are not making operational decisions independently and are being held accountable for their actions by the States. This is set out in Figure 17, which shows where accountability for decision-making is assigned at various levels.

Figure 17 Framework for Murray–Darling Basin operational decision-making and accountability

Source: Interim Inspector-General of Murray–Darling Basin Water Resources.

States are actively involved in river operation decision-making. The Water Liaison Working Group (WLWG), which has members from the Commonwealth, NSW, Victorian and South Australian governments, meets fortnightly throughout the year to discuss current operational decisions and future operational planning (MDBA 2019h; MDBA 2019e). This includes discussion of issues such as risks associated with delivery, risks of capacity shortfall and whether water should be delivered above channel capacity or not. The WLWG updates both the River Murray Operations Committee (RMOC) and the BOC on operations through regular reporting and may escalate issues for decision if required.

River operations decisions are risk-based decisions and assessing outcomes with the benefit of hindsight is not fair or appropriate. Instead the quality of the decision-making should be evaluated on the extent to which the approved process was achieved. At the end of each water year the MDBA's performance in managing the river, and its compliance with its documented objectives and outcomes, is assessed by the Independent River Operators Review Group (IRORG) (MDBA 2019e). IRORG is an independent advisory committee established under Section 203 of the Commonwealth *Water Act 2007*.

The IRORG's assessment process and the findings of their annual review are not publicly available however, the Inquiry received the IRORG reports for 2017-18 and 2018-19.

The IRORG's assessment process includes interviewing State government officials to assess their satisfaction with the MDBA's performance, and making recommendations about improvements to river operations, the objectives and outcomes and future Annual Operating Outlooks. The assessments of the past two water years both found that the MDBA had fulfilled its obligations.

While existing governance arrangements are in place to ensure river operators are held accountable and that State governments actively participate in operational decision-making, the transparency of these arrangements could be improved. The river operations process is not well understood by the community and the processes and outcomes are not clearly set out in an easily accessible and readily available format.

Increasing the transparency of these processes and outcomes would provide stakeholders with confidence that river operators are being held to account for minimising conveyance losses, as well as potentially highlighting the complexity of decision-making and the processes that underpin river operations.

South Australian Dilution and Loss entitlement

In NSW and Victoria, the Inquiry also heard questions about the Dilution and Loss component of South Australia's allocation. People questioned whether any flows are still required to manage salinity and whether the inclusion of these flows in South Australia's allocation means that they are receiving water for the environment twice.

To a large extent, this seems to arise primarily because of the description given to this entitlement under the Agreement. The 696 GL Dilution and Loss entitlement is conveyance water allocated to South Australia to enable delivery of consumptive water from the border to Wellington just upstream of Lake Alexandrina (DEW n.d.). It serves the same purpose as the conveyance water shared between NSW and Victoria and is best considered along with conveyance water in the Basin generally (DEW n.d.).

Conveyance water also plays a role in managing salinity along the length of the Murray. This is not unique to South Australia, but the prevalence of historical salinity issues has been greater in the lower reaches of the river. Conveyance water helps to maintain river levels that prevent ingress of saline groundwater. It also ensures adequate flow rates that provide less opportunity for salt to accumulate in water flowing along the river (MDBA 2020 pers. comm. 12 February; NRMB 2019).

Some people expressed a view that lower levels of salinity downstream mean that the dilution flows are no longer required. However, the South Australian Government states that:

“The dilution and loss component provide conveyance to Wellington and is critical to delivering water of a suitable quality to support critical human water needs and other consumptive purposes.” (DEW n.d.)

The MDBA and South Australian Government have informed the Inquiry that Dilution and Loss flows were accounted for in baseline modelling for the Basin Plan, which means that any environmental water requirements identified for the Lower Lakes by the Basin Plan are above and beyond the water already being delivered. Reducing South Australia's Dilution and Loss

entitlement would result in the need to recover more water under the Basin Plan, as well as creating both delivery and water quality risks.

Concerns about the appropriateness of South Australia's Dilution and Loss entitlement seem to arise primarily from:

- an incomplete or inconsistent understanding of the purpose of this water
- the level of trust and confidence that irrigators have in river operators' ability to deliver water efficiently
- a lack of confidence in the extent and outcomes of water required to support the environment
- transparency about how much of this water is used for different things, including conveyance, managing salinity and delivering outcomes in the Lower Lakes.

