‘Market architecture’ refers to the framework of laws, rules, policies and arrangements that make markets for tradeable water rights work. Important elements of the Basin’s market architecture include rules governing the trade of water between zones, and the sharing, storage and delivery of water. The following four chapters describe the ACCC’s assessment and recommendations for market architecture.

Chapter 13 outlines the basis for the ACCC’s high level conclusions about current trends impacting and being impacted by market architecture, and about how the Basin’s market architecture is currently functioning.

Chapter 14 takes a detailed look at managing the impacts of interzone trade and delivery of traded water. It covers current rules and policies such as intervalley trade limits and other trade rules used to manage environmental impacts from trade, conveyance losses, delivery risk and managing environmental deliveries.

Chapter 15 looks at managing the interactions of trade with allocations, storage and use. It covers states’ allocation policies and how they will deal with a changing climate, carryover policies and how efficiently they manage storages, the rise of carryover parking and its impacts, and the importance of modelling and accurate, timely measurement of water use.

Chapter 16 recommends priority actions governments can take to improve market effectiveness, through legal and policy reforms, and investments in improved information. It also proposes options to develop more efficient, integrated Basin market architecture.
13. Market architecture: understanding and managing the impacts of trade

Key Points

- ‘Market architecture’ refers to the framework(s) of laws, rules, policies and arrangements that make markets for tradeable water rights work. Important elements of the Basin’s market architecture include rules governing the trade of water between zones, and the sharing, storage and delivery of water.

- Current market architecture and governance arrangements are largely state-based, complex, dispersed, lack transparency and are not well attuned to dealing with issues or effects that cross state borders.

- Market architecture rules should ensure that inter-valley transfers occur within the bounds of ecological tolerances, and do not exacerbate deliverability issues. Rules for trade and delivery should manage water transfers with regard to all relevant users and operational considerations.

- Southern Basin market architecture design currently relies upon a range of simplifying assumptions, such as allocation trade generally occurs on a one-for-one basis and allocations can be delivered at any time of year. These assumptions are being challenged by changing water uses, trade patterns and water availability, and need to be reassessed as to whether they remain valid and how effectively they function to manage third party impacts.

- Not attributing the full costs of their decisions to traders creates a range of issues for other water users, but is currently most acute with regard to managing the interzone delivery of traded water and associated impacts.

- While arrangements for allocation trade have functioned reasonably well in the past, emerging pressures on the system, changing supply and demand factors and increasing trade mean key assumptions underpinning the market architecture need to be reassessed so that water markets remain robust and effective into the future.

- By developing tools that rely on market mechanisms to better signal the costs of decisions to trade, policy makers can design market architecture that will more efficiently facilitate trade and manage its impacts, offering benefits to market participants and to the wider community. For tools to be robust and to best mitigate third party impacts, they should align with the hydrological characteristics of the system.

- Many issues such as delivery shortfall risk, environmental damage and conveyance losses, are more closely linked to the timing and location of water deliveries and use rather than the timing of trade. The market architecture currently manages these impacts largely through inexact and sometimes ineffective controls on trade, and mechanisms for capping extractions are not well established.

- Under current water register, metering and accounting systems, it is difficult to track traded water. This makes it difficult to identify the effects of trade in isolation from arrangements more generally, and to assess the magnitude of impacts or causal link between trade activity and the consequences that stakeholders attribute to trade.

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931 Delivery shortfall occurs when available water cannot be delivered to users when they want it. This can occur even without trade, but trade that results in changes in the timing and/or location of water use may contribute to shortfall risk. This is considered further in section 14.2.2.
This report defines ‘market architecture’\(^{932}\) as the framework(s) of laws, rules, policies and arrangements that make markets for tradeable water rights work, including the storage and delivery of traded water. Key Basin market architecture elements include the:

- Legal frameworks that create property rights\(^{933}\) (tradeable water rights include water access entitlements, water allocations, water delivery rights and irrigation rights) and provide for access to water resources
- Intergovernmental agreements and Basin state and Commonwealth laws and policies that establish the arrangements for the sharing of water between the States, and among water users
- Basin State, Commonwealth and irrigation infrastructure operator (IIO) trading rules, that determine when and how trade can occur, in what water products, and if any special constraints or requirements apply to certain products or transactions
- A range of ancillary rules and arrangements that provide for the storage, delivery, measurement and use of, and accounting for, traded water and the operation of the river systems and their associated infrastructure.

The interim report drew on submissions from stakeholders and preliminary ACCC and other analysis to identify a range of concerns with the Basin’s market architecture. This included concerns with carryover policies and the operation of rules to manage constraints on inter-valley trade.\(^{934}\) For the final report, the ACCC has undertaken further analysis and drawn on others’ research and analysis, to refine its views on the significant issues with, or arising from, the operation of the Basin’s market architecture. To assist this work, we commissioned an independent consultancy to consider market architecture issues (see box 13.1).

932 The use of the term ‘market architecture’ is influenced by systems theory and takes its inspiration from similar terms used in other fields, such as information technology (“data architecture”) and global trade and investment (“investment architecture”, “trade architecture”). See, for example: Ismail, F. ‘The Changing Global Trade Architecture: Implications for Sub-Saharan Africa’s Development’, Commonwealth Trade Hot Topics, No. 131, 2016, [https://doi.org/10.14217/5jlv0qp7xs0-en](https://doi.org/10.14217/5jlv0qp7xs0-en), viewed 2 February 2021.

933 Note that the ACCC refers to property rights throughout this report with reference to their definition in economic theory, which is that a property right implies ‘the powers to consume, obtain income from, and alienate ... assets’. Economic theory commonly notes characteristics of property rights as excludable, enforceable and transferrable and can include ‘incomplete’ property rights. Barzel Y, Economic analysis of property rights (2nd edition), Cambridge University Press, Cambridge, 1997, p. 64.

934 The inquiry terms of reference directed the ACCC to consider particular elements of Basin market architecture including the impact of carryover arrangements and the trade of water carried over; and arrangements for the management of storage and delivery constraints. See chapter 1.
Box 13.1: Independent analysis of the effects of market design on trade outcomes

To assist with its market architecture analysis, the ACCC engaged consultants Frontier Economics to assess whether the design of Southern Connected Basin water markets was constraining or distorting trade. This included asking Frontier to consider if a ‘gap’ existed between the trade and operational rules and the hydrological realities of the system and, if so, how closing such a gap could improve the operations, transparency, competitiveness or efficiency of Southern Connected Basin water markets.

Frontier worked with the ACCC, the MDBA and the southern Basin States, and drew on data and information collected and supplied by the ACCC for this analysis. Frontier prepared a report for the ACCC (the Frontier Economics Report) which outlined the issues it identified. These related primarily to interregional trade, delivery arrangements, carryover and individual storage arrangements, and governance. Consistent with the ACCC’s interim report, Frontier also found the Southern Basin market architecture to be complex and fragmented, with overlapping governance arrangements which lacked consistency.

Supplementing its own analysis and consultation, the ACCC has had regard to the Frontier Economics Report when considering market architecture and governance issues, and has drawn on Frontier’s material in preparing this report. The ACCC has credited Frontier where appropriate and the Frontier Economics Report is published on the ACCC website along with this report.

For this final report, the ACCC has focused on identifying and analysing:

- evident, emerging or potential problems resulting from inadequately managed impacts of trade-related activity
- opportunities to better manage trade arrangements through changes to the rules regulating trade, with resulting improvements in market efficiency and outcomes.

Some of the analysis and commentary that follows is relevant to the whole Basin; however, this Part mainly focuses on concerns in the Southern Basin. Water markets in the Southern Basin are larger, more active and have more participants, and the issues are consequently more acute. This is true in particular for issues with deliverability risk and the management of intervalley trade.

The following three chapters describe the ACCC’s assessment. This chapter, 13, outlines the basis for the ACCC’s high level conclusions about how the Basin’s market architecture is currently functioning. Chapter 14 takes a detailed look at the issues associated with managing the impacts of interzone trade and delivery of traded water. Chapter 15 looks at managing the interactions of trade with allocations, storage and use. Chapter 16 recommends actions governments can take as a matter of priority to improve market effectiveness through legal, regulatory and policy reforms, investment, improved information or other measures. It also proposes some options policy makers can explore to develop more efficient and integrated Basin market architecture in the years ahead.

13.1 Market architecture should be amended to accurately signal the costs of water usage and trading decisions

Market architecture defines property rights, determines how and where trade can occur, and manages the impacts of trade. The design of the Basin’s market architecture determines whether its water markets are effective and how efficiently they operate.

The Basin’s market architecture is created by a range of different Commonwealth, Basin State and irrigation infrastructure operator instruments. Chapter 2 of this report provides more detail on the specific laws, rules and policies that establish the key elements of these markets.

This part of the report considers how changing market activity and other conditions are altering how effectively the Basin market architecture is operating to facilitate trade and to manage the impacts of trade. Table 13.1 describes the key market architecture elements considered in the following chapters.

### Table 13.1: Key market architecture elements discussed in this part

<table>
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<th>Market architecture elements</th>
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<th>Discussed in</th>
</tr>
</thead>
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<td>Trade</td>
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#### 13.1.1 Market architecture manages the impacts of trade and determines who can trade, and where

Water trading markets perform well when the costs of individuals’ decisions on other parties (including the environment) are fully reflected in the prices and charges faced by that individual. Where prices correctly reflect the benefits, costs and risks of water use, market participants are encouraged to make efficient usage, trading and investment decisions. If price signals are inaccurate, people may make choices which are not optimal for themselves or which may inadvertently cause negative impacts on the natural river system and on other water users (often referred to in economics as “third parties”).

A key function of market architecture is to ensure that when individuals enter water markets, they are not able to undertake trades that would facilitate changes in water use and delivery that result in significant negative impacts on other parties.

Problems can arise where the market architecture does not adequately account for the impacts of trade and delivery (such as increased spill risk or environmental damage) or interactions between different policies or rules. Where this is the case, market participants may use water in ways that are privately beneficial to them, but ‘socially’ costly when the impacts on other water users or damage to the environment is taken into account.

For example, the existing market architecture does not allow trade of water allocations between locations that are not hydrologically connected, such as from the Goulburn Valley in Victoria to the NSW Border Rivers. The trading framework does not allow this because water capable of being delivered to users in the Goulburn Valley cannot be delivered to users in the Border Rivers region without negative impacts other users. Supplying the traded water allocation to the buyer’s location would require water to be taken from the available supply in the Border Rivers, thereby reducing water available to other users in this region. In this example, the potential for negative impacts is obvious, and the case for the trade restriction is straightforward.

However, in many cases, making rules which appropriately protect third parties while still allowing for beneficial trade to occur is a difficult and complex exercise. One complicating factor is that impacts

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936 This is recognised by the Basin water market and trade objectives and principles, set out in Schedule 3 of the Water Act 2007 (Cth), which provide that the design of Basin water markets should (among other matters):
- facilitate the operation of efficient water markets and the opportunities for trading, within and between Basin States, where water resources are physically shared or hydrologic connections and water supply considerations will permit water trading
- enable the appropriate mix of water products to develop based on water access entitlements which can be traded either in whole or in part, and either temporarily or permanently, or through lease arrangements or other trading options that may evolve over time
- recognise and protect the needs of the environment
- provide appropriate protection of third-party interests.

937 In this case, water ‘use’ includes the trade or holding of water as an investment.
arising from trade are often only felt when the traded water is actually used, which may be a long
time after the trade occurs. In order to reflect as accurately as possible the benefits, risks and costs of
trading, the Basin’s market architecture needs to consider the impacts of trade on water management
and water delivery more generally.

To do this, market architecture should closely align with the hydrological realities of the Basin’s rivers
and storage systems. However these hydrological realities are complex and change over time. This
complexity, along with the aim of ensuring markets accurately reflect all the relevant benefits, costs and
risks sits in tension with providing users with simple, easy to use, low cost arrangements for trading.

An example of trading that is allowed by the existing market architecture is of water allocation from
the Goulburn valley in Victoria to the South Australian Murray. In this case, since the two areas are
hydrologically connected and the destination zone is downstream from the origin zone, it is possible to
deliver traded water from the origin zone to the destination zone. Such a trade need not directly impact
water rights held by third parties in either zone.

However, the trade creates the need to deliver water further down the river, and the buyer’s use of the
traded water may contribute to river channel congestion issues, conveyance losses or other issues such
as increasing spill risks. For example, irrigators using water in a way that necessitates delivery of water
from the Goulburn at times of heightened environmental sensitivity and when river flow is high might
result in environmental damage which would not occur if delivery was required during a period of lower
river flows. These indirect effects of trade may negatively impact others, and so need to be considered,
but can be very difficult to assess. Assessing the effects of trade is further complicated by the timing of
use of the traded water being individual’s decision and not known in advance.

13.1.2 Southern Basin market architecture relies on simplifying assumptions

Designing and operating water markets is a fundamentally challenging exercise. Harvesting, storing and
delivering a natural resource through a natural system has a number of implications for market design
and operation, including:

- supply of the resource is limited and variable, being ultimately determined by the weather and
government rules and decisions on allocating the resource rather than responding to traditional
signals, such as high prices

- delivery of water is limited by the capacity of man-made and natural infrastructure, including
constraint points. Delivery also generally entails conveyance losses and it takes time for water to
travel through the system

- storage is likewise subject to limited capacity (due to finite storage infrastructure) and losses

- protecting the environmental health of the natural river system and its associated ecosystems
requires management strategies which may not align with the needs of other water users (such as
irrigated agriculture).

To establish water markets that appropriately manage these characteristics but are simple enough to
be relatively low cost and accessible for participants, policy makers adopted a number of simplifying
assumptions when designing the Southern Basin’s market architecture (see box 13.2).

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938 Desalination plants may offer some very limited scope to contribute to water availability.
Box 13.2: Key simplifying assumptions made in the design of Southern Connected Basin market architecture

The key simplifying assumptions made in establishing water markets in the Southern Connected Basin, noted by Frontier Economics are:

- allocations can be delivered any time in the water year and are not tied to a particular season
- trade between trading zones does not result in additional conveyance losses and thus generally occurs on a one-for-one basis
- conveyance losses are socialised; that is, shared across all entitlement holders
- rainfall rejections\(^{939}\) are permitted
- shortfalls in delivery will be managed via rationing water extractions
- rights to storage and delivery can be combined in one instrument along with rights to inflows
- the period of water management is the water year, which runs from 1 July to 30 June.\(^{940}\)

Information in chapter 3, in section 13.2 below and in the following chapters 14 and 15, shows systemic or behavioural changes are challenging the validity of some of these simplifying assumptions. These changes are affecting how river operators run the system, with consequential impacts on other users and the environment. In particular, the location of demand is increasing congestion in the system, carryover has changed the water year, and conveyance losses appear to be increasing.

- The assumption that water allocations can be delivered at any time contributes to the lack of signals water users face about the real costs and congestion associated with delivery, leading to increasing strain being placed on the Southern Basin’s delivery infrastructure.

- The assumption that storage and delivery rights can remain bundled with rights to inflows has led to the rise of a ‘proxy’ market for storage capacity (in the form of carryover parking) and the absence of an effective mechanism for water users to manage their own delivery risks.

- While crop growth, weather and water availability and many elements of agricultural operations are not decided by the date, the construct of the water year (from 1 July to 30 June) was introduced to facilitate the development of administrative and accounting rules. Carryover has partly ameliorated the pressures created by this artificial construct, though it still requires a regime of account limits and accounting mechanisms to approximate finite storage capacity and address third party impacts.

- Conveyance losses from water delivery appear to be increasing for various reasons. While evidence on the magnitude is not strong, trade downstream may be contributing to increased conveyance losses, challenging the assumptions that all trade should occur on a one-for-one basis, and that conveyance losses should be socialised.

- It is assumed delivery shortfalls will be managed via non-priced based rationing of extractions but the mechanisms for doing so are not well established and a coordinated approach is yet to be agreed and communicated to water users. In the absence of efficient rationing mechanisms, consistently high flows during times of heightened environmental sensitivity have resulted in environmental damage.

Frontier Economics, in its analysis for the ACCC, concurred that ‘some assumptions underpinning market trading architecture are being increasingly challenged. This in turn means that individual water trading decisions are having impacts on other water users, resulting in lost opportunities for more efficient use, increasing costs/losses of system operations, and/or adverse environmental impacts’.\(^{941}\)

\(^{939}\) Rainfall rejections occur when a water user places an order for water, but then no longer requires it because their water needs are subsequently met by rainfall, and so the water ordered stays in the river (possibly leading to increased flows and flooding downstream), and the user’s account is not debited.


The concern is that if the market architecture does not accurately reflect the costs – increased deliverability risk, marginal conveyance loss impacts and environmental damage – water users will not face the full economic cost of their decisions, resulting in inefficient patterns of trade and investment. This points to the need to reconsider whether the assumptions underpinning current market design remain appropriate.

### 13.1.3 Market architecture creates a ‘disconnect’ between the timing of trade and the timing of water use and delivery

As explained in section 2.6 of this Report, water trading does not usually result in individualised delivery of water at the time of trade. When parties trade water, it is not physically moved between the parties or between storages. Rather, when trade occurs, it is the parties’ right to access water that changes rather than the physical movement of water.

Once traded water enters the buyer’s account, in regulated systems the buyer is generally free to use or trade it on at any time, including in future years (subject to relevant carryover rules), relying on river operators’ bulk deliveries of water to ensure water is available in the river system for use.\(^\text{942}\) This creates a ‘disconnect’ between the timing of trade and the timing of water use and delivery.

A further ‘disconnect’ arises between retail water use and on-river bulk water movement because, as noted above, river operators do not generally release water to meet individual water orders. Rather, they estimate aggregate demand (based on historical usage data, prevailing weather conditions and other factors) and manage bulk releases to meet these forecast demands.

The ACCC’s assessment of the consequences of these disconnects for market operation is discussed below at section 13.3.2. It considers where current arrangements are generating, or increasing the magnitude of, impacts from water users’ delivery and use decisions, and focuses on identifying issues with the operation of the market, and the effectiveness of the market architecture, not the operational aspects of Basin water management.

### 13.1.4 Market architecture requires regular review and updating to reflect changing conditions

The influence of changing climatic, hydrological, market and other conditions means that the market architecture is unlikely to remain fit-for-purpose without regular review. This is particularly true in the context of climate change. A 2019 discussion paper by the MDBA identified that:

> Climate change will have significant implications in the Basin, increasing pressure on the health of the Basin’s environment, its communities and its economy. It is also likely that the management, sharing and delivery of the basin water resources will become significantly more complex, and contested.\(^\text{943}\)

These increasing pressures highlight the need to get the market architecture right, so that water users can make optimal decisions for themselves and their businesses, minimising negative impacts on other entitlement holders or the environment. The MDBA outlined the challenge of this task as follows:

> Under declining water availability, the water market products offered by states need to remain fit-for-purpose. Inter-regional trade rules and limits need to be responsive to and sufficiently flexible to allow irrigators to trade water to mitigate risks associated with an increasingly warmer and drier climate. The reliability of water being able to be delivered to market users, particularly during an increasingly drier and low water availability future, needs to be well-understood. Research is needed into how production and financial risks of irrigators change and how irrigators may then respond to these changing risks (e.g. changing the extent, types and timing of crop plantings). Better understanding of these

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risks to irrigation will have implications for river operations with water management and planning decisions, and will reveal whether current water market rules are able to support irrigators mitigating and adapting to climate change risks.\footnote{Murray Darling Basin Authority, Climate change and the Murray–Darling Basin Plan – MDBA Discussion Paper, 2019, p. 22}

These design and information challenges point to the benefits of prioritising, and assigning clear responsibility for, the coordinated development of the Basin’s market architecture. It is important not only to review the continuing fitness-for-purpose of the arrangements for trade but to anticipate emerging issues and address them early through market design.

Proactive action helps ensure that the negative outcomes associated with current arrangements do not continue to grow over time. Timely action will help ensure benefits from flawed arrangements are not taken as given, which can motivate resistance to change. The following section describes how changes are creating pressure for key elements of the market architecture.

### 13.2 Significant changes have occurred in the Basin since water markets were established

Water use and trade activity are dynamic, responding to changing climatic and market conditions. Since trade was introduced, water markets have continued to evolve, and trade growth has been enabled by incremental market architecture reform. Major reforms include the:

- gradual unbundling of water rights from land, to facilitate trade
- introduction of, and adjustments to, carryover policies
- evolution of rules restricting trade, with barriers progressively being removed and the Basin Plan water trading rules introducing a right to trade free of certain restrictions (among other matters)
- establishment of trading zones and the rules governing trade between zones
- introduction of environmental water held by governments, a category which now accounts for roughly 30% of water holdings in the Southern Connected Basin (see figure 3.29, and also section 4.2 for analysis of environmental water holdings).

These major policy changes enabled the growth of water markets and facilitated significant changes in water use and investment around the Basin, such as the increased plantings of horticultural crops in the lower Murray (see box 13.3).\footnote{Aither, 2019, Water Supply and Demand in the southern Murray–Darling Basin, Victorian Water Register, https://waterregister.vic.gov.au/images/documents/Water-Supply-and-Demand-Report_Aither_FINAL.pdf, viewed 2 February 2021.} Removing trade restrictions has enabled market-based re-allocation of water, including from consumptive to environmental uses.\footnote{Productivity Commission, 2010, Market Mechanisms for Recovering Water in the Murray–Darling Basin, Productivity Commission, https://www.pc.gov.au/inquiries/completed/murray-darling-water-recovery/report/water-recovery-report.pdf, viewed 2 February 2021.} The introduction of new forms of trade such as multi-year leases and forwards, together with reduced costs of allocation trade, have allowed irrigators to develop new water ownership and trading strategies; in particular, allowing them to carry on irrigation businesses without necessarily owning their own entitlements.\footnote{See table 4 in the report for the ACCC, which estimates around 3% of irrigators in the last 5 years “used no water from own entitlements (all water from purchases on temporary market and/or leased entitlements)”, J Schirmer & D Peel, 2020, Understanding participation in water trading by irrigators in the Murray–Darling Basin - report prepared for the ACCC, https://www.accc.gov.au/focus-areas/inquiries-ongoing/murray-darling-basin-water-markets-inquiry/accc-commissioned-research, viewed 2 February 2021.}

At the same time, a range of non-market factors have affected water allocations, trade activity and system capacity. Long-term average temperature and inflow patterns have altered, with more frequent heatwaves and declining average inflows in the River Murray System. The Darling River has been in drought for much of the last 20 years\footnote{MDBA, 2020, Managing Delivery Risks in the River Murray System, Murray–Darling Basin Authority, https://waterregister.vic.gov.au/images/documents/Managing-delivery-risks-in-the-River-Murray-system.pdf, p. 16, viewed 2 February 2021.} and the MDBA has been unable to call water out from the...
Menindee Lakes to meet River Murray demand since 2017. Channel capacity through the Barmah Choke has also reduced from 11,500 ML per day in the 1980s to 9,200 ML per day in 2019, decreasing the volume of water that can be delivered from upstream storages in the River Murray without overbank flooding and increasing losses.

Box 13.3: Investment in permanent horticulture in the lower Murray region

In recent years, the lower Murray region has experienced significant growth in horticulture plantations, and in particular, almonds (see section 3.2.2). High almond prices have driven high gross unit returns for this crop, contributing to the increased planting area. Horticulture producers have relied on carryover and the increasing scale and sophistication of the market to facilitate access to water and to manage risks.

The scale of investment has increased the risk of delivery shortfall and supply shortages (where the volume of water available will be insufficient to meet the demands of permanent plantings in the system). In 2019, analysis for the Victorian Government by Aither forecast that, in similar drought conditions to the Millennium drought, current permanent horticultural plantation demand would require 125% of all of the surface water available in the connected Murray region (though groundwater and carryover may offer some relief, see figure 13.1). These forecasts are even direr once projections of predicted growth in plantings are applied, or the lower Murray is considered in isolation. Under these scenarios, it can be assumed that the price of water would increase drastically (up to the price paid by the user with the highest willingness to pay, likely permanent horticulture), possibly well beyond what users in most agricultural sectors could afford to pay.

The ACCC considers this an example of a gap or flaw in the market architecture as current arrangements do not at present adequately signal risks and costs, likely contributing to inefficient patterns of investment in the agricultural sector, with ongoing impacts for water users and their communities.

Figure 13.1: Water availability scenarios and baseline permanent horticulture water demand (at full maturity), Southern Connected Basin (excluding Murrumbidgee)

Source: Aither


950 The Barmah Choke is a naturally occurring narrow stretch of the River Murray that runs through the Barmah-Millewa Forests near Echuca, and is the lowest flow stretch of the River Murray.


13.2.1 Interzone trade has facilitated water use moving further down the Murray

Trade, along with a range of other drivers such as climatic factors, is changing historical patterns of water use across the Basin. As noted in section 3.1.1, while the volume of water allocation trade in any given year strongly depends on total water availability, data indicates that volume traded relative to the total water allocated to entitlement holders is growing, and irrigators are increasingly participating in water markets.

Basin State trade data sheds some light on how trade is changing the location at which water may be taken in the Southern Connected Basin. The majority of individual allocation trades (measured by the number of transactions) occurs within a single zone\(^53\), and information on how the location of use varies within a zone is not available from this data. However, as some of these zones are quite large, these may not be appropriate to manage current river operation issues such as delivery shortfall risk or conveyance losses.

Note that interzone allocation trade is only one of several mechanisms to move water between zones. Additional mechanisms, such as legacy exchange rate trades, tagged usage, and transfers made under bulk arrangements are not included in the figures 13.2 and 13.3, and so they do not fully capture the volumes of water moving between these zones.

Figure 13.2 shows that the annual volume of interzone trade fluctuates across the Southern Connected Basin over time. However, the proportion of interzone trade which is from a tributary (for example, from the Murrumbidgee, Goulburn, or Lower Darling) or from upstream Murray zones to downstream of the Barmah Choke has remained relatively constant. This is despite significantly reduced water availability for the final three years, particularly in the Lower Darling and the Murrumbidgee.

**Figure 13.2: Interzone trade flows in the Southern Connected Basin, 2012-13 to 2019-20 YTD**

![Interzone trade flows in the Southern Connected Basin, 2012-13 to 2019-20 YTD](image)

Source: ACCC analysis based on New South Wales, South Australian and Victorian Government responses to voluntary information requests.

Notes: Intrazone trades excluded, includes all interzone allocation trades in the Southern Connected Basin. U/S = upstream; D/S = downstream. Tributary zones comprise 13, 14, 1A, 1B, 2, 3, 4A, 4C, 5A, 6B. Upstream Murray zones comprise zones 10 and 6; Downstream Murray zones comprise zones 7, 11 and 12. Zero-price trades included. 2019-20YTD = 2019-20 year to 30 November 2020.

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\(^{53}\) ACCC analysis based on New South Wales, South Australian and Victorian Government responses to voluntary information requests. Note that direct comparisons of the number or volume of intrazone trade versus interzone trade is complicated by the face that an increasing proportion of interzone trade is facilitated via trade onto and off intermediaries’ licences. This can occur in a variety of configurations, for example, a series of trades from (i) seller’s account to intermediary origin zone account (intrazone trade), (ii) intermediary origin zone account to intermediary destination zone account (interzone trade) and (iii) intermediary destination zone account to buyer’s account (intrazone trade). Where this occurs, by definition one or more intrazone trade happens for each interzone trade.
For interzone trades into the lower Murray, data reveals an increasing reliance on water allocations traded in from the Goulburn, exhibiting an upward trend since 2013–14 (see figure 13.3). This likely reflects the reintroduction of the Barmah Choke ‘no-net trade’ rule in October 2014\(^{954}\), low water availability in the Murrumbidgee, and the Lower Darling being unavailable for MDBA call-out or interzone trade since December 2017.

**Figure 13.3: Interzone trade flows into the lower Murray by source zone, 2012–13 to 2019–20 YTD**

![Interzone trade flows into the lower Murray by source zone, 2012–13 to 2019–20 YTD](image)

Source: ACCC analysis based on New South Wales, South Australia and Victoria response to voluntary information request

Note: Intrazone trades excluded, includes all interzone allocation trades in the Southern Connected Basin. ‘Goulburn’ includes 1A, 1B, 2, 3, 4A, 4C, 5A, 6B. Lower Murray zones include 7, 11 and 12. Murray above Choke includes zones 6 and 10. 2019–20 YTD = 2019–20 year to 30 November 2020.

For trades between the different lower Murray zones (that is, zones 7, 11 and 12), ACCC analysis shows that the overwhelming direction of trade is to move water allocation from Victorian Murray below Choke (zone 7) downstream to South Australian Murray (zone 12). Examination of the parties involved in these trades shows that, between 2012–13 and 30 November 2019, 94% of trades were undertaken by environmental water holders.\(^{955}\)

Usage data also demonstrates changes in where water is being used, shifting use lower down the Murray

Analysis for the MDBA by consultants Hydrology and Risk Consulting (HARC) shows that, despite drought conditions in many recent years, the total volume of consumptive usage in the zones between the Barmah Choke and the South Australian border has remained relatively constant. However, a greater proportion of this use is being supplied by the ‘call-out’ of water from inter-valley trade (IVT) accounts (a trend backed up by separate ACCC analysis).\(^{956}\) Reduced water availability due to environmental water buybacks and drought years has been offset by increased call out from IVT accounts, leading to consumptive use remaining relatively stable in downstream zones.\(^{957}\)

Water use relative to available water determination volumes has increased significantly in the NSW Murray Below Choke zone, even exceeding 100% in 2018–19, due to the ability to access carryover and trade (see chapter 3, figure 3.33). Figure 13.4 below also represents this change, but examines aggregate changes in water use in zones below the Barmah Choke, and reflects the impact of the delivery of water from tributaries (IVT call-out), on these trends. In figure 13.4, solid lines represent

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955 ACCC analysis based on New South Wales, South Australian and Victorian Government responses to voluntary information requests.

956 The MDBA has the ability to deliver or ‘call-out’ water from IVT accounts to meet water use demands in the Murray.

actual water use as a proportion of total Southern Connected Basin usage, while the dashed lines reflect the proportion of water used if all IVT water had been used in its origin valley. The gap between the coloured and solid lines of the same colour represents the volume of water called out from IVT accounts. The significant and growing gap between the solid and dashed purple lines indicates that IVT has been a significant driver of this increasing proportion of water use below the Choke, though it is likely that water availability has also played a role.