Implications of downstream horticultural development

The Inquiry heard many concerns about the impact horticultural developments downstream of the Barmah Choke may be having on water delivery and conveyance losses, as well as the flow-on effects this may be having on State shares and allocations.

There have been calls to extend the moratorium on new horticultural developments announced in Victoria to South Australia and NSW, and for downstream irrigators to pay for any increased conveyance losses out of their allocations.

Many related submissions assume that high rates of downstream development are significantly increasing conveyance losses. The MDBA has informed the Inquiry they are aware of these concerns and have undertaken some investigation (MDBA 2019g), but a definitive answer is not yet available and it is difficult to attribute conveyance losses to any one source (MDBA 2019d).

The MDBA found in its Losses Report that conveyance losses in 2018-19 were comparable (albeit slightly higher) to years when the flows and operational strategies were similar (MDBA 2019d), indicating that the impacts of downstream development on conveyance might not be as material as some people suggest.

There are also existing inter-valley trade restrictions that mean it is not possible for consumptive water to be traded downstream of the Barmah Choke (outlined in Schedule D of the Agreement). Trade in this direction can only occur once 'opened up' by an equivalent volume being traded upstream. This practice has occurred since the early 2000s (Horne & Grafton 2019).

It is worth noting that Victoria's moratorium on horticultural development is largely driven by concerns about the impact continued expansion of perennial crops will have on the risk of a short-term delivery shortfall in response to peak demand (Neville 2019).

Riverbank erosion in the Goulburn River and the Barmah Choke arising from increased downstream demand was also an issue raised with the Inquiry. A number of submissions suggested there would be benefit in dredging sediment build up in the Barmah Choke, which may be exacerbating the natural constraint.

The MDBA is currently investigating each of these risks and how they can be addressed and is reporting its findings to the Ministerial Council (MDBA 2019g). The work to date has been reviewed by the Independent Panel for Capacity Project Review (Doolan et al. 2019). The Victorian Government is also currently investigating changes to operational and trade rules to reduce the risk to the environment, with changes expected to be introduced by late 2020 (Neville 2020).

Recent overbank transfers

In recent years there have been instances of overbank transfers through Barmah-Millewa Forest, which have been necessary to move enough water to Lake Victoria to meet system demands downstream of Hume Dam.

These losses are counted as conveyance losses deducted from the State shares of NSW and Victoria (MDBA 2019d), which was a process agreed by the States (MDBA 2020, pers. comm. 12 February). Overbank transfers are typically only used to move water downstream when all other options have been considered, specifically to avoid any increase in losses. Overbank transfers are discussed through the Water Liaison Working Group and agreed to by all States (MDBA pers. comm. 12 February 2020). The MDBA's Losses Report (2019) addresses the overbank transfer through the Barmah-Millewa Forrest in 2018-19.

Environmental water and overbank transfers

Many people questioned whether conveyance water should be credited to the environment, particularly instances where overbank transfers have been made through the Barmah-Millewa Forest to meet downstream delivery demands. There was a view that this should enable environmental allocations to then be credited back to irrigators.

The Commonwealth Environmental Water Office have informed the Inquiry that environmental water holders do not get to decide where or when overbank transfers are delivered, or the volumes that are delivered. While there are some environmental benefits of overbank transfers, environmental water holders have no control over these flows. This means that the timing, location and volume of flows may not be adequate to achieve environmental outcomes that water holders are expected to achieve, like specific fish or bird breeding events (CEWO 2020b).

In addition, the environmental water requirements established under the Basin Plan are based on modelling that took account of conveyance water (MDBA 2019d). Environmental water is the amount of water that is needed in addition to conveyance water. If conveyance water were to be credited to the environment, it would mean that the equivalent volume would need to be recovered in order to attain the same ecological outcomes being sought under the Basin Plan (CEWO 2020b; MDBA 2019d).

Measuring conveyance losses and improving operational decision-making

In addition to a desire for greater transparency, the Inquiry frequently heard calls for improved measurement and modelling of river operations. Many people question why irrigation water is held to a different standard for measurement than environmental water and river operations. There is a sense that improved measurement would lead to improvements in water availability.

Some submissions raised concerns at the on-farm (retail) scale, whereas others focused on system-wide (bulk) water delivery (whether in the river channel for downstream users, environmental water volumes, or conveyance water).

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The approach to measuring (and accounting for) water use differs depending on the scale of the flows (MDBA 2020, pers. comm. 11 February). The larger the volume of water, the harder it is to measure. This also means that the accuracy of measurement decreases as the volume of water increases.

Measuring volumes of water at a Basin or valley scale, like conveyance water or bulk State water shares, relies on computer models that use climatic data and data taken from river gauges (MDBA 2020, pers. comm. 11 February). These models are only accurate to within the nearest 10 GL (or more), which is the accuracy at which bulk State allocations are measured and reported (MDBA 2020, pers. comm. 11 February). Different standards for measurement and accounting are applied at different scales of water use or management according to the accuracy of measurement that is technically possible (MDBA 2020, pers. comm. 11 February).

There are a range of standards, forums and work programs that are driving consistent and improved measurement of water use across Australia under the Compliance Compact and the Inquiry noted that the assurance report found that the States and the MDBA had made good progress against their Compact commitments (MDBA 2019f).

Environmental water

Most of the issues raised with the Inquiry about environmental water included concerns about transparency, clarity and outcomes.

Background

Historical over-allocation and overuse of water in the Basin has been addressed through the provision of water entitlements to the environment (DAWE 2020c). Environmental water is not intended to return the Basin to its natural (pre-development) state. Instead, it seeks to improve flows and connectivity and support key species that are indicators of ecosystem health, like native vegetation, water birds and fish (VEWH 2020; MDBA 2019b).

The primary environmental water holder in the Basin is the Commonwealth Environmental Water Holder (CEWH). The CEWH is supported by the Commonwealth Environmental Water Office (CEWO) to manage the environmental water portfolio. Environmental watering is coordinated between CEWO, MDBA and Basin States, and informed by a suite of planning processes at the catchment and Basin scales, which include regular engagement with communities (DAWE 2020a).

Environmental water entitlements, allocations and rules

The Inquiry heard perceptions that environmental water holdings are different to consumptive entitlements, and are therefore subject to different allocation processes and rules. There are also concerns that environmental water is prioritised over consumptive water.

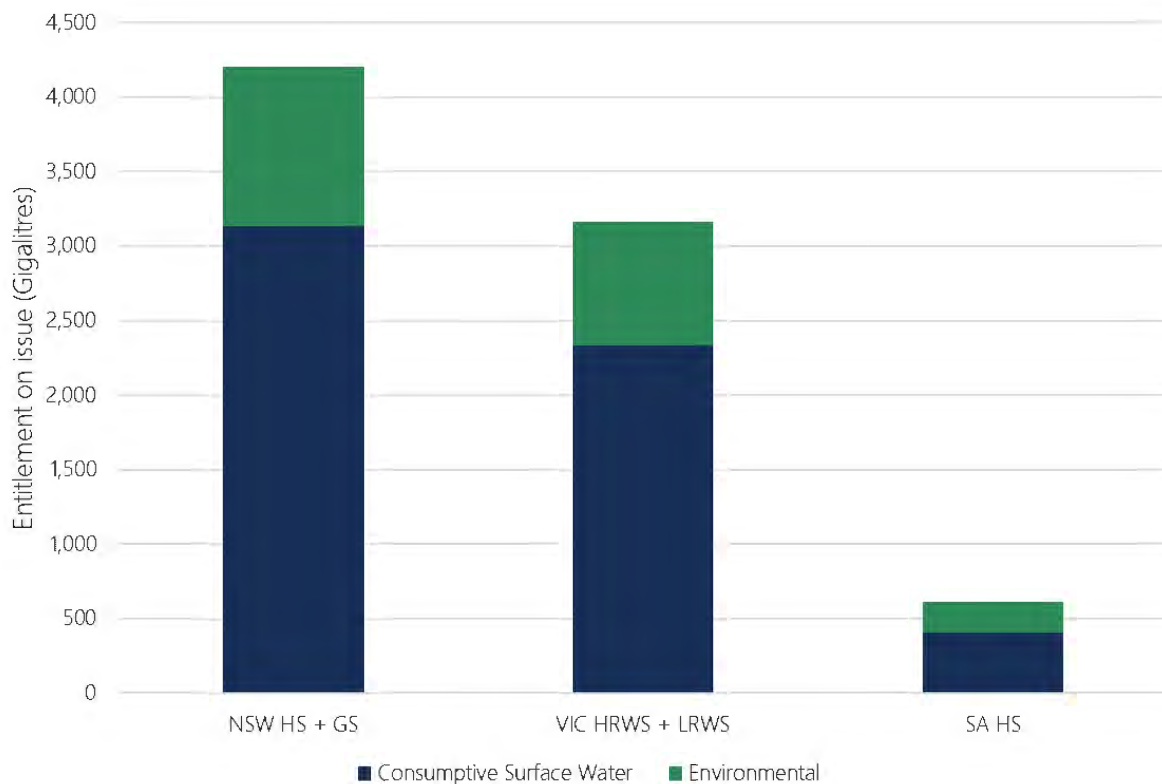
The Commonwealth environmental water holdings are comprised of exactly the same types of entitlements that are held by irrigators, including both high and low security entitlements in NSW, high and low reliability shares in Victoria and consumptive entitlements in South Australia.