Figure 13.4: Proportion of total use (including environmental water) in the Southern Connected Basin in the Murrumbidgee, the Goulburn and Below Choke, with and without intervalley trade callout, 2012–13 to 2018–19

Source: ACCC analysis based on New South Wales, South Australian and Victorian Government responses to voluntary information requests.

Notes: Assumes all IVT water is called out to zones below the Barmah Choke (Victorian Murray Barmah to SA, NSW Murray Below Choke or SA Murray). That is, it represents the volume of water use that changed valleys as a result of intervalley trade. This data is based on administrative records, which may contain errors or omissions.

13.2.2 Changes are making delivering water more challenging, increasing impacts on other water users and the environment

River operators are contending with changes to water use both in location, due to trade, and in purpose of application; that is, crop type. These changes are rendering historical assumptions about water demand patterns less useful. Figure 13.5 shows that although consumptive use (met from both regional resources and imports) between the Barmah Choke and the South Australian Border during the January to April period has remained relatively static, total usage and delivery through this reach has increased over the last seven years.958

Demand shifting to the lower Murray and increasing reliance by river operators on water from IVT accounts to meet that demand – together with other non-market factors – are increasing the operational challenges for water resource managers and river operators. These changes are contributing to a range of growing stakeholder concerns about the impacts of water trade and associated movement of water. During consultation, MDBA river operations staff indicated they are aware of the growth in trade since the Millennium drought and, in particular, the operational implications of water being traded between valleys. They acknowledged there may be a need for these patterns of water trade to be considered in the guidance framework used for guiding river operations decisions.

River operators and water users increasingly face the risk that even though there may be enough water in the system, it may be unable to be delivered when and where it is needed. This is referred to as delivery shortfall, and this risk has been found to be increasing.

Understanding timing of use is an important component of assessing and managing delivery shortfall risk. There is limited consistent data available about actual time use of, and forecast demand for, water across the Basin. Shortfalls are likely to materialise in days and weeks rather than months, and in certain reaches of the river system rather than the whole river system. To effectively manage shortfall risk, river operators and water managers will need more granular data (see sections 15.3.1 and 16.2.3).

Decreasing Barmah Choke capacity and changes to Goulburn IVT and operational rules are also heightening the challenges for river operators in meeting downstream demand and managing shortfall risk. Further, as environmental watering arrangements have developed, and the volume of environmental water has increased, the changes in delivery patterns resulting from environmental water deliveries has introduced additional complexity to managing river operations.

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Source: Frontier Economics analysis of data used in the HARC report.


Environmental damage associated with interzone water delivery has been observed in the Goulburn, Murray, Edwards-Wakool systems and Murrumbidgee river systems.\textsuperscript{963} Movements of water including to facilitate trade also appear to be placing upward pressure on conveyance losses, which may be one of a number of factors impacting the reliability of allocations, particularly for lower reliability entitlement classes.

As noted in section 13.1.4, climate change is already having an impact on river operations, and is predicted to increase maximum temperatures and the number of hot days, decrease cool season rainfall, snowfall, soil moisture and run off, and increase the intensity of extreme rainfall, time in drought and frequency of severe drought.\textsuperscript{964} All these factors will contribute to future reduced water availability, increased operational losses and increased shortfall risk, exacerbating the challenges for river operators and water users.

### 13.3 Trade and market architecture design are contributing to growing problems

Despite challenges with obtaining robust data (see section 13.5 below), ACCC analysis has shown that under current market settings:

- carryover has the potential to result in third party impacts, though these are likely to not be of a significant magnitude
- proxy storage markets have emerged in the form of trade for carryover parking, reflecting that carryover is tied to entitlements rather than specified as a separate storage right. Due to low levels of trade, this is operating reasonably well. Higher levels of carryover parking may impact trade limits, and could increase the magnitude of any third party impacts not effectively addressed by existing policies.
- IVT limits do not adequately protect third parties from delivery related impacts resulting from trade. A limited number of market participants are also able to circumvent IVT limits using ‘grandfathered tags’\textsuperscript{965}
- IVT limits are becoming more binding (or restricting trade) at the same time, and are expected to continue this trend. When IVT limits are binding, larger and better resourced participants such as agribusinesses and brokers dramatically increase their successful access to trade opportunities at the expense of irrigators.
- delivery related impacts are not well managed by market architecture, including:
  - changing patterns of water use are making the management of water deliveries more difficult and potentially contributing to increased conveyance losses
  - risks of delivery shortfalls are increasing, reflecting unpriced and bundled or uncapped rights to on-river delivery capacity
  - there is a need to better protect the environment, riparian landholders and other water users from the unintended impacts of delivering water throughout the system
- current metering data is not sufficiently timely nor spatially granular for a range of purposes, including for use in modelling and informing river operators’ decisions.

As noted above in 13.1.3, the ACCC has found that the way the market architecture manages the hydrological characteristics of the storages and river systems produces a series of ‘disconnects’ between the time of trade and the actual movement of water, resulting in indirect, less efficient approaches to managing the impacts of trade. This can be seen in:

\textsuperscript{963} Delivery shortfalls occur when actual water usage is higher than it was forecast to be when water was released from the storages, weeks prior, to meet the forecast needs for irrigation and environmental water. MDBA, Managing Delivery Risks in the River Murray System, 2020, p.1; Victorian Department of Environment, Land, Water and Planning, Changes to the Goulburn to Murray trade rule, Consultation paper, 2020, https://s3-ap-southeast-2.amazonaws.com/hdp.au.prod.app.vic-engage-files/9015/8338/7812/Goulburn_to_Murray_trade_rule_review_consultation_paper.pdf, viewed 7 February 2020.

\textsuperscript{964} MDBA, Climate change and the Murray-Darling Basin Plan, MDBA Discussion Paper, pp. 9-10.

\textsuperscript{965} The term grandfathered tags refers to a small number of water access entitlements that are exempt from restrictions on the trade of water allocation within or between two regulated systems, because a ‘tag’ between the systems was established before 22 October 2010. Basin Plan Water Trading Rule 12.23(2) creates this exemption. See section 14.1.7.
trade rules, such as inter-valley trade limits, being used as an imperfect mechanisms for managing all of the impacts of inter-valley water deliveries

third party impacts of water trades that change the location or timing of use (such as environmental damage, delivery risks and conveyance losses) not being appropriately priced into water users’ business decisions

river operations being increasingly challenged by changing patterns of water use occurring in part as a result of trade (in conjunction with other non-market factors).

The ACCC concluded that the Southern Basin’s market architecture may:

- not allocate available storage and delivery capacity efficiently. Market architecture does not always accurately reflect the hydrological realities of the system and does not effectively send price signals to users reflecting the limited storage and delivery capacity and the potential third party impacts of trade, storage and delivery decisions

- increase risks to other water users, river operators or the environment by failing to cost externalities into the market, such as the impact of individual decisions on conveyance losses, delivery congestion and environmental damage

- create distributional impacts, where some market participants are implicitly favoured at the expense of other water users. For example, when holders of grandfathered tags bypass inter-valley trade limits; when well-resourced participants are able to monitor trade openings; in river operators’ decisions to prioritise mitigating delivery risk at the risk of increasing conveyance losses; and in the combined effects of trade and declining inflows on allocations to low reliability entitlements

- not effectively distinguish between beneficial and undesirable trades and so may not efficiently allocate limited opportunities for inter-valley trade to the highest value users. IVT limits have also prevented trades - when restrictions have been in effect because account limits have been exceeded - even though an individual trade might not actually increase spill risk, delivery risk or conveyance losses

- allow inter-valley trade to occur beyond ecologically acceptable limits. For example, IVT limits have permitted trades that have contributed to water deliveries leading to environmental damage, as has been seen in the Goulburn in recent years

- add complexity and uncertainty to the roles and obligations of river operators by providing inadequate consideration of market impacts and guidance on trade-offs between different system operation requirements

- have an overall effect of reducing the net benefits of water trade.

The effective operation of the Basin’s water markets is also significantly hindered by lack of transparent information on market architecture, adequate and reliable data, and coordinated and comprehensive modelling capabilities.

The ACCC considers that many of the market architecture problems identified arise from the simplifying assumptions made in the market design to enable the trade of water rights (see section 13.1.2) and from the characteristics of the underlying property rights. The balance of this chapter and the two chapters that follow set out and explain the basis for the ACCC’s assessment.
13.3.1 The definition of water rights mean prices do not reflect the full costs of trading or using water

Water rights can be defined in many different ways. As outlined in chapter 2, the current approach to defining rights in most regulated systems in the Basin entails specification of a water access entitlement as a share of the relevant water resource, and issuing allocations against these entitlements throughout each water year.

One key feature of this approach is that the right to storage and ongoing right to inflows are combined or ‘bundled’ into water access entitlements, rather than being separately specified. Further, the right to have water delivered to an on-river extraction point has also effectively been bundled in with these rights in most states. In Victoria ‘extraction shares’ have been created though not capped.

On-river delivery infrastructure and storage infrastructure are scarce resources which offer significant value to their users. However, their scarcity is not explicitly signalled to users in current property rights or by market architecture. The lack of adequate price signals due to the lack of separate rights, leads to trades occurring that are not socially desirable. These are inefficient trades because the costs of externalities or third party impacts, such as reductions to the total available water resource, environmental damage or increased delivery risk, are not reflected in the prices of the traded rights to the individual.

Pricing scarce delivery capacity

Water markets in the Basin do not put a price on the scarce and dynamic on-river delivery capacity through which water can be delivered. The right to have water delivered to an on-river extraction point remains bundled with the right to access water, in the form of water entitlements, and is generally assumed there are no restrictions on the time of water delivery within a water year. When demand for delivery capacity (which derives from demand for water at specific locations) exceeds the amount of water that can be delivered, then a water delivery shortfall occurs. This results in broad restrictions on extractions, which act as a mechanism for rationing delivery capacity. In theory, limited delivery capacity could be rationed more efficiently using a market-based mechanism which determines a price for this limited resource.

In Victoria and New South Wales, water users pay charges for the delivery of water that include (or pass through) bulk water delivery charges imposed by the relevant bulk water suppliers (irrigation infrastructure operators also generally impose charges for delivery of water through their networks). However, water users are not required to pay a price for on-river delivery capacity which would vary according to its relative scarcity and increase during times of peak demand. This means there is no direct price signal to encourage water users to adjust their current or planned water use patterns away from times and locations where delivery capacity is scarce.

Many water users have assumed that delivery will continue to be the guaranteed and have made decisions based on this assumption. Note that this can be a rational response by individual growers to current market architecture settings. Providing a price based mechanism for allocation delivery capacity would allow for more efficient long term irrigation development downstream in the lower Murray, as market participants would be able to, and in some instances, be required, to pay to arrange their own delivery. Delivery shortfall risks are covered in section 14.2.2.

Socialising conveyance losses

Similarly, water users do not face the costs that their delivery decisions have on conveyance losses as conveyance losses are currently socialised across all entitlement holders (though impacts are being concentrated on holders of lower reliability entitlements). A decision by one water user to have water delivered in a manner that increases losses can result in a third party impact, in the form of reduced water availability for all water users.

The marginal impact of one individual water use or delivery decision is unlikely to have a significant impact on total conveyance losses in the River Murray System. However, the total aggregate volumes...
of water lost to conveyance due to altered river management to support large volumes of additional downstream delivery may not be negligible under particular seasonal conditions.\textsuperscript{966}

Under the current system for conveyance loss accounting, water users face no incentive to avoid seeking deliveries over longer distances or to seek delivery outside of peak periods. Peak periods usually have flow rates which are higher and weather conditions tend to be hotter and drier, usually increasing losses. The lack of price signals (or other mechanisms) reflecting the varied conveyance losses will likely lead to an increase in total losses and a reduction in total resource availability. This also constitutes a third party impact, the burden of which is most acutely felt by water users with less secure entitlement types. See section 14.2.3 for more detail.

**Environmental impacts of delivery do not have a market cost**

Water users also generally do not face the costs incurred as a result of environmental damage caused by their water delivery decisions. Water delivered to meet downstream demand can result in environmental damage, as seen with the environmental damage in the lower Goulburn from consistently high flows. However, once again, the costs of these impacts are not fed back to water users, meaning they are not incentivised to seek water deliveries in patterns which do not result in damage occurring.

Environmental damage that results from the use of natural river channels for delivery of water is an externality that is not accounted for within the market. Those who benefit from overuse of delivery resources – water users who are receiving water – are not facing the costs of their overuse. As part of the National Water Initiative in 2004, Basin States agreed to implement water pricing and institutional arrangements which give effect to the principle of user-pays in respect of water storage and delivery.\textsuperscript{967} These issues are explained in section 14.2.1.

**Evaporative losses are largely socialised**

The lack of evaporative loss factors attributed to individuals for allocation and some carryover policies also contributes to the imperfect price signals facing water users’ use decisions. Similarly to conveyance losses, individual use and carryover decisions are unlikely to have significant impacts on evaporative losses. However at an aggregate level, decisions to carryover water or leave water in the dam for longer within the water year, will increase the overall level of losses and reduce the available water resources. Where carryover policies do not require water users’ to incorporate the cost of these losses into their use decisions, these users will be incentivised to carryover more water than would be economically efficient, resulting in third party impacts. Ideally, evaporation losses would be applied at a more granular time period and for all water stored including allocated water, however this is not currently able to be done with current market architecture. See section 15.2.4 for more detail.

**Market architecture flaws impact water markets and irrigation development**

The outcomes of these flaws in the water market architecture depend in part on interactions with other factors outside of water markets. For example, expansion in irrigated agriculture in the lower Murray region is a factor of soil types, land values, agricultural zoning laws, relative costs of establishing greenfield irrigation sites versus adapting existing sites, and agricultural commodity prices coupled with an absence of incentives to take into account impacts of water trading and use decisions (see box 13.3).\textsuperscript{968}

These changes in demand coupled with other shifts, and reductions in supply, are leading to an increase in these risks and third party costs. It is important to note that water trading itself does not create these

\textsuperscript{966} Frontier Economics Water market architecture: Issues & option, Input into ACCC market architecture assessment, 2020, pp. 48–49.


\textsuperscript{968} On 11 July 2019, the Victorian Water Minister announced that she would review all works licence applications in the lower Murray, including applications for new works licences and amendments to existing works licences. The conditions relating to extraction share will take into the consideration the cumulative impacts of growing extractions. The effect of this could be to restrict future growth in extraction share in this region: Victorian Minister for water, Minister announces review for works licence applications in lower Murray, media release, 11 July 2019, https://waterregister.vic.gov.au/about/news/273-minister-announces-review-for-works-licence-applications-in-lower-murray-2, viewed 7 February 2021.
issues, but is facilitating changes to water use patterns which appear to be contributing to increased risks and costs.

The above flaws in market architecture may result in distortions to market activity in addition to the direct impact of increased delivery risk, losses and environmental damage, such as:

- inefficient levels of development and use further downstream of constrained and environmentally sensitive reaches. This will likely lead to increasing conveyance losses, delivery risk and environmental impacts, compared with the case when development and use were to occur upstream of constrained reaches
- inefficient levels of investment in crops with use types with inflexible summer or peak demand profiles, compared to investment in crop types with more flexible or off-peak demand profiles
- a relative lack of investment in on-farm storages and other storage solutions, or other tools to manage the threat of a delivery shortfall faced by individual water users.

### 13.3.2 Trade rules struggle to manage impacts because of the ‘disconnects’ between time of trade, use and delivery

Rules governing trade between zones or valleys are generally specified with a view to ensuring the future obligations to supply water users at different locations do not change ‘too much’. This allows them to manage impacts from the ‘on-paper’ movement of water between accounts and between valleys, such as changes in the likelihood and burden of spills from storages.

However, the impacts on the river system generally result from the physical movement through, or extraction of water from, the river system, not the trade itself. Whether, and how substantially, impacts arise is influenced by the timing and flow patterns of water deliveries. This ‘disconnect’ means that existing trade rules have little influence on the timing of water use. As such, they are an ineffective mechanism for managing the physical impacts of water delivery and use (managing inter-valley trade is discussed in section 14.1.)

The ACCC has found issues with how IVT limits are managing interzone trade, which are expected to worsen in the future. Specifically, IVT limits do not directly manage delivery related issues such as environmental degradation, delivery shortfall risk and conveyance losses from trade. These restrictions are ‘blunt’ mechanisms unable to distinguish socially beneficial trades from socially negative trades.

The lack of a separate right or mechanism to allocate delivery capacity has resulted in managing delivery constraints via trade restrictions. This is despite trade not having a direct relationship to when water is used and moved through the system, making trade restrictions an indirect control on delivery and conveyance loss issues, at best. This is discussed further in section 14.1.3.

These issues arise because of the ‘disconnect’ between the timing of trade and the timing of water use and delivery (see 13.1.3). These disconnects in the current architecture add to the complexity of designing rules and other mechanisms which effectively address the impacts of delivery.

### 13.3.3 Interzone trade rules can better address efficiency and equity considerations and operational outcomes

Access to IVT opportunity largely operates on a ‘first come, first served’ basis. Stakeholders have raised concerns that this may favour better-resourced market participants such as brokers, large agribusinesses and investors over smaller irrigators, as these market participants are able to invest more resources to capture this opportunity. These issues are examined further in section 14.1.6.

The effective management of IVT and delivery impacts related to this are also undermined by the presence of ‘grandfathered tagged entitlements’. The exemption awarded to these entitlements (under the Basin Plan water trading rules) allows a small number of water users to capture windfall gains by circumventing closed trade restrictions. Grandfathered tags are considered in detail in section 14.1.7.

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969 Note that this disconnect does not exist for water traded and used by holders of tagged water access entitlements, as water ‘traded’ between these accounts remains in the source valley until the time use.
Taking all these issues together, the ACCC’s view is that there is a need to rethink the current controls and model for interzone trade. Many issues such as delivery shortfall risk, environmental damage and conveyance losses, are more closely linked with timing of use rather than timing of trade. There is a need to reassess when and how water should be allowed to move between zones, and when and how it should be restricted.

13.3.4 Complex, inconsistent policies and requirements across Basin States create confusion

Overlaying a market on top of a natural system, with adequate rules to protect other water users and the environment, will almost inevitably result in complex rules. The state-based nature of a lot of governance arrangements for water and market architecture elements, have resulted in a complex web of policies. There are differences between states’ policies in metering, entitlement, allocation, carryover policies, and IVT rules and other trade limits.

These differences feed stakeholder concerns that market architecture is overly complex and that water users in some Basin States face less stringent obligations than in others. Stakeholders are also concerned that in some states water users could be advantaged through access to arbitrage opportunities (that is, trading to take advantage of rule differences between zones). This occurs in the case of carryover parking trades which take advantage of more favourable carryover provisions in other zones. Carryover parking is considered in more detail throughout section 15.2.3.

Some policy differences are warranted by local conditions or features of state water management laws. However, Basin States should take the opportunity at the time of scheduled reviews (or sooner) to develop more harmonised policies, and simpler, clearer documents. Particularly in trade-connected valleys, this will help improve levels of understanding and confidence in market architecture.

Policies for metering and measurement of take are another example of policy inconsistencies of concern to stakeholders. Specific obligations vary between states, even with recent efforts under the Basin Compliance Compact to harmonise them. Inherent differences between the northern and southern Basin’s hydrology and water markets can justify some ongoing differences in metering obligations. However, the similarities and interconnected nature of the Southern Basin mean long-term differences in metering and measurement-related obligations are difficult to justify.

Stakeholder confusion with market rules and policies can also be partially attributed to the currently dispersed nature of market information. Information can be found across numerous levels of government, government bodies and private information providers. Stakeholders need information about key rules and policies that is easy to access and understand. Basin States and the Australian Government are currently working together to create a centralised information portal to help water users easily find accurate and up-to-date information. This work, along with further analysis of market information is discussed in chapter 11.

The complexities of market architecture and related market elements favour individuals and businesses who are able to commit time to research and understand their intricacies. Brokers help users navigate these complexities, for a fee. Broker conduct is discussed further in chapter 8.

13.3.5 Governance arrangements and decision-making frameworks need to more effectively integrate water trade into water management regimes

Market architecture has evolved with changing trade needs and patterns, but change has not always been coordinated, consistent or timely across all Basin States. Market reforms at both national and state level have been ambitious and far-reaching. Over the last several decades, Basin States have formalised and expanded trade arrangements, introduced carryover policies and created statutory rights to water for the environment, among other measures.

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970 Carryover parking refers to water that has been moved between accounts (either within or between trading zones). This can be between accounts owned by the same person (intraparty), or for carryover parking between accounts with different owners (interparty).
Despite the relevant intergovernmental agreements containing agreed objectives and principles to guide improvements, reforms to facilitate trade haven’t always been implemented consistently across Basin States. Investment in metering technologies is a key example of where Basin States adopted different approaches to delivery agreed policy commitments.

Achieving a harmonised approach in practice is not easy. The system needs timely, informed, expert, coordinated and strategic policy making to design market architecture that can manage changing needs and conditions. Consistent oversight or input into market design and rule-making could promote increased harmonisation of trading rules over time. Governments should consider the benefits in having a market-focused expert institution that is able to analyse and consider market-wide as well as more localised impacts of any proposed rule change and provide advice into rule-making processes. This option is outlined further in chapter 17 in the discussion on establishing a Water Markets Agency.

13.4 Stakeholder concerns with Basin market architecture are growing

The existing market architecture has developed incrementally over a period of around 30 years. Key elements of the existing architecture have been designed with the input and support of stakeholders. For example, the simplifying assumption that trade within zones should be wholly free of restrictions has been long-supported by stakeholders, as has the view that exchange rates should not be applied to interzone trade.\(^{971}\)

However, as the shortcomings of the current market architecture become more apparent, stakeholder concerns about market architecture are growing, and many stakeholders are showing increased willingness to re-examine at least some of the simplifying assumptions, and to re-consider whether existing arrangements are likely to remain fit-for-purpose in the future.

In consultation, the ACCC heard a wide range of views on how the Basin’s market architecture managed the impacts of trade and influenced the opportunity to trade. Stakeholder perspectives on, and concerns with, market architecture differed across the Basin, including between the Southern and Northern Basin, and as concerned different rules, policies and arrangements. The ACCC heard opinions like those of one water user who said:

> The biggest problem is market architecture. [...] The whole way water is set up, tangled up in rules and regulations, it just goes on for ever. And tickets are getting clipped all over the place...How can all these other markets work? Water is a shocker.\(^{972}\)

The diversity of views from stakeholders reflects, among other factors, stakeholders’ differing experiences with the largely state-based legal and policy frameworks governing water management, and the wide range of highly technical matters encompassed by market architecture. The following sections outline common themes identified across market architecture concerns, with more detailed coverage of views relating to particular issues set out in the following chapters.

13.4.1 Stakeholders were concerned about the complexity of market architecture

A number of submissions commented on the complexity of the Basin’s market architecture. This can make it difficult for individual stakeholders to find relevant information, understand key rules and policies, and establish the materiality and main drivers of perceived issues. The complexity also decreases trust placed in institutions and stakeholder confidence that issues are being well-managed.\(^{973}\)

Australian Dairy Industry Council’s submission to the ACCC’s interim inquiry report stated:


\(^{972}\) ACCC post-Interim report consultation with stakeholders, 14 October 2020.

Chapter 12 discusses the need to improve the transparency, availability and understanding of water marker information. Part III of this report covers oversight of the conduct and regulation of market participants, and matters relating to integrity and confidence in the market.

### 13.4.2 Stakeholders raised concerns with the current operation of elements of market architecture

Stakeholders expressed concerns with how particular elements of the market architecture were operating. This included managing the impacts of trade, allocation policies, metering, carryover, deliverability and conveyance losses, intervalley trade restrictions, and tagged trades. Some stakeholders expressed distrust in the allocations process and alleged that New South Wales had changed its policies at the expense of general security entitlement holders. Other issues included managing the impacts of trade, allocation policies, metering, carryover, delivery shortfall and conveyance losses, intervalley trade restrictions, and tagged trades. Among other issues.

Stakeholders were concerned that trade increased the risk of delivery shortfall and conveyance losses, impacting lower priority entitlement users. Some identified that these problems arose because interzone trade rules did not adequately manage the impacts of trade and caused environmental damage. There were also concerns about the rules managing trade opportunities, such as the intervalley trade limits, the equity of access of participants, and support for removal of ‘grandfathered tags’.

In New South Wales particularly, stakeholders had concerns regarding allocation policies. Many expressed distrust in the allocations process and alleged that New South Wales had changed its policies at the expense of general security entitlement holders. Some submitters held the view that allocations were being received later than in previous years. Stakeholders held contested views on carryover, with some wanting it abolished or restricted to productive users only, whereas others saw it as a valuable risk management tool.

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975 ‘Tagged entitlement trading’ is an arrangement to trade water between water sources or trading zones where the water access entitlement continues to be held in the source zone but is ‘tagged’ for extraction in a different source or destination zone. When an allocation announcement is made in the source zone, the purchaser is credited with the volume allocated and can order water for delivery in the destination zone.


concerns about carryover’s impact on other users, particularly low security entitlement holders, through third party impacts. 985

Stakeholders expressed support for improved metering and more telemetry986 and concerns about floodplain harvesting and overland flows in the Northern Basin not being metered.987

13.4.3 Feedback on interim report options acknowledged some problems but showed preferences for incremental reforms

The ACCC’s interim report outlined a range of options for market architecture reform.988 Submissions in response to the interim report largely expressed preferences for making incremental changes to improve operation of existing market architecture over pursuing more significant reforms. One intermediary, Waterexchange, stated that irrigators are weary of water reform and investment decisions have been based on the existing market framework.989 In contrast, investor Argyle Capital Partners supported progressive changes to market architecture, provided they accord with the National Water Initiative Principles and the Basin Plan.989b

Others, like the Murrumbidgee Valley Food and Fibre Association, submitted that the ACCC’s interim report highlighted the poor design of the ‘market architecture’, which was not fit for purpose and open to manipulation.990 Chris Guest submitted that the water market had perhaps had far less reform attention than any other aspect of Basin management:

Reform is well overdue...the Interim Report presents the information and analytical base from which a reform program can be constructed.991

In contrast, Aware Water, an investor, said that at this time, it did not support changes to water market architecture. Aware Water stated that water entitlements were an important asset and it was important to maintain certainty in relation to the features and values of those entitlements, to attract investment into Australian agriculture.992

One representative body, the New South Wales Irrigators Council (NSWIC), submitted that many market architecture problems were likely best addressed through state planning frameworks. They outlined that further investigations and stakeholder consultation would be required on specific reform areas and options. In their view, a staged pathway should be developed; any more-significant proposals should be based on principles of best-practice regulation and include cost-benefit analysis. NSWIC also noted there were differences between the southern, central and northern systems, which must be taken into account in determining the scope of reform options.993


Overall and at a high level, the views expressed by governments and water users can largely be summarised as:

- Many water users advocated fixing current problems through incremental solutions; being wary of major changes and the cost they might entail.\(^994\)

- Basin State governments indicated some willingness to fix what might be seen as already-acknowledged issues, such as concerns with ‘grandfathered tags’ and access to IVT opportunities. Some expressed cautious interest in some more significant reform ideas, such as revised mechanisms for handling and processing IVT applications. There was some wariness of major changes, because of what these might cost to implement and maintain, because they question the need for them, because they consider there are gaps in the information available on the issue to determine their merits, or because of concerns about reform fatigue.

- The Victorian Department of Environment, Land, Water and Planning indicated, in particular, that in recognition of the cost to implement and maintain any further significant reforms, Victoria expected clearly demonstrated benefits to justify the costs of reform. With regard to processing and managing trade opportunities, the Department considered that it was important to look at options to keep up with technological advances in market operations and harness the benefits of modern technology.

- Basin State governments were generally of the view that storage management arrangements, including carryover arrangements, do not need major reform.\(^995\) While many stakeholders value carryover as a risk management tool,\(^996\) a limited number of other stakeholders expressed concern about the potential for third party impacts to arise from specific carryover settings, with some advocating the removal of carryover altogether, or limiting access to carryover to certain users only.\(^997\) On the whole, concern about storage and carryover arrangements was less than concerns about other elements of market architecture.

- There was mixed and cautious interest in considering whether there should be new mechanisms to price and distribute on-river water delivery capacity.\(^998\) However stakeholders are concerned about the costs of further reforms and are unconvinced that significant reforms would be justified.\(^999\)

- Many stakeholders continued to express concerns about the impact of conveyance losses, and commonly supported the introduction of conveyance loss factors on trade to account for these, while others supported alternative measures (such as preventing over bank flows).\(^1000\) Other stakeholders raised questions over the practicality of and justification for loss factors.\(^1001\)

- Many water users and Basin State governments were concerned about how potential changes to market architecture could affect the current definition of property rights for water, and the potential additional complexity significant reforms could introduce to the market.\(^1002\)


How the Basin States and the MDBA manage trade and delivery of water through constrained points like the Barmah Choke and between the Goulburn and Murray Rivers remains of concern. This includes support for removing the exemption for grandfathered tagged entitlements.

The Australian and Basin State governments generally recognised the need for better guidance and resourcing for considering trade and the market’s impacts within water management and river operations decisions, and improvements to the consultation and decision-making processes, when making changes to trade rules.

13.5 Trade is one factor driving changes in the Basin, but assessing the magnitude of trade’s role in changes can be challenging

The current market architecture is operating increasingly inefficiently, with some elements undermining the achievement of the Basin water market and trade objectives and principles. In reaching this conclusion, the ACCC has integrated a wide range of data sources and information to inform its assessment. However, existing water data was not always fit-for-purpose for analysing water market impacts.

Due to a lack of reliable data, the ACCC was unable to identify the precise contribution trade made to aggravating third party impacts such as increasing conveyance losses, environmental damage to river banks, and growing delivery shortfall risk. This lack of data included the absence of comprehensive, real-time water use and location data, and of comprehensive trade opportunities data sets from certain sources: these and other data gaps have contributed to the difficulty of robustly analysing the contribution of traded water to growth in these impacts.

Current water trade arrangements and accounting systems also do not allow water to be ‘tracked’ as it moves through the system (see section 11.5.3). This means that once water has left a zone, it can be effectively ‘mixed’ with other allocated water on a person’s account to be on traded, used or carried over. The ACCC cannot trace when and where traded water is being moved and used, making assigning trade’s role in wider changes in the system difficult. Measures to improve the ability to track water are discussed in section 12.4.4.

The difficulty in identifying and allocating trade’s impact is compounded by the large changes occurring in the river system. The dynamic interactions between, and large changes in, hydrology and climatic conditions, river operation decisions and other environmental factors contribute to the difficulties to assess whether trade has exacerbated these externalities.
14. Managing the impacts of trade and delivery

Key Points

- Intervalley trade (IVT) limits aim to manage the third-party impacts of trade between valleys and are key regulators of allocation trade in the southern Basin. However they are not managing these impacts effectively.

- IVT limits have become increasingly binding in recent years, a trend which is anticipated to continue. This is contributing to price differences between valleys, and reflects that there may be more demand for intervally trade than can be met under current arrangements. This raises the question of whether current settings are optimised to maximise the value of intervally trades by allowing efficient, and restricting inefficient, trades.

- Trade rules could better align with changing system conditions, be more equitable and better able to maximise trade within physical constraints and environmental tolerances.

- Environmental damage is occurring, particularly in the Lower Goulburn, as large volumes of water from IVT accounts have been delivered at consistently high flow rates – a cost not borne by the beneficiaries of these water movements.

- ‘First-in, first-served’ queueing systems for administering access to intervally trade opportunities are likely not the most efficient mechanisms and have resulted in large market participants investing in information technology systems for lodging quick trade applications in order to get to the front of the queue.

- ‘Grandfathered’ tagged water access entitlements are exempt from allocation trade restrictions. This provides a small number of market participants an inefficient and inequitable ‘loophole’ to circumvent trade limits.

- Delivery infrastructure is becoming increasingly congested and the risks of shortfalls are increasing as demand patterns and system operations change. Meanwhile, strategies for managing an actual shortfall are not well established or communicated.

- The guidance to river operators provides little direction over how river operators should manage conflicting objectives, such as delivery risks, conveyance losses and environmental damage, while also not effectively integrating water markets and water management.

- Interzone trade rules and the operational arrangements for managing water delivery arrangements are failing to adequately accommodate users’ different delivery needs, pointing to the need for better integration of trade and delivery arrangements for environmental water, and water markets.

This chapter examines issues associated with managing the impacts of interzone and intervally trade (IVT) and delivery of traded water.

14.1 Understanding the issues with interzone and intervally trade

Water markets aim to move water to its highest valued use. To achieve this, trading rules allow the location of water use to change, including through trade between zones, valleys and even rivers, where hydrological and water supply considerations permit, it and the impacts on other water users and the environment can be managed.

There are some concerns with how the market architecture currently manages trades between valleys and their potential impacts. These relate to how efficiently and effectively the intervally trade rules manage the movement of traded water and associated impacts and trade opportunities.
### 14.1.1 Interzone and intervalley trade limits are key regulators of allocation trade

Interzone and IVT rules are a major factor in determining where and when trade can occur at a given time and in influencing arbitrage opportunities. These trade rules limit the volume of water than can be owed to the destination valley, to manage third party impacts (discussed in subsection 14.1.2). They are therefore significant influences on trade and price differentials in the Southern Connected Basin.

Allocation trade between valleys works by moving water from the source valley to the destination valley through a series of water accounting adjustments at the individual account and bulk level (figure 14.1 shows a map of trading zones in the Southern Connected Basin). River operators and trade approval authorities use IVT accounts to track the water owed, and delivered, between valleys to seek to ‘ensure there is sufficient supply as a result of a sale to meet the purchaser’s demand’.\(^{1006}\) Water in IVT accounts is available for delivery or ‘call-out’ by the MDBA, to be used to meet water demands in the Murray.

**Figure 14.1: Interstate trading zones, Southern Connected Basin**


In the Southern Connected Basin, IVT and interstate trades are the subject of joint management and oversight through arrangements set out in Schedule D of the Murray-Darling Basin Agreement (and supported by various protocols).

As the river operator in the Murray, the MDBA maintains the IVT accounts, administers the Barmah Choke trade balance, and directs the call out (or ordering) of water. Basin States and intergovernmental protocols set limits on maximum (and minimum) IVT account balances (see table 14.1). As restrictions on trade, these rules must comply with the Basin Plan water trading rules. When the limit is reached,

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trade halts until the balance owed reduces to a specified level. Basin state trade approval authorities manage the processing of allocation trades between states and valleys.\textsuperscript{1008}

IVT account balances:

- increase when water is sold from the upstream valley to the downstream valley, representing a net future obligation on the valley. This occurs whether or not the water has physically left the dam or water source for use by the individual.
- increase due to legacy entitlement trades. Legacy entitlement trades were abolished in 2007, but involved ‘converting’ a traded entitlement by cancelling it in the source valley and reissuing it in the destination valley with an exchange rate applied\textsuperscript{1009}
- reduce when the net amount of water owed is reduced, such as when the operator of the Murray River, the MDBA, ‘calls out’ or orders water to meet downstream demand; or water is ‘back traded’ upstream into the IVT account valley.

### Table 14.1: Allocation trade limits within the Southern Connected Basin

<table>
<thead>
<tr>
<th>Limit name</th>
<th>Rationale</th>
<th>Trade limit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Barmah Choke</td>
<td>The Barmah Choke is a narrow stretch of the Murray, which has a limit ‘to protect water delivery to existing entitlement holders and for environmental reasons’.\textsuperscript{1010}</td>
<td>No net trade allowed downstream</td>
</tr>
<tr>
<td>Murrumbidgee IVT limit</td>
<td>The 0 GL limit is so that the Murray cannot owe water to the Murrumbidgee, as a negative balance would require water to be delivered upstream into the tributary to clear the valley account. The 100 GL limit represents approximately 5% of general security allocations in the Murrumbidgee system and is viewed as an acceptable level of risk to third parties, particularly conveyance losses.\textsuperscript{1011}</td>
<td>0–100 GL (following closures, trade opens at 15 GL and 85 GL)</td>
</tr>
</tbody>
</table>


\textsuperscript{1009} Approximately 100 GL of water shares were cancelled in the Goulburn and re-issued in the Murray, including some traded to South Australia. There is also 40 GL of water in the Goulburn for environmental flows in the Snowy and Murray rivers. Up to 140 GL of water entitlement in the Goulburn system is owed to the Murray system. This water needs to be delivered to the Murray every year. This is discussed in more detail here: Victorian DELWP, Changes to the Goulburn to Murray trade rule, 2020, available at https://engage.vic.gov.au/download_file/26084/3373.


<table>
<thead>
<tr>
<th>Limit name</th>
<th>Rationale</th>
<th>Trade limit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Goulburn IVT limit</td>
<td>The limit is needed to protect Victorian Murray water entitlements stored in dams and prevent the volume of trade adversely affecting storage levels (spill risk).</td>
<td>200 GL Trade from the Murray and other main tributaries are limited to back trade only, effectively limiting trade from downstream to prevent water being owed from the Murray to the Goulburn.</td>
</tr>
<tr>
<td>Lower Darling</td>
<td>Trade is only allowed when the lower Darling is connected to the Southern Connected Basin, and under MDBA control to ensure traded water can be delivered from the Lower Darling.</td>
<td>MDBA gives control of Menindee Lakes to New South Wales when the total storage volume falls below 480 GL. Control reverts back to the MDBA once storage levels rise above 640 GL.</td>
</tr>
<tr>
<td>Interstate trade limit</td>
<td>Victoria has imposed a general limit on trades from New South Wales into Victoria to prevent spills. Victoria considers these rules provide a safety net to 'avoid the need for future sudden trade suspensions that affect how people can manage their water'.  This is to help manage dam capacity constraints.</td>
<td>This limit operates in two parts: First, trade into Victoria is not permitted if Victoria's share of Hume and Dartmouth Dams has a risk of spill of 50% or more. Second, total trade from New South Wales into Victoria is limited to 200 GL per year.</td>
</tr>
</tbody>
</table>

14.1.2 Limits on interstate and intervalley trade aim to manage third party impacts of trade

Rules limiting trade interstate, intervalley and through the Barmah Choke are designed to manage the operational issues associated with moving water between valleys and the potential impacts of these transfers on other water users. Some potential impacts which are supposed to be managed by rules on interzone trade can include:

- **spill risk** – the limit reflects that water traded out ‘on paper’ still physically sits in the origin valley and takes up airspace in the storage. In a wet year, this water can potentially displace (that is, prevent the storage of) inflows that would otherwise be allocated to origin valley (or, in the case of the interstate trade limit, Victorian) entitlement holders in the following year.
- **delivery risk** – the physical capacity of the river channel constrains how much water can be delivered within a period of time. If too much water has been pledged to other regions via trade, river operators may not be able to supply adequate water at the time and place it is needed (discussed in subsection 14.2.2)
- **conveyance losses** – depending on prevailing conditions, when water is traded downstream to a zone beyond the water source, such as beyond the long reach of the Murrumbidgee River, more water may be lost to evaporation or seepage as the traded water is called out to meet demand and flows through the river system. Losses can impact the pool of consumptive water available for allocation (discussed in subsection 14.2.3).

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1013 ‘Back trade’ means a transfer from one trading zone to another trading zone, being a transfer that is no greater in volume than the net volume of preceding transfers between the same trading zones in the opposite direction and the volume available in the relevant valley account, as defined in Schedule D – Permissible Transfers protocol.
1014 Schedule D – Permissible Transfers protocol.
1015 Schedule D – Permissible Transfers protocol.
1016 Schedule D – Permissible Transfers protocol.
environmental damage – large amounts of water moving through river systems over long periods of time, particularly out of line with seasonal patterns, can cause bank slumping, erosion, loss of vegetation and negative impacts on the river environment (discussed in subsection 14.2.1)

14.1.3 Intervalley trade limits do not cap how much water can be traded and do not adequately manage issues related to timing of use

IVT limits do not cap the amount of water that can be traded or delivered from one valley to another, nor control or track time of use. In some years the large volumes delivered between valleys far exceed the volume of the IVT account balance limit. Figure 14.2 demonstrates the substantial volumes of call-out from, in particular, the Goulburn IVT account in recent years, and reveals that call-out volumes can far exceed the volume of trade limits. Concern over the environmental damage associated with the high volume and the pattern of this call-out is discussed in subsection 14.2.1.

Figure 14.2: Volumes of call-out from intervalley trade accounts, 2012-13 to 2019-20

The inability of the current regime of IVT restrictions to cap the total volume of water delivered from an IVT account also means that they are an ineffective mechanism for managing conveyance losses associated with delivering this water through the source valley. Conveyance losses are discussed in more detail in subsection 14.2.3.

The way market architecture manages the hydrological characteristics of the system produces a series of ‘disconnects’ between the time of trade and the physical movement of water. This is why trade rules, such as intervalley trade limits, are an indirect, less efficient approach to managing the impacts associated with the delivery and use of water. While conveyance losses and environmental damage are linked to the timing and patterns of physical water delivery (rather than the time of trade), IVT limits operate by restricting trade itself, while delivery patterns are determined by river operations decisions regarding call-out of water from IVT accounts.
14.1.4 Intervalle trade restrictions have been limiting trade at the same time more frequently

IVT limits for trade into the Murray below Choke are increasingly ‘binding’ at the same time. An IVT limit is binding when trade is closed due to the limits being reached; meaning that market participants cannot trade between valleys for increasingly extended periods. In 2019–20, trade into the Murray from the Goulburn and Murrumbidgee, as well as from upstream to downstream of the Barmah Choke were all binding simultaneously for an extended period for the first time. This is shown in figure 14.3.

Figure 14.3: Occurrences of binding trade limits, Southern Connected Basin, 31 July 2012 to 30 June 2020

Source: ACCC analysis based on MDBA and NSW, Victorian and SA governments’ responses to voluntary information requests.

Note: First Goulburn trade restriction data point is 20 November 2012, and for Barmah Choke it is 31 October 2014. Barmah Choke ‘closure’ is defined as account balance is less than 10 ML. Murrumbidgee closures from 31 July 2012 are calculated from intervalley trade account balance data. For 2019–20 water year, daily data for this account did not accurately capture IVT closures, so these were manually corrected. It is possible other such discrepancies exist for previous water years. Chart incorporates changes to Murrumbidgee IVT limit operation over time.

Frontier contends that limits can be expected to be reached earlier each year (assuming underlying conditions remain the same), as irrigators will be incentivised to trade earlier in the season, if limits are consistently reached.1018 Research by the Australian Bureau of Agricultural and Resource Economics (ABARES) has also concluded trade restrictions are likely to be more binding in future.1019

Compared with total Basin water volumes, the amount of water moved between valleys in this manner remains small.

Greater Goulburn (zone 1a) and Murrumbidgee (zone 13) have experienced prolonged periods of significant divergences from Southern Connected Basin average prices in recent years. Figure 14.4, below, further demonstrates that trade restrictions binding concurrently is a relatively recent phenomenon in the Southern Connected Basin, while also revealing the impact of this on allocation trade prices. Where the price series is above 100%, this means that the average price of allocations traded in the below Barmah Choke zones is above the Southern Connected Basin as a whole, and vice versa. Prices below the Choke are more likely to be above the average Southern Connected Basin prices, and rise when all three restrictions are binding, a trend particularly evident in the second half of 2019. This is due to higher demand in Below Choke regions.


At a time of scarce supply and strong demand in late 2019, average water-allocation prices across the New South Wales, South Australian and Victorian trading zones below the Barmah Choke were up to $330 per ML higher than Goulburn-zone prices and $210 higher than Murrumbidgee prices. This compares with an estimation by market intermediary H2OX that the volume-weighted average price of water allocations in the Southern Basin since mid-2007 has been about $180 per ML.

**Figure 14.4:** Timing of combined intervalley trade restrictions compared to average trade price for water allocations below the Barmah Choke, 1 July 2012 to 29 November 2019

![Diagram showing the timing of combined intervalley trade restrictions compared to average trade price for water allocations below the Barmah Choke, 1 July 2012 to 29 November 2019.](image)

Source: ACCC analysis of Basin State information request responses.

Note: Trade restrictions include Goulburn and Murrumbidgee intervalley trade limits and the Barmah Choke trade restriction.

- First Goulburn trade restriction data point is 20 November 2012, and for Barmah Choke it is 31 October 2014.
- Barmah Choke ‘closure’ is defined as account balance is less than 10 ML.
- Murrumbidgee closures from 31 July 2012 are calculated from intervalley trade account balance data. For 2019–20 water year, daily data for this account did not accurately capture IVT closures, so these were manually corrected.
- It's possible other such discrepancies exist for previous water years.
- Chart incorporates changes to Murrumbidgee IVT limit operation over time.
- Daily average price for ‘Below Choke’ zones (zones 7, 11 and 12) and Southern Connected Basin (all zones) price series derived using ABARES GAM methodology.[1][1020] Excludes zero dollar trades. Price differentials of <0.2 and >1.8 are excluded. This figure shows price differentials for the Below Choke zones as a percentage of the Southern Connected Basin (all zones) average price. For example, on 16 November 2019, average prices in Below Choke zones were 143% of the Southern Connected Basin (all zone average price).

As noted in subsection 3.3.2, the ACCC considers that, while the overall objective of water markets is not to achieve a single price across the whole Southern Connected Basin, sustained pricing differentials between zones, combined with data on the volume of interzone trades that are refused, indicate that there is more demand for intervalley trade than is able to be met under current intervalley trade arrangements. This gives rise to the question of whether current settings governing intervalley trade are optimised to maximise the value of intervalley trades by allowing efficient and restricting inefficient trade, within system constraints.

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14.1.5 Dynamic intervalley trade limits may better reflect river system constraints

Given the potential impacts on the price of water due to IVT closures, IVT limits should only be binding when necessary. Dynamic limits that change with changing system conditions would be better at restricting potentially harmful trades while allowing beneficial trades.

These dynamic limits may help incentivise trade to occur at times when there are fewer impacts on the river system, and reduce trade when there are negative impacts on the river system. For example, lowering the IVT limit during summer, when high unseasonal flows create more damage in the river system, may help reduce the amount of water owed and required to be delivered.

IVT limits could be improved by better aligning the rules with the risks that they are meant to manage. While changes to directly address issues of environmental damage and conveyance losses are complex, incremental changes to the current accounting and water trading system may help to lessen the impact of some of these issues. Options for what this could involve are explained in subsection 16.2.5.

The Victorian Government is currently considering alternatives the current IVT limit mechanism through the Goulburn to Murray trade rule review, discussed in in box 14.1.

**Box 14.1: The Goulburn to Murray trade rule review**

The Goulburn suffered environmental damage in 2018 and 2019 due to high volumes of water traded and called out. This prompted the Victorian Government to investigate whether changes were needed to inter valley trade limits to better protect the river and better reflect the natural constraints of the system.

The options the Victorian department are considering include:

- an annual, capped limit
- a dynamic rule. This operates as a two part rule:
  - the first part early in the season works similarly to the current IVT limit which can be drawn down as water is delivered
  - the second part would work similar to an annual limit which caps tradeable volumes for the rest of the year based on what can be delivered
- seasonally-based rule. This operates as a two part rule:
  - the first part allows the use of water from a tagged account from the Goulburn to Murray during spring, late autumn and winter
  - the second part works similarly to an annual limit, capping tradeable volumes for the rest of the year to what can be delivered.

The Victorian Government also introduced interim measures, including a cap of 40 GL per month on call-out of water inter valley accounts during summer. Both these interim measures and the introduction of the longer term alternative options, which are currently proposed to commence in July 2021, have the potential to significantly influence trade opportunities and access to water in the Southern Connected Basin (see subsection 14.2.2).

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14.1.6  Current ‘first-in, first-served’ trade processing is inefficient and is creating an ‘arms race’ for submitting applications faster

Services for processing inter-valley trade applications operate on a ‘first come, first served’ queuing system. This has prompted a technological ‘arms race’ between a limited number of market participants who have the expertise and resources to use digital technologies to help ensure they are at the ‘head of the queue’ and able to capture the majority of benefits from inter-valley trading opportunities. This issue has gained the nickname of the ‘fastest-finger’ problem. The systems and registry related aspects are further discussed in subsection 10.2.4.

For example, recent MDBA analysis found that, for trading across the Barmah Choke:

Since early September, most trades from Up to Down [above to below the Choke] occurred within 2 minutes of trade opportunity becoming available.

In one instance, the entire 14.5 ML of trade opportunity was taken up by one trade two minutes after opening.

The ACCC has examined data on who is gaining access to inter-valley trade opportunities during those constrained periods, to investigate concerns that there are just a few market participants who are gaining the bulk of these opportunities. This is not illegal behaviour, although the ACCC has concerns about equity of access to IVT opportunities.

Analysis of Goulburn IVT trading data, included in figure 14.5, shows who gets access to trading opportunities when the IVT opportunity is open for less than 24 hours, compared to periods where it is open for longer. This analysis indicates that the share of the IVT capacity that irrigators won was reduced by half when the IVT opportunity was limited (33% to 16%), with agribusiness’ and brokers’ shares significantly increasing (15% to 25% and 5% to 29%, respectively). This suggests that the ‘first in, first served’ approach does favour better resourced market participants, when IVT capacity is constrained. The ACCC was unable to conduct a similar analysis for Murrumbidgee IVT opportunities due to the lack of granular data on the timing of opening and closing of the IVT.

Figure 14.5:  Proportion of Goulburn inter-valley trade opportunity captured by different types of water users when restrictions are open for more than and less than 24 hours (November 2012 to September 2019)

Source:  ACCC analysis based on NSW, Victorian and SA governments’ responses to voluntary information requests.
Note:  Excludes a small number of transactions where the buyer and seller are unknown. EWH refers to Environmental Water Holders, IO refers to Infrastructure Operator.
Current IVT accounts and restrictions use a queueing system to allocate out capacity for trade. Allocating out capacity using a queuing system is inefficient as:

- it does not facilitate the scarce intervalley trade opportunity being allocated to those who value it most; but rather to whoever has the ‘fastest finger’
- it results in incentives for socially wasteful expenditure to capture the trade opportunity, such as investments in technology for monitoring trade opportunities or lodging quick trade applications.

There was widespread concern in written submissions in response to the Inquiry Interim Report that IVT operation is not transparent and may be unfair or inequitable. For example, Lislea Lodge expressed concerns about ‘unfairness or uneven transparency’ in the current IVT arrangements.1022 South Australian Irrigation Infrastructure Operator Central Irrigation Trust wrote ‘the IVT transfer process needs to be more equitable to all market participants through mechanisms such as a ballot’.1023

For the reasons described above, the ACCC recommends that New South Wales and Victoria implement a new way of allocating out the available trade capacity. The ACCC recommends the use of market-based mechanisms for allocating the capacity for trade through IVT restrictions and the Barmah Choke. This is likely to be more efficient, as well-functioning market-based mechanisms will allocate the capacity to those who value it most. Gaining access to these opportunities allows parties to purchase water in one zone and sell it in another. It can be expected that market forces would value this right at the price difference between the source and destination trading zones. Doing so would also eliminate the fastest finger problem by allocating IVT opportunity to those who are willing to pay for it, rather than those who are fastest at submitting applications.

Further detail on this proposal, and discussion of alternatives such as a ballot, appear in the subsequent chapter of this report, in subsection 16.2.5.

14.1.7 ‘Grandfathered tags’ undermine the effectiveness of intervalley trade limits

‘Tagged entitlement trading’ is an arrangement for trading water between water sources or trading zones where the water access entitlement continues to be held in the source zone but is ‘tagged’ for extraction in a different source or destination zone. When an allocation announcement is made in the source zone, the purchaser is credited with the volume allocated and can order water for delivery in the destination zone.

The term ‘grandfathered tags’ refers to a small number of water access entitlements that are exempt from restrictions on the trade of water allocations within or between two regulated systems, because a ‘tag’ between the systems was established before 22 October 2010. Basin Plan Water Trading Rule 12.23(2) creates this exemption.1024

The currently available data on grandfathered tags is complex and contradictory. Different data sources show different numbers of grandfathered tagged entitlements. It appears that, as at December 2020, there were: five remaining interstate grandfathered tags – all New South Wales to Victoria or South Australia; none from Victoria to New South Wales or South Australia; and 16 intrastate tags in Victoria. Note the Victorian tags are tagged accounts rather than water access entitlements, so these may have multiple water access entitlements attached to the account. New South Wales did not provide data to the ACCC on intrastate grandfathered tags, and these tags are not included on the New South Wales public water register.1025

1024 Rule 12.23(1) of the Basin Plan Water Trading Rules, contained in the Basin Plan 2012 (Cth), provides, in simple terms, that delivery of water under tagged water access entitlements is subject to the same restrictions as trades of water allocations between the two locations relevant to the tag. The purpose of this rule is to ensure that water made available through a tagged water access entitlement is not treated differently to water made available through the trade of water allocation. However, rule 12.23(2) states that rule 12.23(1) does not apply to tagged entitlements established before 22 October 2010. The 22 October 2010 date relates to when the MDBA indicated its intention to propose a rule of this kind, in Volume II of the Guide to the Basin Plan.
New South Wales reported a number of tags established between Queensland and New South Wales; (however, Queensland does not record these arrangements as tagged trades). The effect of Basin Plan water trading rule 12.23 is immaterial to interstate trade arrangements between Queensland and New South Wales as there are no restrictions exist on allocation trade between New South Wales and Queensland in the Border Rivers water source, which is the only Northern Basin water source in which tagging currently exists.\textsuperscript{1026}

The ACCC has identified that the owners of the handful of grandfathered tags established for interstate trade in the Southern Connected Basin include an irrigation infrastructure operator and substantial locally and internationally owned agribusinesses.

Table 14.2 below features data on the use, by volume, of grandfathered tag Water Access Entitlements, excluding tags in the Northern Basin, in GL. Note that as the ACCC has been unable to analyse usage occurring under intrastate grandfathered tags in New South Wales, figures representing the magnitude of usage are likely to be at the low end of the scale.

**Table 14.2: Usage of water allocation available under grandfathered tags (GL)**

<table>
<thead>
<tr>
<th>Years</th>
<th>Victoria</th>
<th>South Australia</th>
</tr>
</thead>
<tbody>
<tr>
<td>2008–09</td>
<td>0.26</td>
<td>0.00</td>
</tr>
<tr>
<td>2009–10</td>
<td>7.16</td>
<td>0.25</td>
</tr>
<tr>
<td>2010–11</td>
<td>14.35</td>
<td>0.00</td>
</tr>
<tr>
<td>2011–12</td>
<td>6.06</td>
<td>0.00</td>
</tr>
<tr>
<td>2012–13</td>
<td>19.23</td>
<td>0.00</td>
</tr>
<tr>
<td>2013–14</td>
<td>25.39</td>
<td>0.00</td>
</tr>
<tr>
<td>2014–15</td>
<td>31.86</td>
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<td>2015–16</td>
<td>25.10</td>
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<tr>
<td>2016–17</td>
<td>32.22</td>
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<tr>
<td>2017–18</td>
<td>33.27</td>
<td>0.00</td>
</tr>
<tr>
<td>2018–19</td>
<td>0.28</td>
<td>0.00</td>
</tr>
<tr>
<td>2019–20 YTD</td>
<td>27.73</td>
<td>0.00</td>
</tr>
</tbody>
</table>

Source: ACCC analysis based on Victorian and SA governments’ responses to voluntary information requests.

Note: YTD = 2019–20 year to 30 November 2019. This data covers the five interstate grandfathered tags (originating in NSW, used in Victoria or SA), plus the grandfathered intrastate tags in Victoria. No data is shown for NSW because the ACCC is not aware of any grandfathered interstate tags established for use in NSW, and NSW did not provide data on intrastate tags.

The exemption means holders of a grandfathered tag can order water for delivery even when a restriction, such as the Barmah Choke restriction or the Murrumbidgee intervalley trade limit, restricts allocation trade from the source to the destination valley. The implications of this are:

- grandfathered tag holders may be able to move water\textsuperscript{1027} between valleys when such opportunities are not available to other users (see figure 14.6 below)
- use of water under grandfathered tags can cause IVT account balance limits to be exceeded in real terms, as the exempted delivery is not counted for the purposes of trade limits. This can undermine the limits effectiveness and market confidence in them.

IVT account balances are credited or debited (depending on the direction of the tag) at the time water available under the tag is ordered for usage. Given that this timing is known to the person making the order, this creates the opportunity for that person to strategically time their tagged usage to create, or close, trade opportunities, and to capture the benefits of trade openings. Since trade applications are currently assessed on a ‘first come, first served’ basis, a person with knowledge of the timing and size of a trade opportunity (which they themselves created by their tagged usage) is best-placed to submit a trade application for the right volume, and at the right time, to successfully capture that opportunity.

\textsuperscript{1026} ACCC analysis based on New South Wales and Queensland governments’ responses to voluntary information requests.

\textsuperscript{1027} Water movement is for usage, not for further trade or carryover.
The ACCC’s analysis of trade and usage data for the period October 2014 to October 2019 indicates that this is indeed occurring in practice. Although this conduct may not breach any current laws, concerns include that any party undertaking such activity has an advantage over other market participants in knowing when it would trigger the ‘opening’ for potentially lucrative arbitrage opportunities.

Figure 14.6 shows this phenomenon occurring. In recent years, the transactions that are increasing the Barmah Choke trade account balance are increasingly tagged upstream usage (shown in yellow), rather than upstream trades (shown in teal). In particular, increases (credits) driven by tagged use were very significant in early 2018 and again in late 2018. These usage credits were then generally followed by decreases (debits) due to downstream trade (shown in purple).

**Figure 14.6: Influence of different transaction types on the Barmah Choke trade account balance, 30 October 2014 to 12 December 2019**

Source: ACCC analysis based on NSW, Victorian and SA governments’ responses to voluntary information requests

Note: Gaps in data series occur at 1 July each year when the Barmah Choke trade account balance is reset to zero.

ACCC analysis of the use of grandfathered tags in Victorian zones found that tagged usage was more likely to occur during periods when the Goulburn IVT limit was binding. The ACCC has not compiled comparable figures for the Murrumbidgee because of the lack of sub-daily time series data on Murrumbidgee IVT closures.

However, publicly available information supported by ACCC consultation indicates New South Wales intrastate tags do affect IVT account balances in this state. The Murrumbidgee IVT account balance has been observed to go into the negative as a consequence of use of water under a grandfathered tag from the Murray to the Murrumbidgee. This creates third party impacts, such as increased delivery risks for water users in the Murrumbidgee as water cannot be delivered upstream from the Murray into the Murrumbidgee.

The ACCC recommends that the Australian Government remove the exemption that so-called ‘grandfathered tags’ enjoy from restrictions on delivery of water when allocation trades between 2 regulated systems are restricted. This is because it enables a limited number of licence holders to circumvent the operation of inter-valley trade limits, undermining confidence in the limits and their effectiveness. In this way, the exemption can impose detriment on other entitlement holders and the environment, with holders of these entitlements awarded a windfall gain not available to others in the basin.

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1029 Negative balances in the Murrumbidgee IVT account balance were observed twice in 2014, and then from April to November 2018 (reaching a balance of -17.6 GL) and again in early 2019. ACCC analysis based on NSW Government’s response to voluntary information request.
market. While the current arrangements for managing intervalley trade remain in place, all market participants should face the same rules for moving water between valleys.

Further detail on potential pathways for enacting this proposal appear in subsection 16.2.7. This includes noting the most direct avenue to effect this recommendation, by amending Basin Plan Water Trading Rule 12.23, as well as recommending that Basin States consider whether all water entitlements for which grandfathered tagging has been claimed are, in fact, entitled to the benefit of Rule 12.23(2). Separately, 16.2.7 also includes discussion and recommendations relating to alternative mechanisms Basin States should consider for allocating the capacity for interzone and intervalley trade.