Environmental water holdings are subject to the:

- same allocations as any other water user holding the same entitlement
- same fees, carryover policies and other rules as equivalent entitlements held by other water users
- same accounting frameworks as other water users, as determined by States
- requirement to meet any incremental conveyance losses from environmental deliveries (CEWO 2020a; DAWE 2020a; MDBA 2019d).

Figure 18 presents the total volume of entitlements on issue for consumptive use and environmental use in NSW, Victoria and South Australia. The majority of environmental water from Victorian entitlements is High Reliability Water Shares (88%), while in NSW the majority of environmental water holdings are General Security entitlements (96%). Given General Security entitlements are currently on low to no allocations, the majority of environmental water currently held in storage has come from the CEWH's Victorian entitlements.

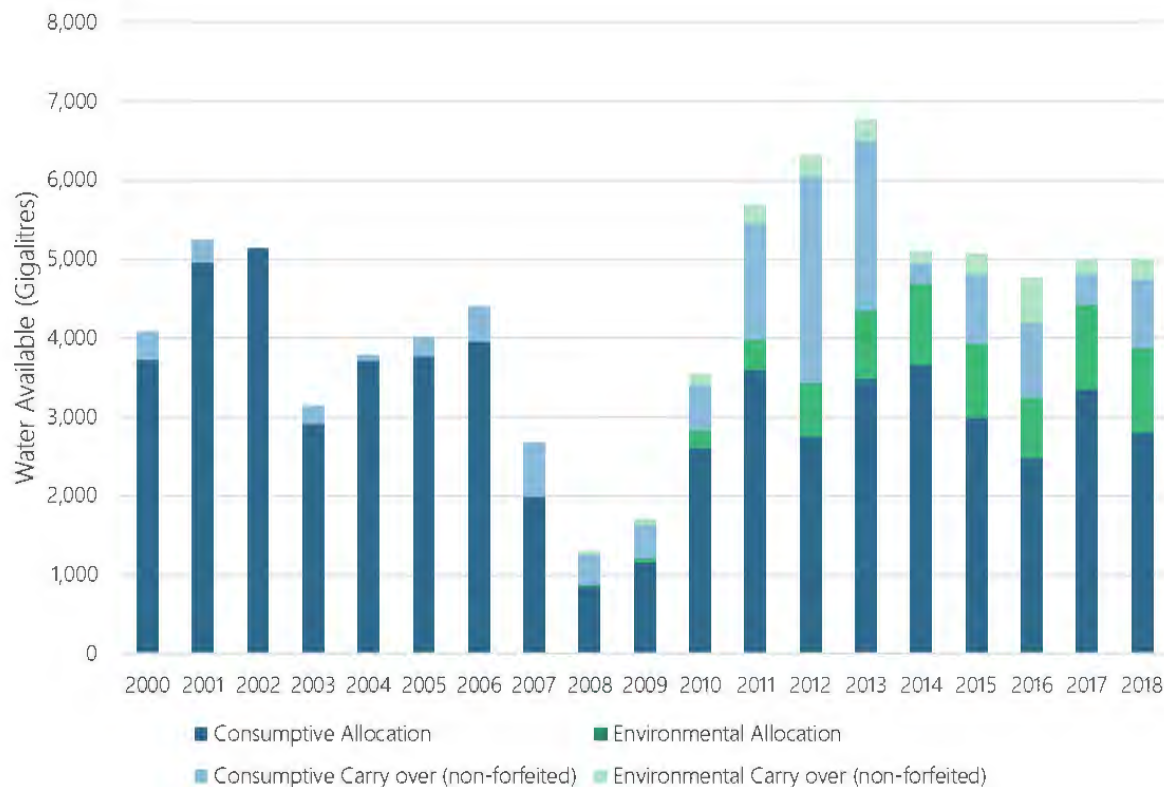
Impact of lower inflows on state shares under the Murray–Darling Basin Agreement

Figure 18 State entitlements on issue, by entitlement type and use, current

Source: Interim Inspector-General of Murray–Darling Basin Water Resources, based on data provided by Aither.