14.2 Understanding the delivery-related impacts of traded water

The ACCC’s focus in this section is on the impacts of trade on water deliveries managed ‘on-river’ by river operators, rather than deliveries to ‘off-river’ users (located within an irrigation network). Off-river delivery is managed by the relevant irrigation infrastructure operator (IIO), largely relying on ‘water delivery rights’ (known as delivery shares in Victoria or as delivery entitlements within some IIOs) to allocate the available delivery capacity. The ACCC discusses the feasibility of developing a similar regime of on-river delivery rights in 16.2.3.

The ACCC is aware of stakeholder concerns about water delivery rights within IIOs, including concerns relating to continued expansion and issuing of additional delivery rights by IIOs and transparency of policies, rule changes and trade information regarding water delivery rights. The ACCC has not been able to consider in detail the market architecture issues relating to delivery rights within IIOs networks, though has been aware of the apparent issues in these schemes in considering the feasibility of developing a similar regime of on-river delivery rights (see in 16.3.2). Chapter 9 considers regulation of conduct by parties including IIOs.

As with other chapters in Part 5, this section is largely focused on the Southern Connected Basin, as it is here that the challenges of managing the delivery of intervalley trade involving tributaries arises almost exclusively.

As outlined in chapter 13, the ACCC has concerns that the full costs of the delivery of water within the Southern Basin, including environmental damage, conveyance losses and the risk of delivery shortfalls, are not effectively reflected back to water users, and so are not being properly priced or incorporated into their water use decisions. As a result, water users are not incentivised to make optimal decisions about water use, storage or trade, and trades are occurring which generate private benefits for the individuals making them but which are not ‘socially beneficial’ because of the externalities being borne by other water users and the environment.

Quantifying the contribution trade makes to increasing delivery risk, conveyance losses and environmental damage is complex as such impacts are dynamic, being heavily tied to broader operational decisions, timing of use and dependent on the prevailing river conditions. However, it is clear that trade has enabled changes in demand for water that are exacerbating the impacts of moving water through limited channel capacity points. As noted in subsection 3.3.1, the ACCC has found that carryover and trade are interacting to allow concentration of water use in particular places, at particular times, for particular uses.

ACCC analysis found conflicting evidence on whether water trade and observed changes in irrigation patterns are driving ‘peakier demand’ (that is, concentrating water use in smaller time periods).


Regardless, the significant additional horticultural plantings (particularly almonds) observed in the Lower Murray in recent years will continue to mature, increasing their water demands during peak irrigation periods which will likely continue to drive increased peak demand.\textsuperscript{1032} Aither has stated that the ‘flexibility’ of water demand will decrease, meaning there will be less ability to reduce demand at times of high delivery risk:

As growth in permanent horticulture increases, a greater proportion of irrigated agricultural water demand in the connected Murray will come from industries with fixed rather than flexible water demands as well as industries with a higher willingness to pay for water.\textsuperscript{1033}

Despite some information gaps, it is generally accepted that delivery risk appears to be increasing with trade and that river operators’ decisions to avoid delivery shortfalls can increase conveyance losses, though the impact of trade on losses is still unclear.\textsuperscript{1034}

The ACCC considers that there is a range of short term measures Basin states can take to address the most immediate concerns relating to the delivery of water, such as finalising shortfall management plans, improving information on risks to users, reviewing river operations guidance materials to be more holistic and to better incorporate trade, and strengthening measurement and modelling capability to better understand issues.

To properly address the underlying flaws in market architecture relating to delivery, long term investigation of significant reforms should also be pursued. There are limited opportunities for smaller step changes to address these underlying flaws, but the ACCC has not been able to conclusively determine whether the substantial, disruptive and costly reforms to the market architecture would be justified, or proportionate to the magnitude of the problem driven by trade.

\textbf{14.2.1 Detrimental environmental impacts of water deliveries are not being adequately managed}

As stated above, the delivery of water in the Basin can cause environmental damage. This is most likely to occur when large volumes of water are transferred at high and consistent flow rates for extended periods of time, during periods of increased environmental sensitivity. The impact of this can include erosion and bank instability. In recent years, this kind of environmental damage has occurred in a number of reaches throughout the Southern Basin.

Not all these impacts result from trade, though trade can facilitate changes to water use and delivery away from historical patterns. In this way, trade can contribute to externalities, such as the damage to the environment that can arise from water volumes delivered downstream of constraints or in excess of seasonally appropriate volumes and flow rates, or through poorly timed or unauthorised flooding of private farmland. Trends in volumes of trade between valleys and changing patterns of water use are discussed in subsections 3.3.1 and 13.3.4.

\textbf{Goulburn River system}

As discussed in box 14.1, environmental damage has occurred as a result of intervalley trade delivery through the Lower Goulburn. The Goulburn to Murray trade rule review acknowledged recent demands on the Lower Goulburn had been too great, and the record volumes of IVT delivery had put the Lower Goulburn under stress and caused environmental damage.\textsuperscript{1035} Large volumes of IVT call-out in recent years are demonstrated figure 14.2.

\begin{itemize}
\item \textsuperscript{1033} Aither Supply and Demand report, p. 9.
\item \textsuperscript{1035} Victorian DELWP, \textit{Changes to the Goulburn to Murray trade rule consultation paper}.
\end{itemize}
Stakeholders have also identified concerns with the environmental impact in the Goulburn, such as the Goulburn Valley Environmental Group, who commented that:

Substantial environmental damage is being experienced by rivers due to high summer flows (IVT’s) needed to deliver increased traded allocations to downstream developments.
High flows and sandbar inundation have social impact on campers, fishing and local communities.1036

The ACCC’s analysis of river gauge data revealed an increasing proportion of summer and early-autumn days1037 on which discharge rates through the Lower Goulburn (as measured at McCoy’s Bridge) exceeded 940 ML/day in recent years. During these months, the environment is detrimentally affected when flows are consistently above 940 ML/day.1038 Further, periods of five consecutive days above this discharge rate were also more common from the 2017–18 water year onwards.1039

**Murray and Edward Wakool River systems**

Many stakeholders have been vocal with concerns about environmental damage in and around the Barmah Choke on the River Murray and Edward Wakool River systems.1040 The *Managing Delivery Risks in the River Murray System issues paper* has noted that ‘the banks of the Barmah Choke are eroding, [in part due] to the river being run at consistently high flows’.1041

Further, the capacity of the Barmah Choke is decreasing, having fallen from 11,500 ML/day in the 1980s to 9,200 ML/day in 2019.1042 Recent MDBA research concluded a ‘massive slug of sand’ caused by early gold mining is slowly moving downstream and accumulating in the Barmah Choke, causing the reduction in capacity. This declining capacity in the Barmah Choke is one of the key drivers of shortfall risks in the Southern Connected Basin.1043

The Barmah Choke trade restriction prevents net trade of water from above the Choke to below, meaning that water trading from upstream to downstream of this constraint cannot contribute to increased deliveries through this constraint. One of the main drivers of high flows through the Barmah Choke in recent years has been the lack of inflows from the Darling River. The MDBA has been unable to call on water resources in the Menindee Lakes system since December 2017, resulting in a heavy reliance on releases from upstream Murray storages and intervalley transfers to meet downstream demand.

Increasing congestion through the Barmah Choke is leading to river operators exploring alternative pathways for delivering water from upstream storages in the Murray. Alternatives include the Edward Wakool system, through infrastructure operated by Murray Irrigation Limited, and through Goulburn-Murray Water infrastructure. The ACCC understands the Edward Wakool system is already subject to heavy use and further increasing use to alleviate delivery pressures on the Barmah Choke will expand environmental pressures across all systems.

**Murrumbidgee River system**

The ACCC has heard concerns about environmental damage in the Murrumbidgee as a result of delivering irrigation water.1044 It is alleged that unseasonal high and steady summer flows in the Murrumbidgee are resulting in erosion and bank instability like that in the Barmah Choke.1045

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1037 Summer and early-autumn includes the months of December, January, February and March.
1038 Victorian DELWP, Changes to the Goulburn to Murray trade rule consultation paper.
In correspondence with the ACCC, the New South Wales Department noted the potential for large or frequent water deliveries to create environmental impact, as has been seen in the Lower Goulburn. However, it noted that deliveries of IVT water are less likely to cause impacts to the Murrumbidgee environment than has been seen in the Goulburn. This is because the Murrumbidgee is a heavily regulated system and total annual IVT volumes have not been as consistently large and there is not a consistent trend of trade out of the valley. As a result, the New South Wales Department indicated it has not considered it necessary to undertake a formal assessment of environmental pressures, but that if one were to occur, it should be a joint initiative between the MDBA (as the IVT operator) and the southern Basin States. It also noted IVT volumes can have environmental benefits.

Based on New South Wales’s response, while it appears environmental damage in the Murrumbidgee is less of a concern than in other reaches, the potential for damage to occur still needs to be factored in market design. Governments should stay vigilant in monitoring environmental health in this river system.

Environmental impacts are likely being exacerbated by market activity

The value of environmental health (or, conversely, the cost of environmental damage) is not reflected back to water users when making their use and delivery decisions. This is because rights for delivery remain largely bundled with water access entitlements and there is no separate, effectively capped property right for the on-river delivery of water through the system. Therefore there is no effective cap on delivery volumes at any given point in time. This results in some water trades generating third party impacts, in the form of environmental damage. Because delivery is generally guaranteed and there is no additional cost associated with use and delivery decisions that generate environmental damage, there is no incentive for users to avoid taking delivery around these times.

Complicating matters further, there is no direct link between the time of trade and time of delivery – that is, there is a disconnect between retail usage and bulk river operations (as explained in subsection 13.1.3). Because the impacts of delivery are significantly influenced by the time delivery occurs, this means there are no effective mechanisms to distinguish between, and restrict trades that are socially inefficient (as a result of their environmental impacts), and allow trades that are socially beneficial.

As noted in subsection 14.1.4, IVT limits do not put a hard cap on the volume of water that can be delivered between valleys. Existing trade restrictions, which are sometimes considered to act as proxy environmental limits, in reality do not provide effective protection of the environment from the impacts of delivery. As noted in subsection 13.2.1, water trade is facilitating an increasing proportion of water use to occur in the lower Murray.

Instead of a cap on delivery volumes (or even hard flow limits), environmental priorities and impacts are managed by river operators who are guided by environmental objectives in the Objectives and outcomes for river operations in the River Murray System (OnO document). The document specifies minimum and maximum flow limits for reaches of the river system. Water Liaison Working Group can provide approval for river operators to deliver water at flow rates aimed at inundating the Barmah Millewa Forests, when desirable. In recent years, river operators have had to ‘run the system harder and use [system] buffering capacity more frequently and for longer periods’ Joint Basin State governments note that to avoid delivery shortfalls, large volumes of water have been delivered as unseasonal flows through various tributaries, an approach which is increasingly causing significant environmental damage and high conveyance losses.

The ACCC is concerned that the framework guiding river operations decisions may be favouring prioritisation of mitigating delivery risk at the expense of environmental health and conveyance losses. An example of this can be seen in the 2018–19 water year (see box 14.2) and the issue is discussed further in subsection 14.2.4.

14.2.2 Trade and flaws in the market architecture are contributing to increased delivery risk

Where a water delivery shortfall occurs, the river operator is unable to supply enough water to meet the demands of water users in a region or regions. This occurs because the river operator (the MDBA in the River Murray system) cannot provide the water necessary to the state resource managers. Resource managers are then forced to introduce temporary restrictions or embargos on water extractions to reduce extractions to the volume of water available for consumptive use.

As shortfalls are most likely to occur during times of peak demand, the greatest threat for shortfalls is during peak irrigation season and during periods of extreme heat. This is most likely in January when evapotranspiration and hence demand from horticultural crops peak, though many other factors can play a role.

There are two main types of shortfalls:

- ‘System shortfalls’ can arise when water is available in the storages but is not able to be delivered though the system in line with demands due to physical or environmental constraints within the tributaries. This could occur because of a long period of unexpected dry weather combining with physical and operational system constraints. It could also occur because of inaccurate demand forecasting or difficulty in managing shifts in demand patterns from the shoulder to peak period which results in water being in the wrong place at the wrong time.
- ‘Short-term shortfalls’, also known as ‘delivery shortfalls’, arise when demand for water unexpectedly spikes in the short term because of a period of hot weather and these demands are unable to be fully met requiring short-term (temporary) restrictions to deliveries. These generally occur upstream of the South Australian border.1049

There always have been, and likely always will be an inherent risk of shortfall in the River Murray system. As noted in subsection 13.1.1, river operators do not generally release water to meet individual water orders but rather manage bulk releases of water according to forecast aggregate water demands. The presence of capacity constraints, and the long travel times for water to be delivered downstream (three weeks delivery time for water from Hume to Sunraysia compared to weather forecasts which are only accurate a week out), mean river operators will always face uncertainty and challenges in delivering water.

Non-market factors have also contributed to increased delivery risks (see further down this section). To date, shortfall risks have been well managed by river operators, with only one delivery shortfall event occurring for consumptive users in 2002, though environmental water holders experienced a shortfall in 2018.1050

Delivery risks are not reflected back to water users

The right to have water delivered to an on-river extraction point largely remains bundled with the right to access water and water markets in the Basin do not put a price on the scarce on-river delivery capacity. As such, the limited delivery capacity is not being rationed as efficiently as would be the case if prices were used to allocate this limited resource, leading to the generation of externalities in the form of increasing shortfall risk.

The ACCC is concerned because delivery risks have not been reflected back to users and incorporated into business decisions, water users may have made decisions to invest (such as in new irrigation developments in the lower Murray) on the false premise of continued delivery reliability (see box 13.2). However, the threat of a shortfall is real and increasing due to a number of factors. Continued unmitigated development based on the assumption that water will always be available when it is needed in constrained reaches of the river system will only increase the threat of shortfalls for all users and not just new entrants to a region (hence creating an externality).

1049 Frontier Economics, Market architecture assessment, p. 62.
1050 MDBA, Managing Delivery Risks in the River Murray System, p. 6.
As development becomes more entrenched, addressing issues will become more challenging as reforms would affect more stakeholders. The sooner governments can improve information for market participants, better prepare for actual events and implement more effective architecture to ration delivery capacity and send appropriate price signals to users, the more likely they are to implement successful reforms.

The risks of a shortfall are increasing as demand patterns and system operations change

As noted in section 13.2, trade is facilitating significant changes in patterns of water use in the Southern Connected Basin. These patterns are posing increasing challenges to river operators, who are also faced with changing system conditions on a number of fronts.

Frontier Economics drew out this point stating ‘the MDBA’s river operations team has indicated during consultation for this report that it is increasingly challenged to deliver large and growing volumes downstream. This is not necessarily due to increased downstream consumption’ but due to a combination of factors in the Victorian and NSW Murray Below Choke zones that are contributing to challenging delivery conditions for river operators, including:

- significant increase in volumes traded into zones 7 and 11
- river system constraints, including the declining capacity of the Barmah Choke
- water recovered for the environment, and increased flows to South Australia due to trade and environmental flows.

The MDBA and Basin States have dedicated increasing resources over the last couple of years to investigating delivery risks, their drivers and potential solutions. The intergovernmental Capacity Policy Working Group, informed by the Independent Panel for Capacity Projects Review, is dedicated to assessing delivery risks and issues posed by capacity constraints in the system. The results of the work of these bodies have been much more concrete statements about the fact that delivery risk is increasing in the River Murray System, and that this threat is likely to continue to increase:

It is clear that shortfall risks in the lower Murray are increasing, and the River Murray system and its tributaries, the Barmah Choke and its forests are being operated at flows in excess of tolerable seasonal rates. Things are likely to get worse in the future if the capacity of the Barmah Choke further declines, if the ecological tolerances are factored into river operations to mitigate and avoid ongoing damage to tributaries and as climate change results in more severe heatwaves.

Goulburn to Murray trade rule review

As discussed in box 14.1, Victoria has been undertaking a review into the Goulburn IVT limit and a number of interim arrangements, the results of which may have impacts on market functioning and delivery risk. New rules will come into effect in July 2021. The new monthly limit on call out over the summer months forms a hard cap on volume of water that can be delivered out of the Goulburn which will limit trade. The Victorian Department of Environment, Land, Water and Planning has advised that with a 40 GL/month interim limit over summer, it is assuming that this will limit the volume of IVT call out to a maximum of 220 GL annually. When considered against the 304 GL called out in 2017–18 and the 428 GL called out in 2018–19, this could mean a significant reduction in water availability in the River Murray.

Water users who have invested in irrigation developments in the lower Murray assuming ongoing delivery demands will be met by water out of the Goulburn may soon find that water is harder to get out of the Goulburn. Even if changes to the Goulburn to Murray trade rule do not increase delivery risk

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1051 Frontier Economics, Market architecture assessment, p. 43.
1053 ACCC analysis based on MDBA response to voluntary information requests.
in the immediate term (as stated by the MDBA), they will impact water availability and likely drive up price differentials between the valleys (which already reached $342/ML in November 2019).

Information gaps in assessing and planning for shortfalls remain

The ACCC considers that the movements of water use facilitated by trade are a contributing factor to increasing delivery risk. However, while it is increasingly accepted and publicised that delivery risks are increasing, separating out how much of this is caused by water movements facilitated by interzone trade remains difficult, and so complicates the devising of solutions to address increasing risks.

As challenges evolve and expectations on modelling continue to grow, continually improving modelling will provide the best foundation for understanding and addressing issues for the benefit of both governments and water users. An improved ability to model water market participant behaviour in response to policy changes, and carryover and trade behaviour will assist river operations decision-making and support the assessment of shorter and longer term solutions to delivery issues. Further, a significant information gap is the lack of timely and fit-for-purpose time of use information, stemming from the limited roll out of telemetry, poor interoperability between systems and inconsistencies in metering between states. These issues are discussed further in section 15.3.

While uncertainty around the effects of climate change is likely to be somewhat unavoidable, this is another area where continual improvement of modelling and forecasting should be targeted, as highlighted by the Independent River Operations Review Group (IRORG):

> The effects of climate change are starting to be seen in a range of areas. It is becoming increasingly clear that history is no longer a guide to the future regarding water resources availability and temporal variability. IRORG is of the view that the MDBA needs to challenge its existing assumptions and operational norms ... [and improve management of] the system in response to a changing climate.

Another significant shortcoming in the information available on shortfall risk is how individual water users can best prepare their business operations to manage an actual shortfall event. The ACCC considers that publicly available information how shortfalls would actually affect individual water users, and how they should manage these events is lacking. The MDBA and Basin States have recently improved the public information about delivery risks, with a dedicated webpage now on the MDBA website and the publication of the Managing Delivery Risks in the River Murray System issues paper. In January 2021, Victoria published a new fact sheet, designed to help water users to understand the latest information about delivery risks in the River Murray System. It describes how delivery risks in the River Murray downstream of Barmah are changing and the actions that the Victorian and other River Murray governments are taking to address these risks. Work on defining ecological tolerances and planning how shortfalls will be managed is ongoing.

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1055 ACCC analysis based on NSW, Victorian and SA governments’ responses to voluntary information requests.
1056 MDBA, Managing Delivery Risks in the River Murray System.
It is unclear how an actual shortfall event would be managed

As noted previously, water sharing in the River Murray System follows a tiered approach, with the MDBA allocating water to the southern Basin States and delivering water to meet these states’ entitlement demands. Basin States are then responsible for allocating water to their own entitlement holders based on agreed allocation priorities. The implication of this for delivery shortfall management is that it is the responsibility of each state to manage diversions in its jurisdiction.1058

Frontier Economics found that ‘under current arrangements the reliability with which water can be delivered throughout the [Southern Connected Basin] is incompletely defined’.1059 Property rights for on-river water delivery have not been clearly defined or fully unbundled in all Basin States. ‘Extraction components’ or ‘extraction shares’ are used to specify the water source from which water can be taken and some constraints on the times, rates and circumstances when water can be taken. However, the role of these in managing access to flows during a shortfall event is not specified and they are not capped in some stretches of river, where physical capability to deliver water volumes in accordance with these shares is limited. Further, Frontier argued that the conditions on, and rights contained in, works licences are not defined in a way that would enable them to be readily used for rationing or sharing if a shortfall occurred.1060

Frontier concluded ‘there are limited mechanisms for river operators or environmental water managers to quickly and easily reduce or ration extractions in segments of the system to protect the environment or third parties [in the Southern Connected Basin]’.1061 River operators actively manage rivers to minimise the need to ration water and to protect the environment, and state-based legal mechanisms exist for rationing individuals’ extractions (including for environmental water holders and private users). However, these rationing mechanisms have rarely been used to manage short-term shortfalls. The ACCC considers rationing mechanisms could be strengthened and the specifics of how they would be utilised in the event of a shortfall should be more clearly communicated to the market.

All water access licences issued in New South Wales include an ‘extraction component’1062 which defines times, rates and circumstances of access, the type of water supply that can be accessed, and, if applicable, the extraction zone in which water can be accessed. Extraction components for Murray and Murrumbidgee regulated licences do not currently impose restrictions with regard to the time, rate and circumstance of accessing water.1063 The NSW Government can use section 324 of the Water Management Act 2000 (NSW) to impose restrictions on extractions in segments of the system to protect the environment or third parties.1064

Likewise, although the legislation provides for it, South Australia has indicated that it does not currently issue delivery capacity entitlements.1065 There is provision under section 109 of the Landscape SA Act 2019 for temporary restrictions on extractions from the River Murray Prescribed Watercourse.1066

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1058 MDBA, Managing Delivery Risks in the River Murray System, p. 22.
1059 Frontier Economics, Market architecture assessment, p. 64.
1060 Frontier Economics, Market architecture assessment, p. 65.
1061 Frontier Economics, Market architecture assessment, p. 9.
1062 The extraction component is also subject to licence conditions set by DPIE, issued to holders and listed on the public register. See Part 2 Division 1 of the Water Management Act 2000 (NSW).
1063 New South Wales is able to amend the extraction component conditions, as has recently been implemented in the Barwon Darling with the administrating of individual daily extraction components (IDECs), though this has not been done in the NSW Murray or Murrumbidgee.
1065 Landscape South Australia Act 2019, This Act repealed the Natural Resources Management Act 2004 (SA) and made provision for the protection of the State’s natural resources, including for the licensing of water and associated entitlements. Division 3, subdivision 5, provides that the Minister can issue delivery capacity entitlements.
Victoria’s regime of extraction shares appear to be the most established, though these too have gaps. Extractions shares, which are a condition on a works licence, issued with respect to a particular location, determine the rights of the licence holder to take a share of the water that can be delivered during a shortfall. In the event of a shortfall, diverters will be restricted proportionally, based on their extraction share. However, how any rationing that would be determined and applied to extraction shares to manage access to flows during a shortfall event has not been specified. Extraction shares are also not capped in some stretches of river, where physical capability to deliver water in accordance with these shares is limited. This means water users would receive a smaller water share of the water that can be extracted during a rationing event.

Figure 14.7 below reveals the significant increase in extraction shares in the Victorian Murray between the Barmah Choke and the South Australian border since 2010-11, which is notable particularly in the context of significant environmental buybacks over this time period and reflects the lack of a cap on these extraction shares.

![Figure 14.7: Change in Victorian extraction share from 2010–11 to 2020–21](source)

The specifics of how these restrictions would be imposed, such as details relating to the timing and duration of restrictions, the volumetric basis upon which they would be applied in New South Wales and South Australia (Victoria would use extraction shares), and how restrictions would vary by location, are not well specified or communicated to the market. Lack of information and certainty regarding how shortfalls will be managed will reduce water users’ ability to make informed business decisions. Further, as short-term shortfall events tend to materialise over a period of days or weeks, it is crucially important that to mitigate the worst impacts of a shortfall event that Basin States and the MDBA have a pre-planned and coordinated mitigation strategy.

The ACCC also understands that some operational measures, such as modifying weir pool levels and utilising alternative delivery pathways might offer some potential for mitigating the impact of a shortfall; though once again it is not entirely clear how these measures could be used to complement state actions. How operational measures can be used should also be incorporated into shortfall management plans.

The Independent Panel for Capacity Projects Review also highlighted this gap in arrangements to respond to an actual shortfall event:

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1068 Frontier Economics, Market architecture assessment, p. 63.

1069 MDBA, Managing Delivery Risks in the River Murray System.
Currently, jurisdictions do not have contingency arrangements in place to manage [a delivery shortfall]. Whilst it may not be possible to agree on exact sharing arrangements, given that the impacts of every shortfall will be different depending on timing and duration, it should be possible to develop a framework for making these decisions when they occur and agreeing on key steps, roles and responsibilities in implementing and communicating them.. The Panel consider this to be an urgent priority.\(^{1070}\)

The ACCC recommends that Basin States and the MDBA move promptly to formalise their arrangements for managing shortfall events, including how they will enforce those arrangements. This is discussed further in subsection 16.2.5.

**Impact of a shortfall event**

The impact of a delivery shortfall on the operations of water users will vary significantly based on what they are producing, where they are located, when in their annual water schedule the shortfalls occurs and the specific rules of any restriction implemented. Overall impacts on the market and the environment will also vary based on the level of compliance with the rationing rules.

For example, table grapes are particularly susceptible to water stress, with varying impacts based on timing. Specifically, a lack of water prior to flowering and fruit setting will reduce yields in the current and following year, while water shortages after fruiting could result in a crop that is not fit for market.\(^{1071}\) Meanwhile, water shortages for almonds or dairy pastures may result in reduced yields in either the current or the following year. Sufficient water shortage can also result in permanent crops dying off. Accordingly, while contingent on a number of factors, the production losses as a result of a delivery shortfall have the potential to be significant.

The Capacity Panel warned that the economic consequences of a shortfall is likely to be much higher than in the past ‘because of the level of investment in Sunraysia and the Riverland’. The Panel also noted the impact would depend on the timing and duration of the event, while the impact of a shortfall on the environment had not yet been assessed.\(^{1072}\)

14.2.3 **Trade may be putting upward pressure on conveyance losses but the magnitude is extremely hard to quantify**

Conveyance or transmission losses are the water that is lost while flowing through the river system (or irrigation channels), generally as a result of seepage, evaporation and transpiration. Conveyance losses are calculated as the difference between the volume of water that flows past an upstream gauge and a downstream gauge once extractions have been accounted for. Given as a net figure, losses can be reduced (sometimes to below zero) as a result of rainfall directly over the river, return flows and inflows from un-gauged systems. Generally, conveyance losses are higher during sustained periods of hot, dry and windy conditions (and dry antecedent conditions\(^{1073}\)), and when river flows are higher.\(^{1074}\)

Losses are an inevitable part of river management, and are heavily influenced by a range of factors, many of which are outside the control of the system operators.\(^{1075}\) Deliveries of traded water are only one relatively small component of the overall amount of water flowing through the river system. Sufficient volumes of conveyance water are required to ensure water can be delivered for environmental purposes, critical human water needs, regular entitlement flows, and other reasons. As such,
Conveyance water is the highest priority of water allocated at the bulk level in the River Murray System by the MDBA.  

In the River Murray System, conveyance losses between Hume Reservoir and the South Australian border are calculated and accounted for at the bulk level by the MDBA before state shares are calculated. Water is then allocated out by states to rights holders based on relevant state allocation policies. The bulk level calculation means that losses are socialised across all water rights holders. Losses downstream of the South Australian border are covered by South Australia’s entitlement, which includes 696 GL annually for dilution and loss. Section 15.1 details allocation policies in more detail. 

In river systems which sit entirely within one state’s jurisdiction, including tributaries of the River Murray like the Murrumbidgee and the Goulburn, calculating and accounting for losses is the responsibility of the relevant state. Losses in those systems are also ‘socialised’ among rights holders in those systems. This means that increased losses from intrazone trade are shared among water users in that zone. Additionally, rights holders in the source zone will bear the burden of increased conveyance losses as a result of net intervalley trade delivered to the point of confluence with the Murray, such as from the Murrumbidgee or Goulburn. The Victorian Department of Environment, Land, Water and Planning explained:

[W]hen Goulburn IVT is delivered to Murray, losses in Goulburn River upstream of McCoys are attributed to the Goulburn (these may be more or less than the losses previously incurred in delivering water to the seller), but any losses downstream of McCoys and location of use are attributed to the Murray.

Many stakeholders raised concerns about increasing conveyance losses, particularly as a result of water trade facilitating the movement of water use further downstream. Sunrice and Ricegrowers’ Association of Australia’s submission to the ACCC Interim Report articulated these concerns, with regard to their impact on the reliability of general security entitlements:

The failure to account for conveyance losses in the price of water trades is the most pertinent example of how the market architecture for trading in the Basin is misaligned with the physical characteristics of the Basin. As noted in our submissions to the Issues Paper, transmission losses created by downstream trade in the Basin continue to have a material and detrimental impact on the yield of General Security water entitlements.

Several stakeholders argued that, because water lost to conveyance in operating the river system can generate environmental benefits, these losses should be debited against the accounts of environmental water holders, rather than socialised and shared equally among all entitlement holders.

However, the environmental benefits of conveyance water were considered and taken into account during the development of the Basin Plan. Attributing conveyance losses to the environment would require a greater volume of water to be recovered from water users to achieve the same level of environmental outcomes and the Environmentally Sustainable Level of Take required under the Basin Plan. Where an environmental water holder’s water orders incur increased losses, this additional loss is debited against its account.

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Conveyance losses vary widely due to a number of factors

The shift of water traded downstream for extraction does not always correlate to the distance travelled by the water. The MDBA has significant flexibility in operating the River Murray system and the ability to meet downstream demands through deliveries from tributaries (such as the Goulburn, Murrumbidgee and, when connected, the Darling) and from other storages. This means that a trade from an upstream user to a user a certain distance downstream will not necessarily result in the corresponding water delivery travelling that same additional distance through the river.

However, the relative location of water’s release and demand points (that is, the distance water travels) can impact conveyance losses. Assuming inflow volumes and locations remain constant, it is reasonable to assume that a large enough shift in the location of water extraction further downstream (and away from the various water origin points) would put upward pressure on conveyance losses. Frontier Economics notes that:

Given [the issues around accurately measuring the incremental change in losses from individual trades], it is reasonable for water to be traded between regions without the need to adjust volumes due to changes in conveyance losses. However, at an aggregate level, increased water demand downstream requires increasingly large volumes of water to be delivered. The incremental losses associated with altered river management to support additional downstream delivery when required may not be negligible under all seasonal conditions.