Allocations to the environment are not prioritised over the same entitlements for consumptive use. Sometimes deliveries of consumptive water can actually be prioritised over environmental water deliveries. The CEWO told the Inquiry that in 2018-19 high volumes of consumptive water transfers through the Barmah Choke resulted in a restriction on the delivery of environmental water to avoid negative third-party impacts. This impeded the ability of the CEWH to meet environmental demands that year (CEWO 2020b).

The mix of different entitlement types held by the CEWH determines the overall allocations available for use each year. Figure 19 presents the water made available for consumptive and environmental use over the last twenty years across the southern Basin. Commonwealth environmental water holdings have been purchased or recovered progressively since 2008 (DAWE 2020f; DoE 2016), so water available to the environment has increased over time.

Figure 19 River Murray system consumptive and environmental allocations and carryover, 2000 to 2018

Source: Interim Inspector-General of Murray–Darling Basin Water Resources, based on data provided by the MDBA.

Information about all of the CEWH's entitlement types, volumes and allocations is reported online, including forecast carryover (DAWE 2020d). The CEWH is the only water user to publicly release this information.

Carryover of environmental water

Carryover rules apply to environmental water in the same way as they apply to all other entitlement holders (DAWE2020b). Carryover is an important tool for maximising outcomes from environmental watering. It allows CEWH to meet early season demands, before seasonal allocations typically occur for most entitlement types, and critical demands (maintenance of highest-priority sites to provide refuges for animals) during dry periods (CEWO 2020b; DAWE 2020b).

CEWO forecasts carryover volumes quarterly and publishes this information on their website (DAWE 2020g). Carryover into the 2020-21 water year in the southern-connected Basin was forecast to be 180 GL to 210 GL (DAWE 2020g). Carryover to 2021-21 will change if rainfall projections improve or significant inflows from the northern Basin make it to the southern Basin.

Environmental water holders do require some unique delivery services, which reflects the nature and purpose of environmental water as it flows through the river system. The main example is return flow provisions, which allow environmental water to be used at multiple environmental sites along the River Murray as it makes its way downstream (through reuse or crediting of water that has returned to the system after being delivered to an environmental site) (DPIE 2019b; VEWH 2019a).

All environmental watering activities seek to avoid third-party impacts. The CEWH's 'Good Neighbour Policy' requires CEWH to take a conservative risk-based approach to environmental flow management (DAWE 2020e). It is adopted to eliminate the risk of unintended impacts on landholders, irrigators and other third parties. All rules associated with environmental water delivery have also been developed with this in mind (CEWO 2020b).

CEWO's business processes and engagement of environmental water planning and delivery have been found to be effective (NCE 2017, House of Representatives Standing Committee on the Environment and Energy 2018). However, it is clear from the concerns raised to the Inquiry that the way environmental water is allocated, managed and delivered is not well understood by the community.

The accessibility and availability of information may not fully reflect the accounting, reporting, operation and local engagement that occurs as part of environmental water management. More needs to be done to improve engagement and communication with stakeholders on these issues and to build community literacy about environmental watering. This is essential to providing people with an understanding of, and trust in, the need for environmental watering and the outcomes it delivers.

The Inquiry notes that CEWO is drafting a new communication and engagement strategy in coordination with State environmental water holders, due to be released in March 2020 (CEWO 2020, pers. comm. 19 February).

Making environmental water available for drought relief

In response to the protracted and severe drought conditions that are being experienced throughout the Basin, some people have called for environmental water to be released, leased or sold to irrigators for consumptive use. These calls have become more prominent as the drought has progressed.

This issue has been considered previously by the government and has been analysed in previous reviews, including the Productivity Commission's Five-Year Assessment of the Basin Plan (PC 2018). The Productivity Commission found that sale or reallocation of environmental water purely for the purpose of drought relief is inconsistent with the National Water Initiative (NWI).

The suggestion that environmental water be given up for irrigation in times of drought implies that the environment does not need water during a drought. The CEWO has told the Inquiry that evidence shows that this is not the case (CEWO 2020b). In times of drought the delivery of environmental water is scaled back and focused on maintaining key refuges (CEWO 2013; DAWE 2020h). This helps to maintain the environment's resilience so that plants and animals can recover when more water is available (CEWO 2020b; VEWH 2019b).

The CEWH also has clear obligations under the Water Act 2007. Trading environmental water can only be undertaken on the open water market when water is excess to requirements and there is no risk to the environment (CEWO 2020b; DAWE 2020h). That is not generally the case during a drought, and is currently not the case for 2019-20 (DAWE 2020h).

Environmental benefits from agriculture

Questions were raised about whether the environmental benefits of irrigated agriculture are properly considered under current arrangements.

The Inquiry received a submission from the Rice Growers Association suggesting that productive water use be credited as environmental water. This idea was raised by others, including dairy farmers, at some of the Inquiry’s public meetings.

The MDBA and CEWO have informed the Inquiry that the baseline modelling for the Basin Plan included the environmental benefits of irrigated agriculture (MDBA 2011). This means that those benefits have been accounted for in the current balance of environmental and consumptive water set out in the Plan. The MDBA and CEWO clarified that if irrigators were to be somehow credited with more water as a result of environmental benefits on their properties, the equivalent volume would need to be recovered to deliver on the Basin Plan outcomes.

Studies have shown that well-managed irrigated agricultural land can provide ‘complementary’ habitat benefits for key species (Smith & Watson 2018; Hering et al. 2019). However, the level of environmental outcomes (range and sustained level of breeding, survival, recruitment and long-term improvement in condition of key populations) is not comparable to environmental water (CEWO 2020b). All planting and watering decisions on irrigated agricultural land are informed by business needs and requirements (CEWO 2020b). While land managed for agriculture can provide coincidental benefit for some species, these outcomes are likely to be less reliable given that production outcomes always take primacy.

Case study 1 Renmark Irrigation Trust

The Inquiry heard from the Renmark Irrigation Trust (the Trust) who this year became the first irrigation scheme in the world to be awarded platinum certification by the Alliance for Water Stewardship (RIT 2020b)

Since 2016 the Trust has partnered with the CEWH to return water to parts of the environment. The Trust currently has seven active environmental watering sites. A further eight sites are planned to be added by 2022 (RIT 2020a).

The Inquiry recognises the Trust for the work it is doing to have positive environmental outcomes in the Basin.

Leadership, communication and water literacy

This chapter examines opportunities around leadership, information and communication, and governance.

Improving leadership and governance

Leadership

Fuelled by uncertainty, misinformation, misperceptions or misappropriation of available information, the public debate around Basin management has become increasingly toxic. It is creating division between the Basin States and even within communities themselves.

In the absence of strong, basin-wide leadership, there is a perception that some parties are too busy ‘playing politics’ and are ineffectual at making any tough decisions—especially when it comes to making decisions in the national interest and at the ‘whole of Basin’ level.

The public needs to have confidence that Basin governments are doing everything they can to work collaboratively and urgently to respond proportionately in difficult conditions. This is true of operation under the Agreement as well as implementation of the Basin Plan.

A more unified Basin-wide position and plan of action for Basin Plan implementation is required across all levels of government to improve leadership in the Basin and address the current crisis in confidence. Coordinated and strategic leadership will help by providing more certainty about water reform in the long-term, which will be beneficial for everyone in the Basin.

In addition to the issues addressed through this report, many people came forward with concerns about other elements of water management and Basin Plan implementation. These concerns should be addressed to help foster increased clarity about long-term policy. They include:

- the feasibility and impacts of an additional 450 GL of water recovery
- the feasibility and impacts of a range of SDL Adjustment Mechanism offsets projects, including the Menindee Lakes project
- the Constraints Management Strategy
- impacts of compliance, metering, water-sharing rules and floodplain harvesting rules in Queensland and NSW on lower Darling inflows to the Murray
- the completion of Water Resource Plans in NSW
- the NSW updated cap factors for water recovery
- the approach to managing peak demand impacts and potential shortfalls in the Lower Murray
- the science and economics behind the water requirements of the Coorong, Lower Lakes and Murray Mouth.