These trends were identified as far back as 2012 by the National Water Commission, which stated water trade was moving water further away from the source, increasing travel distance and increasing flow rates in some reaches which would be expected to increase transmission losses and affect the general resource pool and hence environmental outcomes. However, the National Water Commission went on to note that the magnitude of the probable increase in conveyance losses due to trade is highly uncertain and that insufficient information is available to quantify this impact.

Current market architecture assumes no additional water is lost due to trade

As noted in subsection 13.1.2, one of the simplifying assumptions of Basin water market architecture is that water trade occurs on a 1:1 basis. This assumes that marginal losses as a result of water trade and from the delivery of individual water parcels are zero.

Actual marginal losses depend on when the traded water is used and on the aggregate volumes being delivered at that time (subsection 13.1.3 discusses the disconnect between time of trade, delivery and use). Water trades that result in bulk deliveries increasingly occurring during hotter, drier periods (such as through the summer peak) and at high flow rates could be driving increased losses.

The marginal impact on losses of an additional ML of water being delivered downstream is likely small, as the incremental increase in flow rates would be minimal. However, where aggregate changes in delivery patterns shift more significantly, the additional distance travelled and change in flow rates could result in a material impact on total conveyance losses and available water resources.

Frontier Economics sums this up succinctly in saying:

Downstream users currently do not face efficient price signals relating to the external socialised costs and risks arising from increasing downstream delivery – as experienced in 2018-19. Current trading arrangements do not address this as they assume the marginal losses from delivery are zero.

1081 Frontier Economics, Market architecture assessment, p. 48–49.
1084 Frontier Economics, Market architecture assessment, p. 48
1085 Frontier Economics, Market architecture assessment, p. 52.
Similarly to the absence of price signals for delivery risk, the lack of a price signal for conveyance losses for downstream trade would in theory have a distortionary impact on the market. This is explained in subsection 13.3.1.

Overall trends in conveyance losses are difficult to discern, and the proportional impact of trade is even harder to separate. The ACCC’s analysis of conveyance losses and their impacts has focussed on the Murray and the Murrumbidgee as this has been where stakeholder concerns have been concentrated. The ACCC also undertook some high-level analysis of the Goulburn system, and generally considers the conceptual problems identified in other systems also apply there.

**Losses in the River Murray System**

Figure 13.14 in the ACCC’s Interim Inquiry Report revealed a significant increase in the proportion of total River Murray system inflows that was being lost to conveyance losses each year since 2012–13. Since then, the ACCC has collected additional data to examine this trend over a longer time period in order to try and better understand trends in conveyance losses without undue influence of climate variability. Figure 14.8, below, is based on the same data but on a longer time scale. Previous analysis by the ACCC was distorted by the uncommonly low results in 2012–13, giving the impression of a strong upward trend over time. However, over the full 20 year timescale, figure 14.8 only reveals a gentle upward trend in losses as a proportion of inflows, despite an upward trend in losses overall over this time period.

Figure 14.8 shows the significant impact of climatic variability on losses, given the peaks and troughs line up with years of notable rainfall. The significant spike in 2006–07 was driven largely by a substantial drop in inflows during the height of the Millennium Drought. Meanwhile, low figures occur from 2010–11 to 2012–13 in and immediately following flood years; losses in 2010–11 were actually far higher than any other year but were dwarfed by massive inflows. Likewise, in the 2016–17 high losses occurred as a result of flooding, which suppressed losses as a proportion on inflows that year and the following year. The MDBA notes that losses are low in ‘transitional years’ following flood years due to the wet antecedent conditions. While small spikes in loss relative to inflows did occur in 2018–19 and 2019–20, this was driven by both above average losses as well as below average inflows.

**Figure 14.8:** Annual conveyance losses in the River Murray system as a proportion of total system inflows, 2000–01 to 2019–20

Source: ACCC analysis based on MDBA’s response to voluntary information requests.

Note: Dotted line represents linear trend (least squares).

The Interim Inspector Generals Report plotted conveyance losses against delivery volumes with similar findings. Importantly, the Interim Inspector General’s report found that in 2018–19 (a dry year) losses accounted for 25% of water delivered, which was equal to the period from 2006–07 to 2009–10.
(a similarly dry period). The implication of this is that while conveyance losses may appear to be becoming a more significant influence on water availability, this trend may be less significant once climatic factors are accounted for. Subsection 15.1.3 notes that forecast impacts of climate change are likely to put upward pressure on conveyance losses in the future.

**Losses in the Murrumbidgee River system**

The New South Wales Department has noted, ‘the Murrumbidgee is a long river and releasing water from headwater storages for delivery to the Murray can be ‘expensive’ in transmission losses’ and that these losses are socialised. It further explained that, ‘historically, with small volumes of trade in both directions, this cost was accepted as necessary and offset by the benefits of the trade opportunity. However, as markets are pulling more water physically out of the valley Murrumbidgee water users are paying the increased operational costs.’ The intergovernmental group (featuring the MDBA and Basin State governments) responsible for the trade adjustments project noted the potential for negative third party impacts (including conveyance losses) if a significant volume of water is owed from a tributary.

ACCC analysis provides some circumstantial evidence the losses in the Murrumbidgee have increased relative the volume of water delivered in the system in recent years (see figure 14.9). However, as for the Murray, it is very difficult to separate this trend from the impacts of climate variability, noting the large spike in the flood year of 2016–17 and the extreme dry conditions experienced from mid-2017–18 to 2019–20. Figure 14.9 reveals that the spike in losses relative to delivery volumes in 2019–20 was driven by reduced water delivery, rather than increased total losses.

![Figure 14.9: Total annual conveyance losses, and conveyance losses relative to the volume of water delivered in the Murrumbidgee, 2013–14 to 2019–20](image)


These statements contrasts with the position of the MDBA with respect to losses in the River Murray system, in which the MDBA has indicated the resolution of loss data does not allow them to estimate the proportionate impact of drivers such as traded water delivery. If New South Wales is able to robustly determine that the magnitude of traded water’s impact on conveyance losses is significant, it should prioritise implementation of mechanisms to account for this. Further, Frontier Economics argued that as the Murrumbidgee IVT limit is partially motivated by conveyance loss concerns, the Murrumbidgee River may be a suitable valley to consider for the earliest implementation of conveyance loss factors to better attribute these losses to those incurring them.

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**Losses in the Greater Goulburn River system**

The ACCC undertook some analysis of losses set aside from seasonal determination water balances at the start of the season against the volume of on-river water delivery in the Greater Goulburn system. This analysis revealed a slight upward trend from 2012–13 to 2018–19. Estimated losses ‘set aside’ data was analysed, as Victoria’s Department of Environment, Land, Water and the Environment stated that ‘used loss for river losses is not calculated. Unknowns in the water balance, such as monthly river diverter use (some diverter meters may be only read once or twice a season depending on location) and ungauged system inflows, make this difficult to calculate’.

Despite not focussing on losses in the Greater Goulburn system and generally fewer stakeholder concerns, the ACCC considers the issues identified in other systems are still relevant for the Goulburn. It is likely that concerns about conveyance losses are less acute in Victoria as a result of its entitlement framework (outlined in subsection 15.1.2) which, in the absence of allocations to low reliability entitlements, means that the impact of increases is generally felt by one entitlement class (high reliability water shares), rather than being concentrated upon holders of one lower reliability entitlements.

**Increased conveyance losses will undermine entitlement reliability, with disproportionate impact on low reliability water users**

Conveyance losses are socialised in the systems mentioned above, and in most systems throughout the Basin. This means that water users are not required to directly pay the cost of their water use decisions, in the form of conveyance losses, and the impact of any increase in losses is shared among water users. Where two parties engage in a trade that changes the location or timing of water use in a way that increases conveyance losses, this generates an externality (or third party impact) by reducing the overall pool of water resources available for consumptive use. Section 15.1 outlines why the impact of this reduction of the consumptive pool most directly manifests in reduced entitlement reliability, particularly for low reliability entitlement holders.

The ACCC does not have the information available to effectively assess the magnitude of the potential impact of trade on conveyance losses, and the corresponding impact on entitlement reliability. However, table 14.3 provides some insight into the relative relationship between losses and allocations in the Murray, under the circumstances and assumptions outlined below. It reveals that for each additional one per cent increase in losses in the River Murray System, general security entitlement holders will experienced a reduced allocation of 0.15% to 0.18%. Meanwhile in Victoria, the same increase in losses will reduce current year HRWS allocations by roughly 0.32% to 0.16% (in the latter case, the impact of the increased losses will be spread across the current year, and the next).
Table 14.3: Approximate impact on current year NSW Murray general security and Victorian Murray high reliability allocations of a one per cent increase in River Murray System conveyance losses

<table>
<thead>
<tr>
<th>NSW Murray GS entitlement holdings</th>
<th>Impact on state’s available resource</th>
<th>Impact on GS allocation (0 to 60%)</th>
<th>Impact on GS allocation (60 to 100%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1674 GL</td>
<td>- 4.1 GL</td>
<td>- 0.18%</td>
<td>- 0.15%</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>VIC Murray HRWS holding</th>
<th>Impact on state’s available resource</th>
<th>Impact on HRWS allocation (0 to 30%)</th>
<th>Impact on HRWS allocation (30 to 100%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1282 GL</td>
<td>- 4.1 GL</td>
<td>- 0.32%</td>
<td>- 0.16%</td>
</tr>
</tbody>
</table>

Source: ACCC analysis based on BOM entitlements on issue data, conveyance losses data provided by MDBA in response to ACCC information request.

Note: HRWS = high reliability water share, GS = general security.

Does not reflect an in-season reduction in available resource, but rather a scenario in which available resource accrues slightly less than the default scenario. Assumes annual losses of 823 GL in the River Murray System (based on median losses from 2000–01 to 2019–20). Assumes additional volume of losses from a one per cent increase is shared equally between NSW and Victoria, and as such that South Australia’s full 1850 GL entitlement has already been accounted for. Assumes all additional available water resource is allocated to entitlement holders.

In the NSW Murray, table 14.3 applies assumptions based on the water sharing plan that when allocations are at a point where high reliability entitlements (such as high security, local water utilities, stock and domestic, etc.) have received a full allocation (of 97% for high security entitlements), then conveyance entitlements are eligible for an allocation of 50% of entitlement. Then, for each additional 1% of allocation to general security entitlements, conveyance entitlement holders are allocated an additional 0.3883% of entitlement. When general security entitlements reach beyond an allocation of 60%, for each additional 1% of allocation to general security entitlements, an additional 0.6675% of allocation is provided to conveyance entitlements. Source: ACCC consultation with NSW Department of Planning, Industry and Environment, 15 February 2021.

In Victoria, table 14.3 assumes that once current year high reliability allocations reach 30 per cent, half of any additional available resource would be allocated to the following year’s high reliability allocations.

From this, the ACCC concludes that while variation in conveyance losses can affect water allocations, the likely magnitude of trade’s influence on these losses is likely to be somewhat lower than many stakeholders are assuming. The ACCC urges improved modelling and assessment capability to better understand the proportionate impact of drivers of conveyance losses, but on current evidence does not consider the scale of the problem to be sufficiently large to justify urgent, major reform to change accounting of conveyance losses (such as through trade loss factors, see subsection 16.3.2).

### Information gaps remain to assess the magnitude of trade’s impact

The ability of the ACCC, and various other agencies, to effectively assess the scale of the problems relating to conveyance losses is curtailed by significant information gaps relating to how trade and losses interact. There are significant inherent difficulties involved in developing accurate assessments of the incremental losses associated with the delivery of individual parcels of water. Lifetime tracking and tracing of water may help one side of the information problem (discussed in 11.5.3).

Frontier Economics outlines further information gaps, including that:

> Actual marginal losses depend on when the traded water is used and on the aggregate volumes being delivered at that time, making it inherently difficult to accurately estimate the change in conveyance losses incurred as a result of individual water delivery decisions. Imposing conveyance loss factors, where one megalitre of water sold from an upstream water user would be converted to less than one megalitre received by the downstream purchaser, for allocation trade in the Southern Connected Basin would be extremely challenging to implement in practice.

The MDBA has indicated that the resolution of system losses data does not allow for an accurate measurement of the proportionate impact of additional drivers such as traded water delivery against other drivers such as climate on total conveyance losses.

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1089 Conveyance entitlements are a category of access licence originally issued to Irrigation Infrastructure Operators to facilitate delivery of water through their channel systems. Note that water use against these licences is considered consumptive use.

Another gap in addressing accounting for conveyance losses is the lack of a direct link between the time of use and trade. The actual marginal loss rate depends on when water is used and the aggregate volumes being delivered at that time. Within current water market architecture no mechanism is widely used to effectively track the time of use of a parcel of traded water, which would allow the application of conveyance loss factors that more accurately reflect the differences in loss rates over time. These issues are covered in more detail in section 16.3.

Work to close these information gaps and improve river operations guidance will lay the foundation for long term solutions to conveyance loss accounting.

### 14.2.4 Guidance for river operators needs to be improved

The current river operations guidance framework for the Southern Basin does not adequately describe how what are often conflicting objectives should be balanced and how trade-offs should be made. This requires the MDBA to balance competing risks and make decisions based on collaboration and professional judgments. The ACCC notes that annual Independent River Operations Review Group (IRORG) reports have consistently found that the MDBA’s river operations have met their specified objectives.\(^{1091}\)

The Objectives and Outcomes for River Operations (Objectives and Outcomes) document set by the Basin Officials Committee is the primary document guiding river operations in the River Murray. It sets a number of general objectives such as, relating to ‘water storage and delivery and accounting’:

- To operate the River Murray System efficiently and effectively in order to deliver State water entitlements [and]
- To maximise the water available to the Southern Basin States, after providing for operating commitments in the River Murray System.\(^{1092}\)

And relating to the ‘environment’:

- To contribute to the protection and, where possible, restoration of priority environmental assets and ecosystem functions within the River Murray System.\(^{1093}\)

River operators’ decisions may have distributional consequences, for example by prioritising delivery objectives over managing losses, thereby meeting the needs of some water users while incurring losses that impact other users. The interaction between maximising delivery reliability and environmental health (as well as conveyance losses) is expanded upon in the recent Managing Shortfall Risks in the River Murray System issues paper:

Avoiding shortfalls in recent years has not been without cost. At times, large volumes of water have been delivered as unseasonal flows through various tributaries to avoid a shortfall, and, increasingly this approach is causing significant environmental damage and higher conveyance losses.\(^{1094}\)

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1092 These objectives are then supplemented by outcomes under the general objectives to be achieved by river operations as well as specific objectives and outcomes. These outcomes include the minimisation of losses and the delivery of authorised water orders to southern Basin States unless prevented by physical constraints; BOC, Objectives and outcomes for river operations in the River Murray System, p. 10.
1093 BOC, Objectives and outcomes for river operations in the River Murray System, p. 11.
Frontier Economics identified the impacts of this in balancing delivery reliability and conveyance losses. It stated ‘the immediate benefits of meeting demand downstream are realised by the users downstream, but [doing so] increases the risk of losses which are socialised across all entitlement holders.’

A specific example of this trade-off is outlined below in box 14.2, which provides a case study of river operators’ decision-making during the 2018–19 water year.

**Box 14.2: River operations and increased conveyance losses in 2018–19**

Stakeholders expressed particular concern around the overbank transfers through the Barmah–Millewa forests during 2018–19, and the resulting high conveyance losses and environmental damage.

In 2018–19, dry climate conditions led to low inflows to Lake Victoria, meaning that the MDBA was required to manage the risk of water delivery shortfalls downstream of Lake Victoria through overbank transfers from Hume Dam. Higher than normal conveyance losses occurred from these overbank transfers as a result of the dry antecedent conditions in the Barmah–Millewa forests. These transfers were undertaken in spring to avoid making deliveries through the heat of summer when conveyance losses would have been higher. This decision increased the risk of spills from Lake Victoria (if late spring rains had led to significant inflows).

MDBA river operations staff consulted with Basin State governments on the trade-off between increased conveyance losses and elevated risk of storage spills or water delivery shortfalls. The ACCC understands that Basin State governments indicated a willingness to incur additional conveyance losses when faced with the threat of water delivery shortfalls and potentially having to restrict extractions. This is ultimately what the MDBA decided to do, and reveals that while the decision on timing of releases was a primarily technical concern, the decision-making process on how to address it was essentially a political one. This reflects that the MDBA’s river operating functions are not bound by strict rules but guided by objectives, principles, collaboration and professional judgement.

Conveyance losses in 2018–19 (of 1039 GL) were both higher than average, and higher than years with similar operational strategies. The MDBA described the impact of these overbank transfers as ‘in the order of tens of GL’ compared to ‘a few thousand’ GL of inflows. It is important to note, that a substantial volume of conveyance water is required to operate the River Murray system regardless of trading activity, with incremental loss because of net trade downstream likely to make up a very small proportion of total losses.

Ultimately, despite stakeholder concerns, climatic factors were the primary driver of high conveyance losses in 2018–19. While overbank flows were incurred intentionally by the MDBA, incurring the associated conveyance losses was considered a necessary operational decision to avoid the perceived greater impact of a water delivery shortfall. The IRORG 2018–19 report concluded the MDBA effectively managed losses in this year in line with agreed outcomes, though the ACCC considers there is a need to revise operational guidance (subsection 16.2.6).

Some stakeholders indicated a belief that increased conveyance losses due to overbank transfers in 2018–19 were the result of environmental watering activities, and should have been debited from environmental water holders’ accounts. Others alleged this event directly led to a 400 GL impact on conveyance losses. These misconceptions reveal the potential for improved market confidence through better communication and information availability regarding river operations decision-making. IRORG noted there was a lot of misleading information about operational losses and environmental water transfers in this year.

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1097 ACCC analysis based on MDBA response to voluntary information request.
1098 ACCC discussions with MDBA, 6 February 2020.
The ACCC understands that:

The MDBA has signalled water managers and river operators will in future consider whether significant losses can be justified to avoid restricted delivery to avoid the associated on-farm economic costs. It stated that a shortfall may be justified in the case of over-development as a potential natural correction to irrigation demand, rather than imposing costs (e.g. overbank transfers) on all entitlement holders to meet the demands of a select few.\(^{1100}\)

This exemplifies the lack of information about delivery risks that is being fed back to water users, and is partly a function of the fact that delivery risks are managed at a bulk level, not by individual water users.

Multiple factors influence river operation decisions, such as the timing and location of demand, antecedent conditions, short and long-term weather forecasts and channel capacity of multiple delivery pathways. These factors vary significantly and cannot always accurately be predicted. The significant inherent uncertainty facing river operators means it is likely not feasible or desirable to impose rigid, inflexible rules dictating exactly how decisions should be made. There is a trade-off between providing certainty as to how decisions will be made under particular conditions so as to assist market participants’ decision making, and retaining a level of flexibility so that river operators can effectively react to unusual, unanticipated or evolving circumstances.

The MDBA strives to balance the trade-off between certainty and flexibility by communicating anticipated river operations decisions. This is done at the start of each year through the Annual Operating Outlook (which updated in October)\(^{1101}\) and throughout the year via weekly river operations reports.\(^{1102}\) These communications, coupled with the (now publicly released) summary and review of the previous year’s river operations,\(^ {1103}\) are generally informative about river operations decisions relevant to market operations. Additional benefit would come from more directly considering and highlighting the decisions that are likely to influence markets, through their effect on prices and trade opportunities.

**Water markets and water management lack integration**

The ACCC has also found there is a lack of guidance around how volumes of traded water should be managed. Frontier found that in order to minimise third party impacts, IVT volumes should be delivered in a pattern that reflects use of the water traded out of the valley, but this water has in reality been called out in a pattern that matches peak demands in summer.\(^ {1104}\) MDBA and some Basin State officials have acknowledged these gaps in river operations governance frameworks and the need to balance trade and ecological tolerances, and have noted there is potential value in incorporating the protocols under Schedule D of the Murray–Darling Basin Agreement into the Objectives and Outcomes document.

The large volumes of IVT call out in recent years (see figure 14.2) and the subsequent environmental impacts, combined with the lack of environmental objectives on tributaries in the Objectives and Outcomes, are driving the need to incorporate traded volumes into guidance documentation.\(^ {1105}\) River operations guidance should be reviewed and amended to give it a greater breadth and incorporate consideration of traded volumes of water, and how these should be handled by river operators. Learnings from the Goulburn to Murray trade rule review as well as the work of IRORG will be important in this endeavour.

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Ecological tolerances should be investigated and established

As noted in subsection 14.2.2, environmental damage has been occurring through the southern Basin as a result of the movements of water driven by water market. While the Objectives and Outcomes Document does include minimum and maximum flow rates in the River Murray system, river operations processes and guidance frameworks appear not to have been successful in fully protecting the environmental health of river systems. Australian and Basin State governments have acknowledged ‘they need to continue to understand the ecological tolerances of our rivers and factor this into system operations to mitigate and avoid ongoing damage.’

It is possible that establishing and adhering to stricter flow limits will increase delivery risks. However, investigation and improved understanding of the ecological tolerances, including how ecosystems will respond to various operational decisions, will help river operators understand and manage trade-offs effectively.

As outlined in subsection 16.2.5, the ACCC recommends that the MDBA and Basin states, through Basin Officials Committee, refine river operations guidance to more effectively and more transparently balance trade-offs.

14.2.5 Trade and delivery arrangements need to better manage all users’ needs, including for environmental water

The combined effect of current interzone trade rules and the operational arrangements for managing water deliveries is that these arrangements are failing to adequately accommodate users’ different delivery needs. This is seen particularly with respect to environmental water, with deliveries occasionally not able to be satisfied because of operational decisions to prioritise consumptive users’ needs.

The ACCC considers that the Australian and Basin State governments, the MDBA and Environmental Water Holders (EWH) should work together to update river operations guidance and consider how trade arrangements are used by EWH, to improve arrangements for managing environmental water deliveries.

The use of trade mechanisms and other arrangements by EWHs to deliver water, is generally not well understood by water users. This contributes to perceptions that EWHs receive special treatment and that environmental watering is negatively affecting other water users, such as through increased conveyance losses or receiving priority delivery.

A fundamental policy commitment in the acquisition of environmental water under the Basin Plan was that entitlements held by the Commonwealth Environmental Water Holder (CEWH) would retain the same characteristics as when they were held by consumptive users. This means that CEWH’s environmental entitlements are subject to the same allocation and carryover policies, and the same trading rules and delivery rules, as consumptive entitlements (of the same class). In addition to entitlements held by CEWH, the Victorian Environmental Water Holder (VEWH) also holds a significant volume of ‘bulk entitlement’.
As environmental watering practices have evolved, EWHs have identified different delivery needs to those of extractive water users. In particular, they require some unique delivery services, reflecting that environmental water stays in (or returns to) the river instead of being extracted.

Trade data reveals the CEWH often trades allocations made to its entitlement to the VEWH, which the ACCC understands is for delivery because Victorian bulk entitlements (including VEWH’s) have some different characteristics to standard retail entitlements. This trade is conducted under the standard allocation trade framework, and no exemptions or preferential treatment occurs relative to trade by consumptive users.

EWHs also make use of delivery arrangements and accounting mechanisms under ‘pre-requisite policy measures’ under the Basin Plan. One example is the ‘Bulk Entitlement Delivery’ mechanism used in New South Wales (see box 14.3). These arrangements allow for delivery of environmental water to be managed as part of bulk operations in the southern Basin. The Basin Plan requires that there be no “detrimental impacts on reliability of supply of water to the holders of water access rights that are not offset or negated” in the implementation of Prerequisite Policy Measures (PPMs).

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1112 For example, EWHs need to ensure releases of held environmental water are protected in transit (that is, cannot be extracted by other water users). Also, EWHs may wish to use a particular volume of released environmental water to water multiple sites - this requires ‘return flow’ accounting mechanisms to ensure water used at those different sites is accounted for so that only unused volumes are re-credited for further use downstream. CEWO, Response to questions submitted by Aither on behalf of the Interim Inspector-General of MDB Resources, 2020, p.11, available at https://www.environment.gov.au/system/files/pages/dca287c3-73bd-4ec1-a3b1-c29dd5cf95f9/files/response-questions-submitted-aither-ip.pdf.


1114 Basin Plan (2012) (Cth), Section 7.15 (1) (d).
Box 14.3: Bulk Entitlement Delivery mechanisms in New South Wales

In New South Wales, the department uses Bulk Entitlement Delivery processes to deliver Held Environmental Water. This allows allocation of this water against a NSW Murray above Barmah Choke water access entitlement to be delivered (across trading zones) to any environmental asset in New South Wales or South Australia that is along the River Murray, including below the Barmah Choke. This involves providing a written direction to the MDBA, as the river operator, for the release of a specified volume of Held Environmental Water allocation from the Hume Dam. Orders of Held Environmental Water using the Bulk Entitlement Delivery mechanisms are subject to any relevant river constraints that could prevent the delivery of that water.

The New South Wales government does not regard the delivery or transfer of Held Environmental Water return flows or the delivery or transfer of Held Environmental Water using Bulk Entitlement Delivery mechanisms to be a trade for purposes of New South Wales state water management law even if the process results in change in the location at which water associated with the water access entitlement can be taken. This means that the delivery of Held Environmental Water return flows and Held Environmental Water that is delivered using the Bulk Entitlement Delivery mechanisms are not subject to New South Wales’s water trading rules, including intervalley trades. However, the ACCC understands that, if, for example, the CEWH wanted to deliver Held Environmental Water, and Bulk Entitlement Delivery mechanisms were used to deliver that Held Environmental Water:

- from Hume Dam to a location below the Barmah Choke when the Choke was at or near capacity (for example, in peak irrigation season), the MDBA, the CEWH and the NSW Department, DPIE, would work collaboratively to determine the best way (including timing) for the Held Environmental Water to be delivered without causing third party impacts.

- from the Murrumbidgee into the Murray, WaterNSW, the NSW Department and the CEWH would work collaboratively to determine the best way (including timing) for the Held Environmental Water to be delivered without causing third party impacts.

Source: ACCC (2020) Advice on the operation of 12.02(2) to (4) of the Basin Plan water trading rules.

In 2020, the ACCC provided advice to MDBA on the operation of section 12.02 of the Basin Plan, which provides an exemption from certain Basin Plan water trading rules for trades of environmental water (when the relevant tests for the exemption are met). In that review, the ACCC identified that there is a lack of clarity about whether some of the new arrangements being developed for delivery of held environmental water should, or should not, be considered a trade of environmental water. Delivery of held environmental water under these arrangements does not use conventional allocation trade mechanisms. While EWHs are subject to the same rules as all other users when trading allocations, allocation trade is not the only kind of trade mechanism or delivery arrangement available to EWH.

The ACCC’s 12.02 advice identified that there is a need to clarify the status of mechanisms available to EWH going forward. Consistent with this, EWHs have themselves identified the need for the continued evolution of the operating rules that manage deliveries and enable water use to ensure arrangements can meet the needs of all water users.

River operators and EWH have also encountered issues with delivering environmental watering due to the prioritisation of consumptive water deliveries over environmental water. For example, the CEWH stated that orders to deliver proposed environmental watering were unable to be fully met in 2018–19 because operational transfers were diverted along the way or contributed to Lake Victoria filling. The ACCC is concerned that environmental water may not be treated equally to consumptive water, despite commitments that this should be the case.


However, in discussing these examples with the relevant parties, the ACCC also understands that environmental users may have a different flexibility in terms of the timing of deliveries, compared to consumptive users.\textsuperscript{1117} For example, whereas an irrigator may only have flexibility within a period of several days as to when they need to take water (due to crop water needs), environmental water holders may be able to shift environmental watering activities over multiple days, or even weeks, and still achieve similar environmental outcomes. This raises the possibility that EWHs may be able to work with river operators and consumptive users to find ‘win-win’ situations in which timing of environmental water deliveries can be flexibly adapted to ensure both consumptive and environmental needs are met, and to help alleviate system congestion in peak consumptive use periods.

Overall, the ACCC’s view is that there needs to be better integration between delivery arrangements for environmental water, and the trading framework. In particular, it appears that delivery of environmental water through constraints or between valleys and zones may in some cases be an alternative to using trading mechanisms, while in other cases allocation trade may be used to effect this movement, or a combination of the two.\textsuperscript{1118}

The ACCC considers that it is essential that all mechanisms which facilitate movement of water between locations (whether intra- or inter-valley) need to be considered together. Further, the ACCC considers that, while new arrangements may be first trialled in the context of environmental delivery, in principle, they should be made available to all uses, regardless of purpose of use.\textsuperscript{1119}

\textsuperscript{1117} The CEWH’s ‘good neighbour’ policy states that it includes the principle of flexibility, described as: ‘At times of critical environmental need, the Commonwealth may assert its rights to access its share of channel capacity. However, in the event of channel capacity becoming limited, we can be flexible about how and when environmental water is ordered so as to minimise any potential impact on others.’ CEWO, Approach to managing Commonwealth environmental water, \url{https://www.environment.gov.au/water/cewo/about/planning}, viewed 4 February 2021.


\textsuperscript{1119} This is not to say that some conditions on access to different mechanisms may not be necessary. For example, a size threshold may need to be applied, as certain mechanisms may not be feasible with respect to a small parcel of water.
15. Managing the interactions of trade with allocations, carryover and use

Key Points

- State entitlement frameworks concentrate the impacts of reduced inflows from climate change and other factors, on low-reliability entitlement types. Reliability may be influenced to a lesser degree by conveyance losses and the impacts of carryover policies but the evidence for this is not strong.
- The specifics of allocation policies are not always well understood by water users and can lack transparency, particularly in New South Wales. Governments are not transparent about the discretion given to water managers, and how extreme events (such as severe dry periods) will be managed. This contributes to uncertainty and is diminishing market confidence.
- Water users value carryover, to help manage their supply risks. While some stakeholders have called for Basin States to abolish or further restrict access to carryover, the ACCC does not support these calls.
- Individual parties should bear the risks and costs of carryover – particularly losses while in storage – rather than ‘socialising’ these across other rights holders. Carryover rules do this reasonably well, but there is room for improvement through better attributing evaporation losses in New South Wales and South Australia.
- Differences in carryover policies between States and water sources are the result of differences in the relationship between the volume of entitlements on issue and the volume of storages in a valley, and state accounting frameworks. For this reason, harmonising carryover policies cannot simply be achieved by aligning carryover limits without increasing the risk of third party impacts.
- The total volumes of current carryover parking appears manageable. Once trade to pursue carryover parking starts to affect trade limits such as IVT limits, authorities will need to consider more fundamental reforms around access to storage.
- Long term, reforms to implement continuous accounting or capacity sharing which harmonise access to storage policies, may offer the best practice system for managing storage capacity.
- With increasing water trade, Basin modelling should be continually improved to better incorporate water markets and user behaviours in to river operations decisions. Improved resourcing for modelling and ‘real-time’ usage data will help improve the management of delivery arrangements and system risks.
- Telemetry will be a key way to improve the operation of the systems, market confidence, tracking of trade and its effects, and the handling of extreme events such as rationing water.
- Market confidence should be improved by ensuring that water users cannot run ‘negative balances’ without consequences, and continue to take compliance and enforcement action on use or ‘take’ and metering matters.
- The flaws in mature water markets and emerging impacts provide lessons which should be applied as early as possible to the development of other markets which are less mature, such as groundwater and unregulated water sources.

This chapter examines issues with the policies that deal with monitoring and measuring water use (metering, accounting and modelling), water market activity, water supply and allocation policies, and storage and carryover policies.
15.1 Understanding how water markets can influence water supply, allocations, available water determinations

Supply of water and demand for water determine what the price of water will be, and therefore have an integral role and impact on the market. The main driver of supply in Basin water markets is inflows, which are primarily a function of rainfall. However, the exact volume of water that is supplied to the market is determined by the entitlement frameworks and allocation policies implemented by Basin States governments.

The ACCC is aware of significant distrust of Basin State governments’, and particularly New South Wales’, approach to allocating water to entitlement holders. The ACCC has found that while a significant amount of information is released by Basin States, the actual operational procedures and calculations performed by the states to determine allocation levels for each entitlement class are opaque. This, coupled with reduced allocations in recent years, has resulted in water users’ perceiving that governments have changed their approach to become increasingly conservative, and to hold more water in reserve for critical human water needs and conveyance losses in future years.

ACCC analysis, which has focused on New South Wales due to the strength of concerns in that state, has failed to find definitive evidence that states’ allocation policies have changed. However the ACCC has identified a need for improved transparency around decision making and the inputs and calculations involved in these. Misconceptions and misunderstandings about allocation policies are inhibiting market confidence and contributing to distrust of water management agencies more generally.

Additionally, the ACCC examined whether trade impacts and the current design of water market architecture have led to reduced entitlement reliability. The ACCC has found that while there are likely some elements of market architecture that have the potential to reduce the reliability of low security entitlements, these impacts are extremely hard to quantify, and are likely less significant than the impacts of changing inflow patterns.

15.1.1 Water supply in the Basin is a function of weather, but ultimately determined by state entitlement frameworks and allocation policies

As noted in subsection 2.3.2, MDBA undertakes the bulk water resource assessment for the River Murray System – a tiered process that sets volumes aside for conveyance, critical human water needs and the conveyance reserve – before allocating a proportion of the shared water resource to the states (see figure 15.1). This includes determining how much of its 1,850 GL total entitlement South Australia receives (including 696 GL for dilution and losses) for distribution to its different commitments.
Following the bulk assessment, Basin State water resource managers in New South Wales and Victoria determine the share of the available water in each water source to be allocated to their entitlement holders, also known as the consumptive pool. This is done according to state water management law, including water sharing plans and entitlement and allocation frameworks. The decision about how much water to allocate out generally involves examining volumes of reserved state water held in relevant storages, inflow forecasts and other considerations at the beginning and throughout each year. These decisions are generally communicated through regular (often fortnightly) allocation announcements (known as water allocation statements in New South Wales and South Australia, and seasonal determinations in Victoria) on relevant state government websites.

### 15.1.2 Allocations have been influenced by states’ historical issuing of entitlements and the different risk demand profile of each state

When examining allocation policies, it is important to take into consideration the differences between states’ entitlement frameworks and histories. Many of the issues raised by stakeholders about differences in allocations between states along the River Murray, are partly due to different decisions about how states decided to issue volumetric entitlements.

Water licences were given out largely on demand until widespread environmental problems from the over-extraction of water became clear. During this time, water licences were linked to the land, were area based (not volumetric) and had previously not been traded apart from a few instances during severe droughts.

**Differences states have different mixes of entitlement reliabilities, impacting allocation policies**

Differences in state entitlement frameworks and allocation policies influence the supply of water to the market. New South Wales continued to issue new licences until 1981 and issued a larger number of water entitlements, with the majority being general security entitlements. The larger volume of lower

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1124 The priority order of water allocations in New South Wales is enshrined in Water Sharing Plans, legislative instruments made under the Water Management Act 2000 (NSW), and updated every 10 years.


1126 As impacts of over allocation began to emerge, governments began replacing area based licenses with volumetric limited licenses and also stopped issuing licenses. National Water Commission, *Water markets in Australia a short history*, 2011, p. 37.
reliability entitlements aligned with irrigator preferences and the prevalence of annual cropping (such as rice and cotton) and climatic conditions at the time.

In contrast, the Victorian Government stopped issuing new licences in the 1960s and limited the volume of entitlements on issue which was partly driven by the objective of maintaining reliability of water for permanent plantings. The choice to reserve water for future years and make it more reliable was made before carryover, meaning that all water was lost and socialised back into the consumptive pool at the end of the year. The introduction of carryover allowed water users to manage their own water availability risks to an extent, and may have reduced the importance of governments maintaining volumes of water in reserves for future years' allocations.

Moving to a harmonised entitlement and allocation regime would involve changing underlying property rights and would not result in equal allocations in different valleys, due to differing inflows.

The nominal volume of entitlements (that is, the total volume on issue, as opposed to the long term average annual yield) for each state can be seen in figure 15.2.

**Figure 15.2:** Nominal volume of water access entitlements on issue in the Southern Connected Basin, by water system and reliability, 2018-19

<table>
<thead>
<tr>
<th></th>
<th>NSW Murray</th>
<th>Vic Murray</th>
<th>Ovens</th>
<th>Loddon</th>
<th>Campaspe</th>
<th>Broken</th>
<th>SA Murray</th>
</tr>
</thead>
<tbody>
<tr>
<td>Entitlements on issue (GL)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>General</td>
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<td></td>
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<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Conveyance</td>
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<tr>
<td>High</td>
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<tr>
<td>Low</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Sources: ACCC analysis based on New South Wales, South Australian and Victorian Government response to voluntary information request.

Notes: Includes the following: for South Australia River Murray: Class 3, 3b, 4, 7, 8, 9 entitlements; for Victorian regulated water sources: High and Low reliability water shares; for NSW Murray and Murrumbidgee: High Security, General Security and Conveyance water access licences. NSW Murray = NSW Murray Regulated River Water Source; Murrumbidgee = Murrumbidgee Regulated River Water Source.

**Some states follow more ‘conservative’ allocation policies than others**

The choice of how much water to reserve for future use against how much water to allocate out is a risk-based decision, based on inflow predictions. Over the last 20 years, New South Wales has allocated a greater proportion of available water resources to entitlement holders. This more fully assigns the risk of variability to water users and gives them greater flexibility to choose whether to increase production in the immediate term, or store water for future years (via carryover, for general security entitlement holders). Victoria and South Australia have more conservative allocation policies, ensuring that the water supply is more stable. This involves greater volumes available for allocation in drier years.

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Figure 15.3 shows the trade-off between the two different allocation policy approaches. This can be thought of as a sliding scale where at one end almost all water is reserved for future years with the administrator seeking to smooth allocation volumes over time using storage. At the other end, the administrator does not seek to smooth allocation volumes and allocates out the water as it flows in. From a market perspective, it is likely to be more efficient to allocate out all water as it flows in (similar to capacity sharing), and allow water users to make their own decisions as to storage, carry-over and use, rather than have this decision being made by an administrator. However, it’s important to note that not all water use in the Basin is for irrigation. For example, maintaining some water in storages buffers the risk that critical human water needs will not be met during extreme droughts.

![Figure 15.3: Allocation policies of states](image)

**Figure 15.3: Allocation policies of states**

<table>
<thead>
<tr>
<th></th>
<th>Administrator reserves almost all water for future use</th>
<th>Administrator allocates out inflows as they flow in</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>SA</td>
<td>VIC</td>
</tr>
<tr>
<td>Relatively lower allocations</td>
<td>WET CONDITIONS</td>
<td>Relatively higher allocations</td>
</tr>
<tr>
<td>Relatively higher allocations</td>
<td>DRY CONDITIONS</td>
<td>Relatively lower allocations</td>
</tr>
</tbody>
</table>

Source: ACCC.

Note: This diagram is only illustrative and is not based on actual data.

### 15.1.3 Entitlement reliability is declining and reduced inflows are likely the primary factor

Entitlement reliability refers to the average allocation that can be expected to accrue to a particular entitlement where climatic influences are held constant. Figure 3.12 in chapter 3 includes the end of year announced allocations for selected water systems in the southern Basin from 2010–11 to 2018–19.

The ACCC’s Interim Inquiry report found that many water users, particularly general security entitlement holders in New South Wales, expressed concern about reduced entitlement reliability.\footnote{SunRice, \textit{Submission to Murray–Darling Basin water inquiry issues paper}, February 2020, p. 6–7; Coleambally Irrigation Co-operative Ltd, \textit{Submission to Murray–Darling Basin water inquiry issues paper}, February 2020.}

Many stakeholders linked this to changes to government policies and approaches (discussed in subsection 15.1.5), increased conveyance losses due to trade and the impacts of carryover.\footnote{Greater Shepparton City Council, \textit{Submission to Murray–Darling Basin water inquiry interim report}, 13 November 2020; Murrumbidgee Valley Food and Fibre Association, \textit{Submission to Murray–Darling Basin water inquiry issues paper}, January 2020, p. 2.} The potential impact of conveyance losses and carryover are discussed in subsections 14.2.3 and 15.2.4, respectively.

The Interim Inspector General (IIG) found that the most significant driver of reduced allocations for Southern Basin entitlement holders has been reduced inflows. This is particularly acute in New South
Wales, where median inflows from the states tributaries over the last 20 years are approximately 65% lower than the previous century (in grey in figure 15.4 below). The IIG Report also identified that dry periods in the Darling and the Murray are increasingly occurring at the same time.\textsuperscript{1132}

**Figure 15.4:** Change in River Murray system inflows, by source, 1895 to 2000 and last 20 years

![Figure 15.4: Change in River Murray system inflows, by source, 1895 to 2000 and last 20 years](https://www.igwc.gov.au/sites/default/files/2020-09/iig_final_report.pdf)


Similar findings about declining inflows are included in subsection 3.2.1 of this report. Figure 3.10, examined the long term reductions in rainfall across the Murray–Darling Basin, and noted annual rainfall has been declining over the period 1980 to 2019 , with 20–40mm decreases per decade for much of the Basin.

Understanding the effects of climate change on water availability will be critical for understanding the evolution of entitlement reliability. The climate of the Basin is changing and the future is forecast to be warmer, drier and involve more frequent droughts and extreme weather events.\textsuperscript{1134} Further, climate will likely increase some of the key drivers of conveyance losses, such as temperatures and reduced soil moisture.\textsuperscript{1135} This will require better modelling, discussed in more detail in subsection 15.3.1.


15.1.4 Water market architecture concentrates the impacts of reduced water availability upon low reliability entitlement types

A fundamental implication of the priority water rights regime is that reduced water availability most directly impacts the supply for holders of low reliability entitlements.\footnote{1136}{Priority water rights regime is allocated according to a top-down hierarchy based on historical entitlement decisions such as High priority and general security entitlements.}

In Victoria, low reliability water shares almost never receive an allocation. This means that the impact of reduced water availability is likely to be shared among the high-reliability water share owners. However low-reliability water shares would become even less likely to receive any allocation.

In South Australia, a single reliability level exists for water access rights for irrigation use, in the form of class 3a entitlements. South Australia’s entire 1,850 GL entitlement, generally supplied equally by New South Wales and Victoria, tends to be guaranteed, except in very dry conditions. These factors mean that class three entitlements’ reliability is generally unlikely to be affected as much as other entitlement types, though increasing occurrence of severe drought may lead to increasing likelihood of less than full allocations.

In contrast, due to the water entitlement framework across New South Wales regulated river water sources, general security water holders effectively receive ‘what’s left’ of the state’s share of available resources after higher priority commitments have been met. This means general security holders will bear the brunt of climate change related impacts on water availability, as well as any effect of increased conveyance, storage losses, and utilisation (leading to reduced forfeitures). In both the Murrumbidgee and NSW Murray, where conveyance entitlements are held by IIOs, allocations for these conveyance entitlements are linked to allocations for general security entitlements, meaning these impacts are shared among holders of both entitlement types.

Only during periods of extremely low water availability do high security entitlements not receive a full allocation. Therefore it would take very large reductions in entitlement reliability for these entitlement types to begin regularly experiencing reduced allocations. NSW Department of Planning, Industry and the Environment (DPIE) has acknowledged the burden being felt by low security entitlement holders:

\begin{quote}
To the extent that water availability reduced over time, this would be borne by lower priority products. However, the water sharing plans do account for climate variability.
\end{quote}

As part of the National Water Initiative, Basin States agreed that entitlement holders were to bear the risk of any reduced entitlement reliability associated with seasonal or long-term changes in climate. In accordance with the terms of reference of this Inquiry, the ACCC’s focus is on water markets in the Basin. Therefore the ACCC has not assessed the broader appropriateness of state entitlement frameworks or the water sharing arrangements under the Murray–Darling Basin Agreement, except where there are direct interactions with water markets. However, the National Water Initiative states governments will bear the risk of reductions arising from changes in government policy.\footnote{1137}{Intergovernmental agreement on a National Water Initiative 2004, Between the Commonwealth of Australia and the Governments of New South Wales, Victoria, Queensland, South Australia, the Australian Capital Territory and the Northern Territory, https://www.agriculture.gov.au/sites/default/files/sitecollectiondocuments/water/Intergovernmental-Agreement-on-a-national-water-initiative.pdf.}

Australian Bureau of Agricultural and Resource Economics and Science’s (ABARES) submission in response to the ACCC’s Interim Inquiry Report suggested that priority water access rights are a legacy of the pre-trade and pre-carryover era, and that in the presence of low transaction cost water markets, offer limited gains in efficiency relative to proportional sharing. ABARES concluded given the small efficiency gains and the large potential adjustment costs, removal of priority rights may not be justified, though it was not unprecedented in the Basin.\footnote{1138}{ABARES Submission, Submission to the Murray–Darling Basin inquiry Interim Report, 18 December 2020.}

The ACCC notes the potential indirect effects of the third party impacts and the impact on the relationship between storage volumes and allocations outlined in subsection 15.1.7. Analysis of the impact on entitlement reliability of conveyance losses (subsection 14.2.3) and the use of carryover
reducing the volume of water forfeited back to the common pool (subsection 15.2.4) will be considered in more detail in other sections of the report.

15.1.5 The specifics of allocations policies are not always well understood by stakeholders and can lack transparency

Stakeholders raised concerns about the declining reliability of allocations. It was commonly alleged that the NSW Government had changed their allocation policies to become more conservative by setting more water aside for future years. A number of stakeholders also called for improved transparency of allocation approaches. H2OX argued for more frequent water allocation announcements with a more transparent methodology. Aware Water Group also called for increased transparency of water allocation decisions.

Despite significant efforts by Basin States to publish information about water availability and allocations, there are still gaps in transparency. This is reducing market confidence, and an increasing distrust of the organisations responsible for managing water resources and markets. Distrust and lack of confidence in market processes can result in poor business decisions, and a lack of willingness to invest, which may result in reduced allocative and dynamic efficiency.

Lack of clarity over the level of discretion has seeded distrust in New South Wales allocation policies

When requesting access or an explanation of the operational rules or process guidelines directing New South Wales decision making for allocating resources, NSW Department indicated ‘water allocation assessments and announcements are market sensitive therefore access to real-time assessment data and information prior to public release is strictly limited.’ As such, the ACCC has not effectively been able to assess whether or how the NSW Department has implemented changes to the processes, calculations and inputs they apply in making allocation decisions within the framework established by water sharing plans.

Within these processes, ‘there is some professional judgement associated with seasonal catchment conditions and outlooks, particularly in determining how much of each incremental resource improvement can be safely allocated to general security entitlement now, and how much is required to be set aside for high priority year 2 commitments as required by the water sharing plan’. The ACCC considers that the NSW Department has not effectively communicated how this professional judgement is applied. This has led some stakeholders to assume that low allocations are the result of water managers shifting the balance to prioritise future year commitments. This view has likely also been influenced by changes in communication approach, outlined below.

Discretion that is not understood by water market participants will result in uncertainty and can undermine the ability of water users to plan effectively. Uncertainty regarding government decisions can be just as damaging to market confidence as misconduct by participants. A shift towards prioritising future year commitments, all other things being equal, will safeguard higher reliability entitlement holders at the expense of lower reliability holders. Such a change in government policy would amount to an erosion of property rights, and is a risk that should, under the National Water Initiative, be borne by governments.

The ABARES submission in response to the ACCC Interim Report raised similar concerns about the level of discretion. ABARES highlighted the variability in allocation levels made to Murrumbidgee water users for varying levels of water availability and argued that ‘uncertainty can be created even under a fixed water sharing plans given the complex and ‘fuzzy’ nature of water sharing rules.’

1142 Year two commitments refer to water set aside to cover high priority needs in the following year.
A change in communication approach has contributed to perceptions of a change in allocation policies

The ACCC has analysed water resources assessments back to 2015–16 to examine trends in New South Wales’ allocation policies in the Murray and Murrumbidgee.1144 In the NSW Murray (figure 15.5) and Murrumbidgee (figure 15.6), this analysis appears to indicate a drastic increase in the volume of water set aside for future year’s allocations,1145 both as a total volume and a proportion of available. This increase is at least in part, due to a change by New South Wales in the presentation of water allocation statements from 2017–18 to add the item water for ‘future high priority water needs’.1146 This item did not appear in the resource assessment table in water allocation statements until December 2017 in Murrumbidgee and March 2018.1147

The NSW Murray water allocation statements do not adequately explain this change in communication approach. Significantly, the notes explaining the definition of total available resources in these water allocation statements were unchanged from previous statements. In correspondence with the ACCC, NSW Department indicated that ‘water has always been needed and set-aside to meet future high priority needs’. In response to the specific changes to water allocation statements in 2017–18, the Department explained ‘rather than set the 220 GL [of future high priority commitments in the Murrumbidgee on 15 December 2017] aside and exclude it from ‘Total Available Resource’, as occurred historically, the Department has begun, in response to public calls for improved transparency, to explicitly recognise the need to build resource in the current year, to ensure that as a minimum, high priority commitments can be met on 1 July, in accordance with the water sharing plan.’

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1144 Due to time and resource constraints, the ACCC was unable to extend its analysis beyond these water sources, and focussed on the NSW Murray and Murrumbidgee given stakeholder concerns in these sources. Since July 2015, New South Wales has improved the depth and extent of data provided in water allocation statements in response to public demand. As such, ACCC data analysis has only extended back to July 2015 when this more detailed data became available.

1145 Water ‘set aside’ is defined in NSW Murray as the sum of reserves, high priority requirements for following year and temporary reserves. In Murrumbidgee, water ‘set aside’ is the sum of reserves and high priority requirements.

1146 The note explaining this item states ‘at this time of year, it is necessary to look ahead to ensure there is sufficient resource set aside to meet high priority needs on 1 July 2018. This additional volume has been assessed as needed to guarantee 1 July commitments, including potential carryover’. In the Murrumbidgee, this note was similar but went further to state ‘any further improvements in resource will first accrue to this requirement’.

Figure 15.5: Volume and proportion of available water ‘set aside’ for future year’s allocations, NSW Murray, 1 July 2015 to 15 October 2020


Note: Water set aside includes reserves, high priority commitments for next year, and temporary reserves.

Figure 15.6: Volume and proportion of available water ‘set aside’ for future year’s allocations, Murrumbidgee, 1 July 2015 to 15 October 2020


Note: Water set aside includes reserves, and high priority commitments for next year.

The ACCC accepts that the statutory Water Sharing Plans guiding allocation policies have not changed and that these require New South Wales to set water aside for the following year. The ACCC found that insufficient communication by the NSW Government has contributed to stakeholder angst and distrust of the decision making process. Based on the water allocation statements, which are the primary New South Wales allocation communication tool, it is reasonable that water users would perceive there to have been a shift in New South Wales allocation policies.

1148 A particular example is explained in subsection 13.2.2 of the Interim Report, whereby unclear communication in water allocation statements appeared to contribute to angst and confusion from NSW general security holders regarding their zero allocations received during the 2017-18 and 2018-19 water years.
The ACCC also observed that the reserving of high priority commitments commences at different times in different years (starting in July 2020 in Murrumbidgee and October in NSW Murray), and reached different volumes (which were higher in 2019-20 than previous years). The NSW Government explained this was a function of conditions and outlooks at the time, as well as the available volume of water for high priority commitments. However, without a transparent methodology, it is not clear how much these decisions were influenced by the risk appetite of New South Wales water managers, and whether the same outcome would result from similar conditions in the future.

The ACCC believes that the NSW Government should improve the transparency of its allocation decision making processes, by clarifying the level of discretion offered to water managers and how this is applied. This could be achieved through the publication of operational processes and calculations applied in these decisions. The ACCC acknowledges the significant amount of information the NSW Government publishes, however only publishing the information about the inputs and outputs of decisions does not effectively reduce the uncertainty about the decision making process itself.

**There is a trade-off between flexibility and certainty in allocation policies**

Forecasts of inflows and weather are inherently uncertain. It is difficult for water managers to confidently provide exact predictions of allocation levels, and there will always be a level of risk that anticipated water availability (upon which allocation decisions are made) will not eventuate. This uncertainty means that there is a benefit for water managers having a certain amount flexibility in their allocation decisions to apply professional judgement while models are not adequately accurate or rapid. However, the trade-off of increased flexibility is additional uncertainty for water users, as seen in the example in the box below.
Box 15.1: Zero general security allocations in the NSW Murray during 2017–18 and 2018–19

Stakeholder concerns about allocation policies often cited the fact that the general security holders in the NSW Murray had not received an allocation during 2018–19 and most of 2019–20. Apart from extremely dry conditions, this reflects the New South Wales Government’s approach to water allocation policies (outlined in subsections 15.1.1 and 15.1.2) of allocating out a greater proportion of water in the current year increasing the risk of not being able to meet all commitments in the following year if inflows are lower than expected.

Lower than expected inflows in the New South Wales Murray led to a 125 GL deficit in the volume of water necessary to meet ‘high priority commitments’ for the 2018–19 water year. This meant additional available water resources needed to be allocated to ‘conveyance entitlements’ before general security. This carried through into 2019–20 with a 145 GL deficit occurring from 1 July 2019. In mid-May 2020, the deficit was erased and New South Wales Murray GS entitlement holders started receiving allocations.

The effect of the deficit resulted in New South Wales Murray stakeholders raising concerns that general security entitlement holders had not received an allocation following good autumn rains. These concerns were linked to a view that greater volumes of water were being held in reserves than in previous years, which the ACCC has not been able to disprove.

These circumstances were coupled with the publication of water allocation statements from late 2017–18 and early 2018–19 that, in the ACCC’s view, failed to explain this deficit explicitly and sufficiently clearly. While the 1 July 2018 water allocation statement did indicate that conveyance entitlement holders would receive a reduced allocation and be the first priority for allocation as new water became available, it did not explicitly state there was a deficit in water needs, or unpack the implications for general security entitlements.

The ACCC does not consider it reasonable to assume that all general security entitlement holders would have a detailed understanding of the workings of allocation rules for other entitlement types and would check the allocation made to conveyance entitlements to extrapolate what that meant for their chance of receiving an allocation in the year ahead. As the reality of the water availability situation was not explicitly explained to them, this likely contributed to the discontent felt by some general security entitlement holders who did not understand why resource improvements were not allocated to them.

Water users’ business decisions, such as which crops to grow and whether to invest in infrastructure upgrade, are based on water supply expectations. Water users will always face the risk of making ‘wrong’ business decisions based on actual changes in supply, but an increase in uncertainty of supply due to government decisions, will further inhibit the ability of users to make efficient decisions. When water users feel their ability to predict outcomes is diminished, their confidence will likely be reduced, further impacting business decisions (for example, by reducing willingness commit to longer-term investments).

The ACCC has found that there is a lack of clarity and understanding of the level of discretion and professional judgement awarded to water managers within allocation policies. The result of this is reduced market confidence, which may be inhibiting market participants’ ability to make long-term business plans and investment decisions. This impact is noted by ABARES, who writes:

> Given the complexity of water sharing plans rules, frequent rule changes, and discretionary input from water agencies, this system lacks transparency and creates additional uncertainty for water users (over and above uncertainty already faced due to climate variability).\(^{1149}\)

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15.1.6 Information about how ‘extreme events’ will be managed is difficult to find and interpret

The ACCC is concerned about the lack of clarity and transparency surrounding the management of extreme events (such as water shortages). During consultation, stakeholder concerns about issues relating to managing water shortages were concentrated in New South Wales and this is where the ACCC’s analysis has focused. In New South Wales minimum inflow assumptions do not rely on the most up-to-date data, (discussed in more detail in subsection 15.1.8) - in this case, it is especially important for information about how water shortages will be managed to be transparent and well-understood.

The New South Wales’ Extreme Events Policy, supported by Incident Response Guidelines, meets the requirements under section 10.51 of the Basin Plan 2012 and outlines the framework under the Water Management Act 2000 (NSW) for managing extreme events in the state. The NSW Government can suspend Water Sharing Plans wholly or in part to ensure supply of critical human water needs and high priority needs can be met. The ACCC considers there is a lack of clear information about the operation of the policy and, in particular, when Water Sharing Plans will be suspended which creates uncertainty for water users. Certainty about changes to potential water sharing arrangement due to severe drought should be maximised, as this will give the community confidence that critical human water needs will be met and will assist water users in weighing up their risks and making their own business decisions.

A lack of certainty may result in perverse incentives and outcomes for other water users. For example, regional councils and those responsible for town water supplies may delay politically unpopular restrictions on town water use, if they understand that the NSW Government is likely to implement ‘contingency’ emergency measures in the event of shortages. There is an argument that a more efficient approach would be to enable councils to go to the water market in the event of shortages. Increasing access and participation in water markets by regional councils may lessen the need for contingency measures.

The ACCC is also concerned that locating and interpreting Incident Response Guides for NSW water sources is difficult for water users, with the localised policy framework for managing extreme events not sufficiently obvious to the ordinary water user. Incident Response Guides for Basin water sources are listed as schedules to the relevant water resource plan, and so are located near the bottom of the relevant page on the MDBA website. However, many guides do not appear on the New South Wales website, which instead includes a deeply buried link to the relevant MDBA locations. An ‘Incident Response Guides’ link on the NSW Government’s website redirects to a page about water resource plans from which several navigation steps are required to be directed to the appropriate MDBA webpage. While searching for the guides by name, either on the MDBA or NSW Government website or via a search engine, will yield results, this requires knowledge of the plans’ existence in the first place.

Further, the incident response guides are lengthy, legalistic documents which are not easy to interpret. The ACCC does not believe that information available to water market participants in New South Wales adequately explains in plain terms how extreme events, such as critical water shortages,
will be managed. This leads to uncertainty for water users, exposing them to a greater risk of making poor business decisions, and inhibits market confidence.

Stakeholders raised concerns, in particular, about the imposition of temporary restrictions on the access of general security water remaining in accounts in the Macquarie-Castlereagh system in 2018-19. In August 2018, general security water users on the Macquarie Regulated River were restricted from accessing 30% of the volume of water in their accounts, because the record low inflows meant that there was insufficient water in storage to deliver account water. This restriction was increased to all (100%) of account water on 1 July 2019 and eased to 60% on 1 July 2020, until it was finally lifted on 14 August 2020, as water availability increased.

The NSW Government undertook a number of approaches (text messages, website and media release updates, publications in government gazettes and local print media) to announce the restriction following its implementation. While the NSW Government undertook stakeholder consultation as part of developing incident response guides, it is clear not all stakeholders understand how and when measures to manage extreme events will be implemented.

Water resource plans outlining how extreme events will be managed can be found for relevant water sources in Victoria, South Australia and Queensland. While the specifics and the phrasing of the provisions varies between state legislation, the relevant Minister in each of these states essentially has the power to reduce or restrict water use during extreme events. Water corporations can also impose restrictions in South Australia and in Victoria (in unregulated and groundwater systems only). Generally, the provisions, and the explanation of the triggers for extreme events in these states, are broad and relatively non-specific.

The ACCC urges New South Wales in particular, and all other Basin States, to publish accessible and easy to understand guidance explaining how states will manage periods of extreme dry conditions and low water availability to improve confidence and better inform water users about when it may be necessary to trade water.

15.1.7 The relationship between storage volumes and allocations has changed

The relationship between storage volumes and allocations have changed, which may be contributing to views that allocation policies have changed. Water users have historically relied on information about total storage volumes to estimate or forecast likely announced allocations. If relationships between storage volumes and allocations change and users are not aware of this, users are likely to misestimate allocations which could lead to inefficient outcomes.

Equivalent storage volumes have coincided with lower allocations in recent years in New South Wales.

This lends further weight to the argument that Basin State governments should improve transparency of allocation decisions by publishing the operational procedures and calculations. Water users need to be informed that past assumptions about certain levels of storages corresponding to particular allocation levels may no longer be accurate.

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Figure 15.7 reveals that in the NSW Murray, while the volume of water in storages in 2018–19 was actually higher than in 2015–16, there was no general security allocation in 2018–19 compared to a 19% allocation in 2015–16. Similarly, despite higher storage volumes in 2017–18 than in 2014–15, allocations were actually higher in the earlier year.