Strengthening governance and oversight for the future

The public needs confidence that governance arrangements that support Basin management are robust and delivering decision-making that is transparent, accountable and in the national interest. Established and detailed governance arrangements do exist, extending from the legislative framework of the Commonwealth Water Act 2007 to the hierarchy of agencies and working groups in place to implement decisions about river operations.

The governance arrangements do provide some flexibility and ability to respond to emerging conditions. Some recent reviews have discussed and critiqued governance arrangements, including the independent review of the Murray–Darling Basin Joint Governance Arrangements by Greg Claydon (the Claydon Review) (Claydon 2019) and the Productivity Commission’s inquiry on the *Murray–Darling Basin Plan: five-year assessment* (PC Inquiry) (PC 2018). The Claydon Review highlighted that BOC needed to take a more strategic and holistic approach to Basin management:

“With the preponderance of ‘emergency’ decision making as critical timelines loom, the BOC has devoted very little if any time considering strategic directions and management of strategic risks.”

BOC has recently responded to the Claydon Review and PC inquiry recommendations, providing a set of 23 revised governance arrangements (BOC 2019). The arrangements have a focus on simplifying and streamlining decision-making, increasing transparency and improving accountability. The Claydon Review also reinforced the need for improved communication and engagement with communities by decision-making bodies.

Many stakeholders raised concerns that the PC recommendations have seemingly been ignored. This is an example of the way in which the status of actions and recommendations can be readily lost from the public’s perspective, and the potential value in consolidating—and keeping up-to-date—the status and outcomes of all recommendations in one place.

Improving communication

Communication of and accountability for past review outcomes

Over the last few years there have been over 40 reports delivered on issues relating to the Basin. For the most part, the reports and key findings delivered at the completion of these reviews are passively published on one of the many government agency websites. There is often no clear accountability for governments or agencies to assess, consolidate and implement the recommendations from these reviews. This can result in people feeling as if little progress is being made and that submissions they have made for past reviews have not been taken into account or resulted in any change.

The number of reviews undertaken in recent years provides an opportunity to build collective understanding of certain issues, and to build accountability and trust with people in the Basin. However, this opportunity does not appear to have been leveraged by Basin governments.

Information

A single point of truth on many issues appears to be more challenging to establish than it should be. This is at the core of many issues brought to the Inquiry.

Huge volumes of information were provided to the Inquiry. While some people simply wanted to convey their views about how current arrangements are failing them or could be improved, others went to the trouble of contributing considerable detail. Information from some sources was often at odds with views from another. Upon further investigation of the issues raised, there often also appears to be a separation between public perceptions and what government agencies suggest.

Misperceptions or misinformation may be part of the problem in some instances, but it is clear that this can be driven by a lack of confidence in the information provided by government agencies responsible for Basin management. This is being aggravated by:

- the complexity of and inter-relationships between issues
- a reliance on modelling and imperfect information
- the number of agencies with responsibilities for Basin management and river operations.

There is an abundance of publicly available information about water resource management in the Basin, much of which resides on the websites of relevant agencies and departments. But, the volume of information that is available means that it is often difficult for individuals to readily identify the specific data or information they are seeking. Problems occur when:

- language is inconsistent between States, websites and reports.
- information is distributed across multiple websites and is not consistent (an example of this is how a search for the current storage volume at Hume Dam produces a different volume across various websites, including the MDBA (MDBA 2020e), Goulburn-Murray Water (GMW 2020) and Water NSW (Water NSW 2020)).
- the specific information that individuals are seeking—such as being able to identify who owns water in a storage or at a point in the system—is not available. This may be for different reasons, including, for example, because that information is complex or problematic to establish, or resides with multiple parties and is not effectively integrated.

While information can be found on multiple Commonwealth and State government websites, a consistent theme heard in this Inquiry, along with those currently being undertaken by the ACCC (ACCC 2019) and the Independent Social and Economic Assessment Panel (Independent Panel 2020), is the need to develop a single point of information.

This Inquiry supports the development of a ‘single source of truth’ that is a one-stop site for information needed to overcome complexity and the confusion that continues to be voiced. A Basin water information and service portal could provide a single and authoritative source of information on water management, ownership, markets and prices. It would likely be web based and could extend to an App.

The Inquiry noted the extensive use of Apps by water brokers, irrigators and some state government departments however, there is no uniformity in how this is done as it appears to be either ad hoc or entrepreneurial.