**Figure 15.7:** Storage volumes compared to general security allocations, NSW Murray, as at 31 December, 2012–13 to 3 Nov 2020–21

A similar story emerges from figure 15.8 for the Murrumbidgee. General security allocations on 31 December of 2018–19 and 2019–20 were 7% and 6%, respectively, while the allocation in 2015–16, for a similar storage volume was 19%. Likewise, an additional 14% of storage volume in 2017–18 compared to 2015–16 corresponded to an additional 1% of general security allocations.

**Figure 15.8:** Storage volumes compared to general security allocations, Murrumbidgee, as at 31 December, 2012–13 to 2 Nov 2020–21

Source: ACCC analysis based on Waterflow data.

Note: Storage volumes do not take into account proportion of NSW state share of Murray resources.
The ACCC performed similar analysis for the Victorian Murray and the Goulburn river systems for high reliability water share allocations on 30 September.\(^{1162}\) However, despite a somewhat similar trend identified in the Victorian Murray when comparing 2015–16 and 2018–19, the ACCC did not find any strong evidence that storage volumes were corresponding to lower allocation levels than in the past in these systems.

These differences are likely, at least in part, because of the fact that a higher proportion of available water in the Murrumbidgee is being held as carryover. Figure 15.9 reveals a slight upward trend in the proportion of available water held as carryover over time and reveals that carryover holdings were comparatively greater in 2017–18 and 2018–19 than in 2014–15 and 2015–16, for both the NSW Murray and the Murrumbidgee.

Figure 15.9: Volume carried over from last year relative to available water in current year, Murrumbidgee and NSW Murray, 2012–13 to 2018–19

Another possible factor in the NSW Murray is a reduced proportion of the available water in the Murray system being held by NSW Government as part of its ‘state share’. Water resources in the Murray are shared between Victoria and the New South Wales, though the proportion held by each state can vary based on the pattern of inflows into the system, usage and interstate trade and will affect the amount of water available to each state for allocating to their entitlement holders.

Figure 15.10 below, only goes back to January 2016, however this likely serves as a close enough proxy for 31 December 2015 to allow comparison to later years. The New South Wales' share of the combined Murray resources was higher in January 2016 (at 42.9%) than in December 2018 (38.9%) or December 2019 (41.5%). This also offer some explanation for the reduction in allocations compared to storage volumes in these later years. The ACCC notes the NSW Government has included the New South Wales share of Murray storages in its allocation statements from August 2018.

1162 The ACCC chose to analyse allocations on 30 September rather than 31 December in these systems because allocations had generally reached 100% by 31 December in these systems.
Despite being partially explained by changes to volumes held in carryover and shifts in the state share, it is possible that the change in the relationship between allocations and storage volumes may also be influenced by a reduced risk appetite among New South Wales water managers. It is important for allocation policy decisions to become more transparent, in order to provide certainty to water users.

There may also be value in Basin States encouraging water users to more closely consider inflow data rather than storage levels data when trying to predict future allocations. The ACCC notes water allocation announcements already appear to be moving in this direction.

15.1.8 The timing of water allocation improvements does not appear to be getting later for most entitlement types

Stakeholders, most commonly in New South Wales, indicated concerns that announcements to increase water allocations had been getting later in recent years. They stated that the lack of water allocations early in the season was impacting their ability to make business decisions, pushing them to increase their reliance on carryover and undermining their ability to access finance.\textsuperscript{1163} In response to the ACCC’s Interim Report, Boundary Bend noted ‘allocations, more than ever, seem to be drip fed to entitlement holders (even in years of high storage volumes) creating less supply early in the season.’\textsuperscript{1164}

The ACCC’s analysis of the timing of allocation improvements revealed that while allocations to many entitlement types have been significantly lower in recent years (because of low water availability), there is no clear evidence that allocation improvements are occurring later in the year for most entitlement types; with a few notable exceptions. The data indicates that climatic conditions and overall water availability are the most significant factor in the timing of allocation improvements, with long waits or no allocations in drier years.\textsuperscript{1165}

Figure 15.11 represents how long it has taken allocations to reach 25% and 50%, respectively, for general security holders (in terms of average number of days from 1 July) in the period 2004–05 to 2011–12 compared to 2011–12 to 2019–20). The figure indicates there is no clear evidence for the argument that water allocations are taking longer to improve in recent years for most valleys. The majority of valleys that exceeded 25% allocations in these years did so with the years’ opening allocation, though reaching 25% at all has become less likely in recent years with prevailing drought conditions. Only the Lower

\begin{footnotesize}
\begin{enumerate}
\item ACCC analysis of Waterflow data.
\end{enumerate}
\end{footnotesize}
Darling and the Upper Namoi experienced slight increases in average wait, driven mainly by 2019-20. The NSW Government has indicated that, based on stakeholder preferences, they attempt to allocate water to general security users upfront (rather than via incremental improvements) to allow them flexibility in how they use water.1166

The ACCC repeated this analysis for high security water entitlement types with a 50% trigger. Of the 11 water sources in figure 15.12, only the New South Wales Lower Darling experienced an increase in average wait times to receive a 50% allocation based on the periods 2004–05 to 2011–12 and 2012–13 to 2019–20.

Figure 15.11: Average number of days taken for New South Wales general security water allocations to reach 25%, 2004–05 to 2011–12 compared to 2012–13 to 2019–20

Source: ACCC analysis of Waterflow data.

15.1.9 Some allocation policies are designed to rely on out-of-date information, rather than being adaptive

The ACCC found that water allocation policies in the New South Wales Murray and Lower Darling, Murrumbidgee and Lachlan systems (and the Hunter, outside the Basin) are designed to ensure that minimum inflow assumptions remain determined by outdated data. The data that these policies is based on was from 2003, when the first water sharing plans were established.1167 Most other plans maintain a constant base for the duration of the plan, but update the assumed minimum inflows based on the latest available information at the commencement of each plan (generally every 10 years).

Updating inflow data for these plans would likely impact the timing and volume of water allocations to water users in these catchments, and necessitate a greater proportion of water being held in reserves (particularly early in the water year). Delaying allocation improvements until later in the year would inhibit water users’ ability to plan for the upcoming season and could prevent users from planting spring crops.


In correspondence with the ACCC, NSW Government noted that ‘the ‘design’ standard [of inflow assumptions] effectively establishes the risk-based balance between water for productive use versus reserving water for security – two mutually exclusive objectives’ and that [a more] stringent design criteria (Millennium drought, or even something more severe) would adversely affect productivity and communities. Instead, the government decision at the time was to use contingency arrangements to underpin critical water needs rather than adopt the lower inflow assumptions and keep more water in reserves. Relying on outdated inflow assumptions may place increasing pressure on water managers to become more conservative, or risk over-allocating water when forecast assumptions do not eventuate.

As a matter of good policy design, the ACCC considers policy instruments should generally seek to rely on and, at appropriate intervals, incorporate current and accurate information. Preventing water allocation policies from ever updating as new data becomes available would undermine the robustness and appropriateness of these policies. If the observed trend of declining inflows continues, allocation policies that do not update risk increasing uncertainty and variability of allocations. There is an increasing likelihood that actual inflows fail to exceed assumed minimums for the year, potentially resulting in another suspension of a Water Sharing Plan, as occurred in the NSW Macquarie-Castlereagh system during the 2018–19 water year. The ACCC appreciates that updating would likely negatively impact general security holders, but considers that an iterative approach to adjusting water sharing plans and allocations, is preferable to having to make large adjustments at some future point in time.

As climate change increasingly drives hotter and drier weather conditions (discussed further in subsection 15.1.3), it is likely that inflows will continue to decrease raising the likelihood that minimum assumptions are not met. Maintaining constant inflow assumptions will mean it is vitally important that users understand how these contingency measures will be used (as outlined in subsection 15.1.4).

15.1.10 Reform options to improve allocation policies range from immediate transparency improvements to major restructures of entitlement frameworks

The ACCC’s scope for undertaking this Inquiry has been to consider issues with relevance to water markets, rather than those with more broad water management significance. While actual state decisions on entitlement frameworks and allocation decisions are not technically market decisions, they are intrinsically linked to the market by establishing the supply of water available to users and traders. ACCC analysis of issues and reform options as relates to supply has been limited to those which will enhance market functioning and boost the market confidence of users. The ACCC has not considered, and will not make recommendations relating to re-specification of Basin State water sharing arrangements or entitlement frameworks more generally.

The ACCC recommends that Basin States increase transparency in relation to water allocation decisions. Basin States should also improve stakeholder understanding about how entitlement reliability, allocations and carryover policies work.

Investigation of capacity sharing and continuous accounting as long term reform options which, among other benefits, would offer significant improvements to the transparency of allocation announcements.

15.2 Managing the efficient use and trade of available storage capacity

Storage refers to the dams, weirs and other infrastructure or assets (natural or manmade), used to capture water from rain or inflows, for later use. States are responsible for setting storage policies, resulting in different rules across states. ‘Carryover’ refers to policies, rules and other mechanisms or arrangements that allow holding or ‘banking’ of water allocations issued in one water year for use or trade in subsequent water years. This occurs at a point in time, at the end of the water year. Carryover arrangements allow water users to save their unused water from wet years for use in dry years, providing water users with a key tool to manage water availability risk (see table 15.1 for a summary of state carryover policies).

ABARES has found that increased use of carryover has important allocation market implications by reducing price volatility. Carryover water is generally accumulated during wet years, resulting in increased prices during those years, but reduces prices in dry years as users draw down on their carryover reserves.\(^{1169}\)

While carryover is used to allocate out storage capacity in the Southern Basin, some Northern Basin valleys have water accounting rules that remove the need to carry over water at the end of the year. For example, the Lower Namoi Regulated Water source in New South Wales uses continuous accounting for general security entitlements. Under continuous accounting, the entire general security account balance carries forward from month to month, subject to a maximum account volume limit (200 per cent of entitlement), without the need for the ‘account reset’ – and calculation of an allowed carryover volume – seen at the start of each water year in systems with annual accounting. These accounts are subject to maximum volume limits, spill risks are controlled by account limits and all losses are centrally managed.

The Macintyre Brook and St George water supply schemes in Queensland use a system largely akin to capacity sharing (known as continuous sharing), in contrast to an annual allocation system. This establishes a water account based on a proportional share of the total conceptual storage volume for the scheme which is updated on a daily basis to reflect inflows, water orders, and estimated storage and delivery losses deductions. Reconciliations between physical storage volumes and user storage accounts occur monthly. The water account is reconciled monthly based on recorded data. The St George water supply scheme also provides for a Queensland water allocation to be managed under a bulk share water account which makes water available through an ‘announced allocation’ system.

## Table 15.1: Carryover rules summary, by Basin State

<table>
<thead>
<tr>
<th>State</th>
<th>Carryover rules</th>
</tr>
</thead>
<tbody>
<tr>
<td>Queensland</td>
<td>Border Rivers, Macintyre Brook and St George water supply schemes allow water to be carried forward through the water year rather than at the end of the water year, and do not reset at the start of the water year. All these systems use either continuous share accounting (for Border Rivers) or capacity sharing (in the latter two).</td>
</tr>
<tr>
<td>New South Wales</td>
<td>Carryover is mostly available for general security entitlements. There are different rules for each water source but invariably restrictions apply. These restrictions differ from each river system. Examples of restrictions include how much a person can carryover from year to year, how much water they are allowed to have stored on their entitlement, or how much water they can use in a year.</td>
</tr>
<tr>
<td>Victoria</td>
<td>Carryover and spill rules differ between water systems based on the hydrology and storage capacity of each system. In Victoria’s smaller systems (the Broken, Loddon and Bullaurook systems), entitlement holders are limited in the amount of dam space they can use. The 100% rule means entitlement holders can only hold carryover and new allocations that add up to 100% of their entitlement volume in any given season. In Victoria’s larger systems (Murray, Goulburn and Campaspe), an entitlement holder can carry over up to 100% of their water share volume for both high and low reliability water shares. Spillable water accounts allow these entitlement holders to make use of space in the dams when it is available to store water above 100% of their entitlement volume. When the stored volume exceeds 100% of entitlement volume, it is quarantined in spillable accounts until a low spill risk is declared. When the dam spills, water is forfeited proportionally across entitlement holders’ spillable accounts. This rule has been in place since 2010 to ensure inflows that support new allocations can be captured in the dams. Victoria also deals with evaporation losses on carryover by deducting 5% of water carried over.</td>
</tr>
<tr>
<td>South Australia</td>
<td>South Australia has recently completed a review into its carryover policy. The new policy now includes a 5% reduction for evaporation loss on carryover water at a bulk level (rather than deducting 5% from an individual’s carryover volume, as per the previous policy) as well as now allowing entitlement holders to roll over excess volumes above 100% for future dry years when allocations reach 100%. Private carryover will be granted when minimum opening irrigation allocations in April are 50% or less. Private carryover is allowed for up to 20% of the volume of Class 3 water access entitlements held. A final water meter reading must be provided by 31 July to be eligible for carryover. After carryover has been announced, if conditions improve and allocations increase to 100%, total allocation (against entitlements plus carryover allocation) cannot exceed 100%. If there is not enough water available in storage to meet the total carryover demand for all eligible water users, the volume of water granted to an individual will be reduced proportionally.</td>
</tr>
</tbody>
</table>

The Australian Capital Territory manages its water resources via the *Water Resources Act 2007* and does not mention carryover in its legislation. The volume of carryover has increased since its introduction, though varies from year-to-year as water availability and specific policy settings change (figure 3.15 in Chapter 3). Different levels of carryover utilisation between states also reflects differences between states’ policies. Trends in carryover are covered in subsection 3.2.1.

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Some stakeholders have called for carryover to be abolished, while others strongly supported its retention

Some stakeholders have called for carryover to be abolished, as they allege that it reduces allocations for lower security entitlement holders.\textsuperscript{1175} The reduction in allocations for low security entitlements is discussed in more detail in subsection 15.1.3.

The ACCC found that carryover may have a small negative impact on allocations, which the ACCC found to be outweighed by the benefits. Furthermore, the ACCC views water that is carried over no differently to water that has been allocated out in the same year to be used or traded. If carryover did not exist, this would likely result in more use of water within the year, rather than leading to significant forfeiture which would increase the pool of water available to be allocated out in the following year.

There have been calls by stakeholders to prevent water from being traded more than once, to prevent carryover parking trade.\textsuperscript{1176} The ACCC disagrees with these calls, as trade can allow the most efficient use of storage, provided that externalities and third party impacts are adequately taken into account. Carryover is also only necessary due to the accounting constraints of the water year. If continuous accounting and capacity sharing were to be adopted, carryover would no longer be needed.

Stakeholders have also highlighted that carryover is an important risk management tool for businesses to be able to access water early in the season.\textsuperscript{1177} goFarm highlights that:

\begin{quote}
Carryover is a critical risk management tool; it helps water users manage water supply-side parameters, and in doing so helps to smooth out price peaks and troughs as well as facilitate short and medium-term investment certainty. In the absence of carryover, the market could become more volatile and a ‘use it or lose it’ approach could see water applied to inefficient uses.\textsuperscript{1178}
\end{quote}

Carryover parking is rapidly increasing

The right to store water between water years, remains bundled with entitlements. Its value to water users as a risk management tool has resulted in demand for carryover above what people are allowed on their entitlement. This has led to the development of a market for trading to access carryover, or carryover parking. Carryover parking refers to water that has been traded between accounts, either within or between trading zones. This can be between accounts owned by the same person (intraparty), or for carryover parking between accounts with different owners (interparty).

The different carryover policies across states and valleys encourage water users to trade allocation in order to access the more generous carryover provisions into certain states and valleys. The ACCC has analysed trade data provided by the Basin States to identify what the ACCC believes to be carryover parking trades, however as detailed box 15.2, in the ACCC’s methodology may not pick up all carryover trades.

\begin{multicols}{2}
\textsuperscript{1178} goFARM Australia Pty Ltd, Submission to the Murray–Darling Basin inquiry, January 2020, p. 2.
\end{multicols}
Box 15.2: Carryover parking classification methodology

As there is limited data on trade for carryover parking, the ACCC developed a methodology to identify carryover parking trades.

The ACCC assumed that carryover parking trades were below $100 per ML and were traded out in June with 90 to 100% of the original volume returned to the original party in the following July, in part to capture the effect of evaporative loss factors applied in Victoria. Where the carryover parking involved multiple trades, the total volume of water traded (in both directions) was used to determine if the group of trades represented carryover parking. Depending on the nature of the individual trades, not all instances of carryover parking involving multiple trades may have been included in the figures. Because the classification criteria are narrowly defined, the figures below almost certainly underestimate the amount of carryover parking occurring.

As seen in figure 3.5, trades approved in June 2017, 2018, and 2019, were more than 15% of the total number of trade within each respective year. Note that the analysis conducted in subsection 5.5.2 on investor carryover parking behaviour is based on actual investor data and therefore more accurately captures carryover parking trades, although it does not include all investor data.

In the future, there will be better data on carryover parking trade due to New South Wales and Victoria’s upgrades to identify trades for carryover parking. 

Figure 15.12 below shows carryover parking is growing over time. The ACCC found that the majority of carryover parking trade was between different participants, but this may be due to the ACCC’s methodology.

The ACCC has also analysed who is leasing and using carryover parking. The largest groups are irrigators for both those who are leasing their dam space and who are using others’ dam space. The largest category pair in the figure below, was irrigator to irrigator at 20% in 2018–19. These reflect the value irrigators place on accessing storage to firm up their allocations, either in anticipation of dry years or to access water early in the season.

Figure 15.12: Volume of water traded for carryover parking annually by market participant type pairings, lessee to lessor, 2012–13 to 2018–19

Source: ACCC analysis based on NSW and Victorian governments’ responses to voluntary information requests.

Note: Other refers to all other identified trades. IO refers to irrigation operators and EWH to environmental water holders.

15.2.3 More information is needed about trade for carryover and its impact on the market and the entitlement framework

Currently, carryover parking does not make up a large amount of trade flows, however it has the potential to increase and start impacting the opening and closing of trade limits. This may occur because water traded from one valley to another to take advantage of different carryover provisions may increase or decrease IVT account balances until they reach their limits.

Of the carryover parking trades that the ACCC has identified, 56% of carryover parking occurs within the same water access licence type and within the same zone. 6% of carryover parking involved interstate trade (4% New South Wales to Victoria, 1% SA to Victoria), with 36% of trades involving intervalley trade within the same state.\textsuperscript{1180} Although these figures are currently small, if interstate or intervalley carryover parking trades continue to grow, then there is the potential that carryover parking may start to impact trade limits.

Stakeholders also indicated that they are concerned with high security entitlement holders in New South Wales (who do not have access to carryover due to the high reliability of their entitlements) accessing carryover by trading water to general security holders and reducing lower security entitlements’ allocations.\textsuperscript{1181} This is because stakeholders allege that water that would have previously been forfeited by high security entitlement owners (and so reallocated to the consumptive pool the following year) is now being parked as carryover on general security accounts. Stakeholders alleged that this forfeited water would have formed part of the consumptive pool and resulted in higher allocations. This is discussed in more detail in subsection 15.2.4.

The ACCC examined the high security forfeiture in the Murrumbidgee and the Murray as a percentage of general security entitlements (figure 15.13). The analysis shows that the volume of high security forfeiture (even prior to carryover parking becoming more widespread in recent years), was less than 1% of the volume of general security entitlements on issue in all years.\textsuperscript{1182} This means the impact on general security entitlement reliability from carryover parking’s impact on forfeitures is very small. However stakeholders may still have equity concerns around high security entitlement accessing carryover as these entitlement types already effectively receive a full allocation every year.

Figure 15.13: High security forfeiture as a percentage of general security entitlement volume, 2012-13 to 2018-19

\begin{figure}
\centering
\includegraphics[width=\textwidth]{high_security_forfeiture}
\caption{High security forfeiture as a percentage of general security entitlement volume, 2012-13 to 2018-19}
\end{figure}

Source: ACCC analysis based on NSW government’s response to voluntary information requests.

\textsuperscript{1180} ACCC analysis based on NSW and Victorian governments’ responses to voluntary information requests.

\textsuperscript{1181} Robert Campbell, Submission to the Murray–Darling Basin water inquiry Interim Report, 13 November 2020.

\textsuperscript{1182} ACCC analysis based on NSW Government’s responses to voluntary information requests.
Carryover parking is changing the impacts on water users. If New South Wales general security entitlement holders park carryover for someone else, this can impact on their allocations in the following year due to account management rules. For example, rules in the Murrumbidgee valley limit water allocation that can be credited to a license to 100% of users’ entitlement volume minus any water carried over, to reduce third party impacts. This means that if a user carries over 30% of water on their account, this reduces their allocations in the following year to a maximum of 70% of their entitlement. It is not clear if all users parking water on their accounts are aware of the implications of these trades; a side effect of carryover parking being an ‘informal’ rather than a formal market. New South Wales Government should improve its communication of these impacts (see recommendation 15).

South Australia should amend its register and trade forms to allow ‘carryover parking’ to be identified as a ‘reason for trade’.

15.2.4 Individual users should bear the risk and costs of carryover, rather than socialising these across other users

The decision of water users to store their water for another year (via carryover provisions), while offering substantial benefits, is not without its costs. If not effectively managed through good policy design, decisions to carry over water could potentially increase the spill risk faced by all entitlement holders in a water source, and increase evaporation losses associated with water storage. These are both potential third party impacts which may reduce entitlement reliability, particularly for holders of low reliability entitlement types. However, while there may be a small reduction in the volume of water forfeited at the end of the water year due to the ability to carry water over, this should not be considered a third party impact as it merely has the same effect as if that water had been used within the season.

In the Southern Basin, water resource managers are required to anticipate and assure that carryover commitments can be met before new allocation is provided to general security entitlements in the new water year. Over the course of the water year, resource managers don’t have to allocate new inflows to carryover, because there should already be water in storage for that, given it was already allocated in the previous year. But the total resource assessment does of course have to account for carryover before any new allocations can be made.

A return to no carryover would also likely lead to inefficient usage of water, and reduce some entitlements’ value. In discussion with irrigators, it has been speculated that without carryover, New South Wales Murrumbidgee general security entitlements would halve in value, as a large part of their value comes from the underlying characteristic of being able to carryover water. The ACCC speculates that this impact would likely be far more significant than the corresponding increase in value arising from possible additional forfeiture and the resulting extra allocation of this water to general security entitlements.

Long term policy solutions in respect of storage rights are continuous accounting and capacity sharing which allow more accurate and dynamic allocating of risks and costs to individual users. These are discussed more in chapter 16, subsection 16.3.2. The primary advantage is that they more accurately mimic what is occurring in the system in terms of inflows, evaporation and storage capacity at the individual level, allowing users to make assessments on what risks, costs and benefits are best for them. These approaches to water accounting are more widespread in the Northern Basin.

Spill risk

Spill can refer to either a physical spill, where water is released from the dam, or a ‘paper’ or accounting spill.

A physical spill refers to water being lost from storage because it is required to be released (because of inflows exceeding the available storage capacity and/or dam safety requirements).

A paper spill occurs when water is not physically released from the dam but is ‘lost’ to a party when a limit is reached for an entitlement or account and the water is then socialised or reallocated to other

1183 ACCC analysis based on NSW Government’s responses to voluntary information requests.
water users. For example, for individual users this is often referred to as forfeiture and occurs at the end of the water year (discussed in the next section).

Stakeholders in the Southern Basin are concerned that carryover, by increasing the amount of water in the dam, increases spill risk. This is a valid concern, though it’s worth noting that all water (including current year allocations, traded water and water held in reserves) also contribute to spill risks. Most states adequately manage the increased spill risks of carryover at the end of the year, by a variety of limits imposed on carryover volumes and account balances. Spill risk, trade and IVT limits are discussed more in subsection 14.1.3.

South Australia, New South Wales and Victoria manage their increased spill risks from carryover in different ways. As South Australian deferred water is the first to spill, it addresses spill risk by only allowing carryover in years where projected opening allocations in April are 50% or less, capping carryover at 20% of entitlement and water use at 100% of entitlement. This means that carryover is only available in very dry years when spill risk is low.

Victoria only allows the volume of allocations in a person’s account to exceed 100% of entitlement volume in river systems where there is access to larger storages. The water carried over above 100% of a user’s entitlement enters a ‘spillable water account’ and is the first to spill if the dam spills and there has been no low risk of spill declaration. Access and ability to trade water held in a spillable account is also restricted until a, low risk of spill, declaration is made. There may be a small risk that this additional carryover water may cause spills that impact other water users if Victorian river operators declare a, low risk of spill, and a dam later spills.

New South Wales manages spill risk (and other third party risks) by having maximum account and use limits. Water users can choose to maximise their carryover, but this reduces their potential allocation in the following year as allocation plus carryover is capped by the account limit.

The ACCC finds that spill risk is generally adequately managed by Basin States policies, and appropriately balances the benefits of carryover for individuals with the risk for third party impacts. However, there could be long-term benefits and increased efficiency in moving to continuous accounting and capacity sharing.

**Evaporation**

Water stored in a dam results in evaporation. Generally, the longer water is stored in a dam and the greater the surface area of the water being stored, the greater the evaporation. Note that evaporation will not necessarily increase linearly with the volume of water held in the dam, so determining the additional evaporative losses from storing an additional ML of water is particularly difficult.

In principle, all users should individually bear evaporation costs for all water that is stored, including allocated water for the period it is stored in the dam. Currently, predicted evaporative losses are accounted for through water resource assessments and socialised across entitlement holders (figure 15.1 shows this for bulk water sharing in the Murray). This does not take account of timing of water use within that year, and hence how long that water spent in storage. Victoria has moved to applying an individual evaporation loss for water carried over, though this is only applied at an annual basis (rather than a more granular measure of the time water spent in storage). Without continuous accounting (which would allow a more granular costing of evaporation losses), carryover rules are the main mechanism that is used to attribute evaporation losses on an annual basis to individuals in the Southern Connected Basin.

1187 ACCC analysis based on NSW Government’s responses to voluntary information requests. NSW explained that the risk of third-party impact, particularly in the context of carryover, is managed by account limits, with carryover water notionally spilling from full accounts as allocations improve and limits are reached rather than carryover being debited from accounts in response to physical spill from storage. Email from DPIE to ACCC.
In table 15.2 below, annual net evaporation is shown as a percentage of storage capacity. Note that due to the high evaporation losses, river operators avoid leaving water for long periods in Lake Victoria which is located in SA on the Murray. In contrast, as Menindee is the main storage on the Lower Darling, river operators do not have a choice in storing water there to meet demand in the Lower Darling.

**Table 15.2: Annual net evaporation as a percentage of storage capacity, 2012–13 to 2018–19**

<table>
<thead>
<tr>
<th>Year</th>
<th>Lake Dartmouth</th>
<th>Lake Hume</th>
<th>Lake Victoria</th>
<th>Menindee Lakes</th>
</tr>
</thead>
<tbody>
<tr>
<td>2012–13</td>
<td>0.22%</td>
<td>3.44%</td>
<td>22.60%</td>
<td>105.31%</td>
</tr>
<tr>
<td>2013–14</td>
<td>0.25%</td>
<td>2.35%</td>
<td>21.91%</td>
<td>70.12%</td>
</tr>
<tr>
<td>2014–15</td>
<td>0.27%</td>
<td>2.10%</td>
<td>22.27%</td>
<td>22.91%</td>
</tr>
<tr>
<td>2015–16</td>
<td>0.46%</td>
<td>1.60%</td>
<td>17.52%</td>
<td>39.11%</td>
</tr>
<tr>
<td>2016–17</td>
<td>0.03%</td>
<td>2.55%</td>
<td>20.52%</td>
<td>97.85%</td>
</tr>
<tr>
<td>2017–18</td>
<td>0.45%</td>
<td>3.73%</td>
<td>22.56%</td>
<td>52.71%</td>
</tr>
<tr>
<td>2018–19</td>
<td>0.42%</td>
<td>3.19%</td>
<td>24.68%</td>
<td>15.90%</td>
</tr>
</tbody>
</table>

Source: ACCC analysis based on MDBA responses to voluntary information requests.

Note: Evaporation losses are net figures and can be reduced below zero by things like rainfall over the dam.

SA and Victoria both deal with evaporation losses on carryover by deducting 5% of water carried over, although Victoria applies this to private accounts and South Australia does so at a bulk level.\(^{1188}\) In New South Wales, evaporation is not costed to individual users of carryover and is socialised across all users.\(^{1189}\)

The ACCC is concerned in New South Wales that evaporation losses are not taken into account, there are third party impacts and these losses are socialised reducing the consumptive pool. Water users in this instance do not face the full cost of their water use and storage decisions. Similarly, South Australia’s policy of applying loss factors at the bulk level also means that the costs of carryover will not be reflected back to water users, and the impact of losses will be socialised across all users.

Conversely, Victoria’s loss factors may be too high. Theoretically, a more accurate and variable loss would result in improved outcomes. However the ACCC appreciates that 5% was chosen to prevent negative third party impacts, to give certainty to users, and for administrative simplicity. The ACCC believes that having an evaporation cost to individuals is more efficient than having no cost, where the costs are less distortionary than externalities would be.

Evaporation losses in Lake Eildon (the major storage in the Goulburn system) were estimated at 2.6% in 2017–2018 and 2.3% in 2018–19.\(^{1190}\) Meanwhile, losses from Lake Dartmouth and Lake Hume didn’t exceed 0.47% and 3.73% respectively, from 2012–13 to 2018–19. All of these figures are lower than the 5% losses applied to carryover, suggesting that Victoria’s 5% evaporation loss may be too high in the Goulburn and Victorian Murray systems. The Victorian Department of Environmental, Land, Water and Planning informed the ACCC that Victoria’s approach to applying a deduction for evaporation is based on average evaporation across years – as assessed through the Northern Region Sustainable Water Strategy. This allows for certainty up front for entitlement holders when they choose to carry over water.\(^{1191}\)

The ACCC recommends that Basin States design carryover rules and policies to appropriately account for third party impacts such as evaporation losses from storing water in a dam, and attribute them to

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1189 ACCC analysis based on NSW Government’s responses to voluntary information requests. NSW explained that the risk of third-party impact, particularly in the context of carryover, is managed by account limits, with carryover water notionally spilling from full accounts as allocations improve and limits are reached rather than carryover being debited from accounts in response to physical spill from storage.