Recommendation 4

The BOC should consider implementing a single authoritative platform that combines information currently available on the various Commonwealth and state websites, to provide higher levels of transparency and trust and to improve water literacy.

Confidence in Basin science

A lack of trust and confidence in the science underpinning many aspects of water management in the Basin contributes to tensions about water-sharing and use. The complexities of the Basin are reflected in the science that is used to make decisions. This needs to be able to be communicated to the general public in a way that is understood.

There also needs to be trust in the agencies that provide the science and the independence of scientific advice. There appears to be a lack of trust in the Basin Plan settings—for example, the setting of the Baseline Diversion Limit (which is a foundation of the Sustainable Diversion Limit), and the amount of environmental water to be recovered.

Another example raised during the Inquiry was the science relating to the Lower Lakes in South Australia, about which there is clearly a high degree of scepticism amongst irrigators. In the immediate term, the Lower Lakes Independent Science Review (MDBA 2020c) currently underway will consider scientific views about the future management of the lower extent of the Murray system.

The Inquiry was advised by the MDBA that it already has work programs and committees dedicated to providing confidence in Basin science. An independent Advisory Committee on Social Economic and Environmental Sciences (ACSEES) has been in place since the establishment of the Basin Plan (MDBA 2019a). They provide scientific advice to the MDBA, check the quality of Basin science and whether the analysis they are undertaking is appropriate, and connect the MDBA with the broader scientific community. Each of the ACSEES members comes from a range of different disciplines and institutions. However, much of the work the ACSEES undertakes is not routinely publicised.

The MDBA, CEWH and Department of Agriculture, Water and the Environment have informed the Inquiry they have recently committed to a four-year Water and Environment Research Program due to start in July 2020. The program will invest in research on changes in climate, hydrology, and social, economic, cultural and environmental outcomes, with the objective of strengthening scientific knowledge of the Basin to help inform water and environment management decisions.

In the long-term, Basin agencies need access to a stable research base to ensure that they make decisions that are informed by the best-available science, and can give people throughout the Basin confidence that water reform and management is grounded on a stable scientific foundation.

Increasing water literacy

The level of water literacy across the Basin varies substantially. This was evident in the personal meetings conducted with stakeholders. Many people put forward the view that they just want to grow produce, and do not have time to ‘play the water markets’. There is also a sense that some family farmers yearn for the policies and conditions of decades ago.

Water literacy has changed, such as the need for irrigators to now understand and have knowledge of how a water market operates. A farmer needs to not only farm, but simultaneously be an economist, trader, and weatherperson. There is limited time to be able to do all of these things, resulting in some family farms falling behind.

Government-funded exit strategies, which support farmers to exit the industry where it is no longer viable for them to remain, were made available in the past (APH 2011; DAWE 2019; Wong 2008). However, there seems to be very little discussion around ‘entry strategies’ and supporting young farmers who want to get into the industry with the information, knowledge and support required to make this change.

There needs to be ongoing empowerment of the younger generations, to enable them to take over the family business, or to enter the industry as a first-generation farmer, armed with the knowledge required for today’s farming.

Recommendation 5

The BOC should consider ways through which States and agencies could work together across their respective jurisdictions to include water literacy in high school and higher education curriculums, including VET, in regional areas.

Abbreviations

Term	Definition
ACCC	Australian Competition and Consumer Commission
ACSEES	Advisory Committee on Social Economic and Environmental Sciences
the Agreement	Murray–Darling Basin Agreement
the Basin	the Murray–Darling Basin
Basin Plan	Murray–Darling Basin Plan
BOC	Basin Officials Committee
CEWH	Commonwealth Environmental Water Holder
CEWO	Commonwealth Environmental Water Office
CHWN	Critical Human Water Needs
the Claydon Review	Review of the Murray–Darling Basin Joint Governance Arrangements
GL	gigalitres
IRORG	Independent River Operators Review Group
the Losses Report	<i>Losses in the River Murray System 2018-19</i>
MDBA	Murray–Darling Basin Authority
MP	Member of Parliament
NSW	New South Wales
NWI	National Water Initiative
PC inquiry	Productivity Commission’s inquiry on the <i>Murray–Darling Basin Plan: five-year assessment</i>
RMOc	River Murray Operations Committee
SDL	Sustainable Diversion Limit
the Trust	Renmark Irrigation Trust
VET	Vocational Education and Training
WLWG	Water Liaison Working Group

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