1191 DELWP, email to ACCC, 9 February 2021.
the individual. Longer term reforms such as continuous accounting or capacity sharing could allow for more accurate evaporation costs.

**Forfeiture**

Stakeholders expressed concern that carryover has reduced the volume of unused water forfeited at the end of the year, which previously would have been returned (or socialised) back to the consumptive pool for the following year.\(^{1192}\) There is a view, particularly among general security entitlement holders in New South Wales, that this reduction in forfeitures is having a sizeable effect on entitlement reliability. As stated earlier in subsection 15.2.1, the ACCC’s position is that water being forfeited has the same effect on available water resources as water being used.

The ACCC has found that in New South Wales water sources, water is still being forfeited in flood years (such as 2016–17) as seen in the figure below. This may be less than what has been experienced with similar years prior to carryover, but a decrease in forfeiture could reasonably be expected even without carryover, due to the value of water increasing. Figure 15.14 below shows a downward trend in forfeiture in the NSW Murray Below Choke, though the trend appears stable in the NSW Above Choke and the Murrumbidgee.

**Figure 15.14:** Water forfeited at the end of the year for New South Wales Murray above and below Barmah Choke and Murrumbidgee as a proportion of water account debits, 2012–13 to 2018–19

Source: ACCC analysis based on NSW government’s response to voluntary information requests.

Note: This data excludes forfeitures by supplementary entitlement holders.

The ACCC understands that end-of-year forfeits of water are rare in the Victorian Murray due to Victoria’s carryover policy (discussed above).

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There seems to be a common assumption among stakeholders that all water carried over in a season or all water carried over by high security entitlement holders through carryover parking arrangements, would be forfeited. The ACCC disagrees with this assumption as water market participants are much more aware of the value of water than in the past and would use the water rather than forfeit it without carryover. NSW Government also expressed this view when it stated:

The expected result of NSW water reforms, namely increased water use efficiency and water migrating to higher value usage, means less likelihood that water users are willing to forfeit their water. Therefore, the forfeiture of unused water and subsequent socialisation between years is reducing.

The Victorian Government determined that utilisation impacts on allocations were acceptable, as this is the same effect as if individuals used their allocation during the season, as they are entitled to do. The Victorian Government concurred with NSW Government on the low likelihood that significant forfeitures would occur in the absence of carryover:

Given the high value of water since unbundling, it is not expected that entitlement holders would simply forfeit their water if carryover did not exist. It is more likely that users would use or trade their water in that season.

NSW and Victorian governments have both indicated that forfeitures are not assumed to contribute to allocation policy decisions, as resource assessments in both these states assume full utilisation of allocated water. NSW Government stated that ‘To assume forfeiture, is to assume a risk in allocating water that may not be available. This could be disastrous for water users’.

The ACCC does not consider that the additional water allocations that would accrue to entitlement holders as a result of water forfeitures should be considered to be part of an entitlement holders’ property right. Relying on forfeited water for allocations is relying on other water users to sacrifice valuable financial assets for a perceived ‘social good’. The additional allocation from water forfeitures should instead be seen as a windfall to entitlement holders. Further, given the changing value of water and shifts in market participant behaviours are likely to have a greater impact on forfeiture than the impact of carryover itself.

15.2.5 Harmonising carryover policies is not straightforward

Differences between states and valleys carryover policies have resulted in some stakeholders calling for harmonisation of carryover rules across the Southern Connected Basin. However there are a variety of reasons for these differences, including the relative volume of storage capacity and entitlements on issue in each water source, and each state’s entitlement and accounting frameworks.

States’ choices in setting carryover rules and account management rules seek to balance entitlement holders’ ability to smooth their allocation profile to manage risks with the increased spill risk to that storing extra water in storages brings. This choice is also linked to allocations and the underlying entitlement framework, discussed in more detail in subsections 15.1.1 and 15.1.2.

South Australia has a stricter carryover policy in response to less reliable access to storage space compared to Victoria and New South Wales. The Murray–Darling Basin Agreement in schedule G, allows the private carryover of South Australian water in upstream storages on the condition it must not adversely impact New South Wales or Victorian water availability by increasing spill risk for these states.

1195 Storage arrangements are set out in Schedule G of the Murray–Darling Basin Agreement – this sets out that if water spills from storage then South Australia’s deferred water for private carryover spills first.
If South Australian carryover water is stored in dams on South Australian accounts, this takes up space that could otherwise be used to capture inflows for other states, increasing spill risk. Therefore, South Australian deferred water is the first to spill when storages in New South Wales and Victoria fill. This, combined with South Australia’s more conservative approach to allocations, results in more reliable allocations and in turn, a more restrictive carryover policy. These stricter carryover rules do not prevent South Australian users from engaging in trade to access carryover parking in Victoria. This division between South Australian water stored on South Australian accounts and South Australian water stored on Victorian accounts is an artificial split due to the carryover arrangements and the lack of a separate storage right.

In the River Murray system, Victoria and New South Wales have a 50–50 split of the Hume and Dartmouth reservoirs, giving them more reliable access to storage compared to South Australia. This access is reflected in their carryover policies allowing higher and more frequent (but also different) levels of carryover. However, significant differences exist between the policies of these states.

New South Wales specification of a 50% carryover limit in the NSW Murray works in conjunction with account management rules to mitigate spill risk caused by increased use of carryover. Meanwhile, Victoria’s approach of a 100% carryover limit and the use of spillable water accounts more directly mitigates the third party impacts associated with spill risk, by attributing the impact of a spill directly to those with volumes of carryover greater than the volume of their entitlement holding. So, while individual decisions in Victoria to hold large volumes of carryover might increase overall spill risks, because the cost of these risks are borne by the relevant individual, these are of less concern when considering market efficiency.

Some stakeholders have suggested that carryover should be 100% of entitlements across all valleys, to prevent trade for carryover. However, because of the differences in accounting approaches outlined above, this is likely not feasible without creating significant risk of third party impacts in New South Wales. The New South Wales approach of managing spill risk with account management rules means that lower carryover limits are necessary to prevent the generation of externalities. Meanwhile, higher carryover limits in Victoria are facilitated by Victoria’s approach to ‘internalise the externality’ of spill risk onto those whose individual carryover decisions increase the risk.

Figure 15.15 shows the amount of maximum permitted carryover compared to entitlements on issue by valley. Victoria allows more carryover than New South Wales due to the ability to directly attribute spill risks to those with carryover volumes in excess of their entitlement volume.

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1199 Select Harvests, Submission to the Murray-Darling Basin water inquiry issues paper, 13 November 2020, p. 4.

1200 It should be noted that access to water in spillable water accounts is limited until the Northern Victoria Resource Manager makes a declaration of low spill risk which does add an additional risk factor. Should a spill occur after a low spill risk declaration, the impact of a spill would be shared across all Victorian entitlement holders in that zone.
Figure 15.15: Maximum permitted carryover and entitlements on issue, by water source

Source: ACCC analysis based on the Bureau of Meteorology.
Notes: Entitlements on issue includes the following: for South Australia River Murray High reliability: Class 3, 3b, 4, 7, 8, 9 entitlements; for Victorian regulated water sources: High and Low reliability water shares; for NSW Murray and Murrumbidgee: High Security, General Security (classed as low or general reliability). NSW Murray = NSW Murray Regulated River Water Source; Murrumbidgee = Murrumbidgee Regulated River Water Source.

To show total carryover allowed in each valley, carryover policies were applied to the relevant entitlements. For NSW, the 30% in the Murrumbidgee and 50% Murray available to carryover on general security entitlements was applied.

In Victoria, 100% carryover limit of high and low reliability water shares was applied. Spillable water accounts are not shown as these are a restriction on the ability to use or trade water in the new season as a result of an entitlement holder’s carrying over of water, and it does not alter the limits on how much an entitlement holder can carry over.

Note for South Australia, carryover only occurs in dry years (see section 15.2 for details) and the 20% carryover limit to class 3 entitlements is applied.

Within New South Wales, there is a wide range of different carryover rules depending on the water source and entitlements issued. The majority of New South Wales water sources allow water to be carried over only on general security entitlements,\(^\text{1201}\) because of their lower reliability and higher percentage of entitlements on issue. The ACCC understands that the 30% carryover limit in the Murrumbidgee (compared to 50% in the New South Wales Murray) stems from the lower relative volume of accessible storage compared to the volume of carryover-eligible (that is, general security) entitlements in the valley. This drives the need for a lower carryover limit in the Murrumbidgee to mitigate the threat of increased spill risk if greater volumes of water were maintained in storages in the Murrumbidgee.

The implication of these factors is that harmonising carryover arrangements cannot be achieved by simply aligning carryover limits. Instead, harmonising these policies across the southern connected Basin would require more significant tweaks to the underlying regimes for the use and rationing of storage capacity. While there may be benefit in the introduction of spillable water accounts across the Southern Connected Basin, the ACCC considers capacity sharing (or continuous accounting) represent the best practice alternative to the current regime of carryover policies. For this, subsection 16.3.2 recommends capacity sharing be considered as part of the long-term roadmap of market architecture reforms.

\(^{1201}\) ACCC analysis of New South Wales carryover policies found in Water Sharing Plans.
15.2.6 If third party or trade impacts are unable to be dealt with, then more substantial reform such as capacity sharing could be required

Currently carryover policies appear to be working reasonably well and, for the most part, are managing third party impacts from carryover. However many of the current rules were written prior to carryover parking and therefore focus on controlling carryover and use only within a zone, rather than more directly managing third party impacts as capacity sharing and continuous accounting would.

At present carryover parking appears to be limited, but will likely expand as water becomes more valuable and water holders reduce their forfeiture risk by using carryover parking. Once carryover parking starts triggering IVT or other trade limits, carryover parking impacts can no longer be managed internally within carryover policies. This may trigger the need for a more fundamental change to continuous accounting and capacity sharing.

Capacity sharing and continuous accounting move both water property rights and water accounting closer towards what is occurring hydrologically in the system. Capacity sharing is where each water user is allocated with a share of storage capacity and a share of water inflow. Continuous accounting operates in a similar way to an annual allocation system, except with more frequent water use accounting. The concept of a water year becomes irrelevant, except where it is used to enforce a use limit. These allow market architecture to better reflect what is occurring in the river system in terms of limited storage capacity and more accurately pricing losses, and helps users to make better choices that result in more efficient outcomes. Furthermore, these enable harmonisation of access to storage, by converting current carryover rights to ML rights, as a share of dam capacity.

Continuous accounting and capacity sharing are discussed in more detail in subsection 16.3.2, as part of a suite of policies that would more fundamentally address the issues discussed in this chapter.

15.3 Modelling, metering, measuring, and accounting for use supports a robust market

A ‘cap and trade’ system such as underpins Basin water markets relies upon robust monitoring of water use, with adequate enforcement of compliance. Robust monitoring requires the installation of metering technology or the use of alternative measurement technologies, and the collection of timely usage data. This enables the reconciliation of water usage data against account balances in order to detect overuse or unauthorised taking of water.

Accurate use data, shared in a timely manner, will also allow river operators to better predict when and how to meet demand, and run the river more efficiently within the river’s hydrological constraints.

1202 “A capacity sharing approach to water property rights and markets includes the following key features:

- Water rights defined as percentage shares of system inflow and storage capacity
- Continuous (i.e., daily) water accounting with periodic reconciliations to ensure physical water supplies match user accounts
- User carryover subject to storage capacity (account) limits and ‘internal spills’
- User level delivery capacity rights and delivery loss factors...”

ABARES, Submission to the Murray-Darling Basin water inquiry Interim Report, 18 December 2020.

15.3.1 Improved modelling capability and real time usage data is needed to help water resource managers and river operators develop new tools and plan for risks

The MDBA, other river operators and water resource managers rely on a variety of models to support decision-making and manage water in the Basin. Models are used to understand the operating outlook and assess deliverability, determine water availability and assess compliance with water use limits, inform river operation and assess the effects of water releases, inform response management for river salinity and water quality issues, and test policies and strategies for improving water management. Modelling also plays an important role in establishing and adhering to ecological tolerances in river operations, discussed more in section 14.2.4.

Inaccurate modelling can have dire consequences. Although the fish deaths in the lower Darling River in 2018–19 were largely due to climactic conditions, inaccurate river models were also found to contribute to these events.\textsuperscript{1204} Better modelling will improve how river operators can plan for the use of water for the environment.\textsuperscript{1205}

Following the Murray-Darling Basin Water Compliance Review, the MDBA published a Model Improvement Program for Hydrological Models.\textsuperscript{1206} Despite significant existing modelling capability in the Basin, there is a need to continually improve and update models, as better data and modelling technologies becomes available.

To understand impacts at a Basin scale, catchment models need to be integrated with one another, which means models need to be developed on a compatible basis, particularly in the Southern Connected Basin where there is widespread trade. The ACCC understands that models for the River Murray (from the MDBA) and the tributaries (from the states), operate on different assumptions and platforms, which has resulted in significant variation in the currency and fidelity of individual sub-Basin models.

The MDBA’s submission to the ACCC’s issues paper highlighted that:\textsuperscript{1207}

These river system models have been collaboratively developed by Basin States and the MDBA. Hydrological models calibrated and validated during the late 1990s may not be reflective of current irrigation practices and farmer behaviour, and consequently may have poor predictive capacity for low-flow periods.

To be effective, models need to accurately reflect the current settings to provide a basis for comparison with scenarios that test different elements of the system. Better integration of actual water user behaviour would help increase the accuracy of long term forecast models. Improved modelling, and including crop type forecasting and behaviour of water users (and in particular environmental water holders), will likely improve management of delivery shortfall risks and help understand conveyance losses. ABARES has the capability to model irrigator behaviour, and better integrating ABARES models with the Integrated River System Modelling Framework would likely increase accuracy. However, further improvements can also be made to ABARES models via regularly updating underlying data and assumptions.\textsuperscript{1208}


\textsuperscript{1207} MDBA, Submission to the Murray–Darling Basin inquiry issues paper, 13 February 2020, p. 11.

\textsuperscript{1208} As noted in Chapter 3, the current model is based on the climate sequence from 2006 to 2019 which was drier than the long term average. The modelling assumes current farms use current capital and technology, and does not allow for long-term adaptation or structural adjustment, and commodity prices are also fixed to observed values in 2018–19. ABARES, Future scenarios for the southern Murray–Darling Basin: Report to the Independent Assessment of Social and Economic Conditions in the Basin, https://www.agriculture.gov.au/abares/research-topics/water/future-scenarios-smdb-independent-assessment-social-economic-conditions, viewed 22 June 2020.
There is a need to better incorporate climate change modelling in a standardised and holistic way across the Basin. While operational models are looked at on a yearly basis to incorporate aspects such as additional losses in a changing climate, the MDBA’s ability to incorporate climate change forecasts into forward planning models is currently limited, and work should be done to develop a common approach between the MDBA and Basin States for considering whole-of-Basin climate change impacts. Current work underway in the Basin to improve modelling and the MDBA states that:\textsuperscript{1209} The MDBA is working closely with the [Bureau of Meteorology] in exploring the use of dynamic streamflow forecasts based on global climate models, to complement and enhance baseline information from historical inflow sequences, for use in future planning.

Modelling is only as accurate as the data that is fed into the model. As discussed in section 15.3.4, without telemetry, limitations on current time of use data result in large time lags between when water is used and when it is recorded.

Time of use data shortcomings are most notable in South Australia. This is illustrated in the water use data in figure 15.16. The chart shows significant spikes at regular intervals and at the end of the water year for SA water users. This reflects South Australia’s policy of quarterly meter reads and annual reconciliation, rather than actual water usage patterns. Although quarterly meter reads and annual reconciliation is consistent with current Basin-wide commitments under the Basin Compliance Compact, the usage data is insufficient to identify changes or trends in the timing of water use. Although Victoria and New South Wales have more real time use data due to higher levels of telemetry and stricter usage reporting requirements, their data is also still not generally granular enough in geographic breakdown or comprehensive enough to help water managers undertake scenario planning and shortfall management.

Data needs to be more granular (in both smaller time periods and smaller geographical areas) and shared in a timelier manner to be useful in managing shortfalls, for example. This will assist models in predicting if or when a delivery shortfall would occur, given shortfalls are likely to be time constrained to days or weeks rather than quarters. Data related issues are discussed more in Appendix G and sharing of information in chapter 11.

\textbf{Figure 15.16: South Australian total consumptive water use (GL) by month, from 2012–13 to 2018–19}

\begin{figure}
\centering
\includegraphics[width=\textwidth]{south-australian-water-use.png}
\caption{South Australian total consumptive water use (GL) by month, from 2012–13 to 2018–19}
\end{figure}

Source: ACCC analysis of South Australian information request response

15.3.2 The Basin Compliance Compact has delivered more harmonised metering arrangements but comprehensive, risk-based monitoring of water take is not yet available

Metering standards are set at the state level. In recent years, Basin states have improved metering standards via the Basin Compliance Compact. In the Basin Compliance Compact in 2018, Basin States agreed to a range of measures to update their metering requirements and accelerate the roll out of updated technologies, with subsequent updates to state policy frameworks. Improvements are still in the process of being rolled out by states.

The ACCC commends Australian and Basin State governments for the goal of requiring all take via water entitlements to be metered by June 2025, and all new and replacement meters to comply with AS4747 including pattern approval and verification, by no later than June 2025.

The ACCC understands that New South Wales, Queensland and South Australia are now operating on extended timeframes due in part to difficulties validating meters in drought conditions. They have completed Victoria’s metering commitments under the Basin Compliance Compact.

The ACCC is concerned that without an ongoing, public reporting mechanism, Basin States are not able to be held publically accountable to their goal of ‘no meter, no pump’ or 95% metering of water take per water resource area. The progress towards 95% of water take being metered is not currently included in the Murray–Darling Basin Compliance Compact Assurance Reports. At the time of writing, Murray–Darling Basin Compliance Compact Assurance Report 2020, had not been released.

15.3.3 Different meter technology and water use accounting requirements can undermine market integrity and confidence

Despite improvements to policies across the Basin, water users still face different metering and accounting requirements depending on where they are located. This may undermine confidence and market integrity, if users feel that these differences are not justified.

The ACCC received multiple submissions that were concerned, in particular, with the measuring of water take in the Northern Basin. Measuring of flood plain harvesting and overland flows are discussed more in subsection 15.3.7. Many stakeholders also raised concerns about South Australia only having quarterly meter reads, discussed in subsection 15.3.1.

However, even with the Basin Compliance Compact’s improvements listed in the previous section, there are still differences in metering requirements and technology for like users in and between states. For example, New South Wales does not require telemetry on groundwater use, and upgrades have been rolled out inconsistently across states. Differences continue to undermine confidence in the market, notably, the absence of requirements for telemetry in South Australia (as discussed in subsection 15.3.4) and slower progress on developing frameworks for licensing flood plain harvesting and overland flows in the Northern Basin. The table below outlines the main differences between states metering policies.

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1214 NSW’s decision to adopt this position was based on detailed assessment of groundwater monitoring requirements along with stakeholder consultation, explaining that the current framework will be reviewed in five years and the requirement for telemetry could be adjusted at that time. All data loggers installed under the new requirements must be telemetry capable, which will help reduce the cost of retrofitting telemetry should the telemetry threshold be adjusted down the track. Groundwater users can voluntarily choose to install a telemetry system. DPIE, email to ACCC, 8 February 2021.
Table 15.3:  States’ telemetry policies

<table>
<thead>
<tr>
<th>State</th>
<th>Telemetry required?</th>
<th>Deadline</th>
</tr>
</thead>
<tbody>
<tr>
<td>Victoria</td>
<td>Yes, for sites pumping more than 10ML surface and 20ML ground water</td>
<td>June 2025</td>
</tr>
<tr>
<td>South Australia</td>
<td>No, but requires that meters are able to have telemetry added</td>
<td>N/A</td>
</tr>
<tr>
<td>New South Wales</td>
<td>Yes, for pumps larger than 200mm and not groundworks</td>
<td>December 2023</td>
</tr>
<tr>
<td>Queensland</td>
<td>No, but requires that meters are able to have telemetry added</td>
<td>Queensland is currently reviewing its non-urban metering policy</td>
</tr>
</tbody>
</table>

15.3.4 Metering and water accounting standards have been set primarily for water management

Metering and water accounting standards have been set primarily in terms of what is required for river operations and maintaining compliance with limits on authorised take, however these are no longer fit-for-purpose to deal with current and emerging issues. Increasingly river operations issues are related to timing of use, such as constrained delivery capacity and the risk of delivery shortfall, and increasing stakeholder concern around conveyance losses.

The current water accounting arrangements do not allow tracking of a particular parcel of water. This makes it difficult to determine when and where traded water is being used, and what contribution traded water and the water markets are having on conveyance losses and delivery risk. This is discussed in more detail in subsections 14.2.2 and 14.2.3.

The River Murray System Summary of River Operations 2018 – 2019 report also noted the need to update modelling to better incorporate the effects of climate change:

The effects of climate change are starting to be seen in a range of areas. It is becoming increasingly clear that history is no longer a guide to the future regarding water resources availability and temporal variability. IRORG is of the view that the MDBA needs to challenge its existing assumptions and operational norms and come up with a defensible approach to managing the system in response to a changing climate.

Conveyance losses and delivery risk are affected by the timing of when water (traded or non-traded) is being used. Conveyance losses are affected by climatic conditions (how hot or dry the river is) and river operator decisions which are driven by predicted water demand, discussed further in subsection 14.2.3. Delivery risk can be heightened due to demand concentrated within a time period. If water use were spread evenly throughout the year, the river system could deliver water without a shortfall. However current trends suggest an increasingly concentrated demand due to horticultural proliferation in the lower Murray, increasing the risk of a shortfall. See subsection 14.2.2.
Delivery risk and conveyance loss issues, due to their timing of use dimension, are not able to be adequately assessed using non-telemetered metering. Part of the reason why these issues and risks have been increasing is because they sit outside market arrangements. Reforming market architecture to internalise these risks is going to require significant investment in more accurate modelling, metering and water accounting.

15.3.5  Widespread telemetry is needed in water markets for compliance and enforcement, and to support longer term potential reforms

Telemetry is an important part of updating metering so that it can be monitored remotely and more frequently. Telemetry refers to meters that allow reading to occur remotely, with the data being sent to a centralised database for monitoring. Telemetry costs more than the Australian Standard AS4747 water meters currently required by all states, although AS4747 meters can all be retrofitted with telemetry if required.

Telemetry will provide multiple benefits to improve the efficiency of river operations. This could include helping to better understand conveyance losses and delivery shortfall risk, if paired with lifetime traceability of water allocations (discussed in subsection 12.4.4).

Telemetry will also be required for any of the longer term reforms for interregional trade that deal with timing of use issues, such as delivery rights, the water market operator, delivery rationing, or congestion charging. As discussed in subsections 14.2.2 and 14.2.3, better metering, modelling and water accounting are required to understand better the interactions between trade, use and what is occurring in the system before more widespread reforms are able to occur. It will also aid regulators to enact better enforcement and compliance regimes, reducing illegal water take.1221

Victoria has advised the ACCC that it has 67% of ground and surface water telemetered, with 19% unmetered.

South Australia currently has 1% of its meters that are AS474 compliant, with 96% of water take estimated to be metered.1222 South Australia has indicated to the ACCC that they will enact telemetry, subject to funding. South Australia has recently lodged a project proposal with the Australian Government’s Department of Agriculture Water and Environment to upgrade to telemetered meters along the River Murray. This is currently being considered by the Australian Government.

New South Wales’s new non-urban metering rules take effect from 1 December 2020, requiring licence and approval holders of surface water pumps 500mm or greater in size to have telemetry installed.1223 The staged rollout will continue until 1 December 2023 when all surface water pumps with a diameter of 200mm or greater must have telemetry installed.1224

Despite recently moving to a require widespread telemetry, New South Wales has 19% of its total water take telemetered, with 46% of take flow metered and 32% of flow unmetered or measured by alternative means. A significant proportion of the unmetered or alternatively measured flow, is from environmental flows or water tagged for interstate use (14% of total take). New South Wales has also advised that other alternatively measured water take make up the majority of the unmeasured or alternatively measured take.1225


1225 Other reasons for non-metered or alternative classification of water take is usage by irrigation corporations (to conveyance canals, channels and the like) with an added level of validation performed by river systems operators, or metered water with a secondary validation applied by WaterNSW staff as part of it’s routine, high-risk management of water take by users.
Basin States should continue to improve metering and monitoring

The Australian and Basin State governments, working with the MDBA, should strengthen their existing commitments to better metering and measurement of water take across the Basin. This should include committing to harmonising the metering standards and technology in use in the Southern Connected Basin, monitoring progress on the measurement and outcomes of overland flows/flood plain harvesting, continued improvement of approaches to handling usage data and improving compliance and enforcement programs. This could be achieved through extending and expanding the scope of the Basin Compliance Compact.

Telemetry should also be implemented across the Southern Connected Basin where technologically possible. In particular, South Australia should commit to upgrading its metering standards to require telemetry, so as to harmonise metering standards in the Southern Connected Basin and ensure that metering is fit for market and river operations purposes.

15.3.6 Alternatives technologies may fill gaps where telemetry is not appropriate

The Basin States metering policies are balancing the costs of installing new telemetry meters on water users, with the benefits of more timely and accurate measurement of take. The ACCC believes that the benefits of more widespread telemetry outweigh the costs, particularly in the Southern Connected Basin where from mid-2012 to near the end of 2018, parties traded about $10.1 billion in permanent water access entitlements and $2.2 billion of annual water allocations.\(^{1226}\)

However the ACCC acknowledges that telemetry is more expensive to install than the current Australian standard AS4747 meters and the overall cost of universal telemetry could be significant, especially for smaller users.\(^{1227}\) Queensland estimates that installation costs for smaller meters are from $8,000 (for meters below 200 millimetres), with very large meters (approximately 1,200 millimetres) costing up to $100,000.\(^{1228}\) NSW Office of Water estimated the average cost of new meter installations (including telemetry and associated works) would be $12,000 to $15,000.\(^{1229}\) Initial estimates indicate that the cost to retrofit telemetry to an existing meter ranges from $500 to $5,000.\(^{1230}\) Governments may wish to consider how the cost of universal telemetry could be shared between themselves and users, in order to balance the desire to satisfy user-pays principle while acknowledging the public benefit of such a move.

Telemetry also cannot be used in all situations, such as where lack of mobile telephone services limits the benefits of telemetry, as it may prevent real-time reporting of data being captured by telemetered meters. Other technology may also be better suited where water take is unable to be easily measured, such as for flood plain harvesting or overland flows. However there still needs to be accurate measurement of this water take to ensure that all water users are complying with rules and regulations.

There are significant difficulties in quantifying how much water has been taken by floodplain harvesting or overland flows, as it occurs intermittently in a variable climate and often covers vast low-lying areas.\(^{1231}\) The water accounting can also be complex, as on-farm storages are typically used to store water from multiple sources, such as water pumped from rivers or bores and floodplain harvesting, each with different conditions on use.

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\(^{1226}\) ACCC analysis based on Bureau of Meteorology and Australian Bureau of Statistics responses to voluntary information requests.

\(^{1227}\) Cost estimates range from $8,000 - $12,000 for small users, up to $100,000 for large users.


15.3.7 Flood plain harvesting and take of overland flow are in the process of being brought into the license framework

Stakeholders are concerned that there is not adequate enforcement and measurement of take in the Northern Basin, and the impact that this has had on the environment and water flows into the Lower Darling system.\textsuperscript{1232} The Four Corners Pumped report alleged widespread water theft in the Northern Basin, and the following Ken Matthews’ review raised awareness of the inadequacies of measurement in the Northern Basin.\textsuperscript{1233} Concern was further escalated due to the fish deaths in December 2018 and January 2019. The Independent assessment of the 2018–19 fish deaths in the Lower Darling found that New South Wales and Queensland need to strengthen compliance with all metering requirements and overland flow extractions expeditiously.\textsuperscript{1234} There was also a need for NSW and Queensland governments to improve their assessment of the hydrological impacts of floodplain harvesting.\textsuperscript{1235}

The ACCC acknowledges the significant progress of the New South Wales and Queensland governments in recent years in measuring and progressing licensing of take. Both states started from different places and therefore implemented these reforms differently. Although, there has been widespread confusion around whether irrigators in New South Wales are able to harvest floodplain water, given the rollback of floodplain harvesting legislation without replacement.\textsuperscript{1236}

Queensland has had a moratorium in place since 2000 on additional floodplain harvesting developments, and has stopped growth by using authorisations and licenses.\textsuperscript{1237} Therefore Queensland only has to bring overland flow take into the licensing framework. Queensland has already issued licenses and implemented measurement programs in some places such as the Lower Balonne, and a third of the works are currently licensed in the Border Rivers.\textsuperscript{1238}

In contrast, New South Wales had not prevented growth in floodplain harvesting take, and has identified that there has been growth in some regions of water take above legal limits since 2000.\textsuperscript{1239} Other experts believe this growth to be quite significant.\textsuperscript{1240} Regardless, licensed take will need to be reduced to the legal limit,\textsuperscript{1241} and the NSW Government expects to have the licensing framework operational in all water sharing plans by 2021.\textsuperscript{1242}

In recent years, New South Wales has invested significant amounts to improve the measuring of non-metered take in the Northern Basin for its Healthy Floodplains project. New South Wales now has access to high-resolution light-detection-and-ranging (LiDAR) and remote-sensing technology to

\textsuperscript{1232} Murray Darling Association, Submission to the Murray-Darling Basin water inquiry Interim Report, 13 November 2020.
accurately measure of floodplain storage capacities. However these technologies do have limits, and New South Wales has acknowledge that telemetry will still have an important role to play for real time data, particularly in protecting first flow flushes.

New South Wales’ new floodplain harvesting measurement policy requires storages larger than 1,000 ML (as listed on a landholder’s work approval) to have an approved meter by 1 July 2021. An approved meter includes radar and submersible storage sensors for floodplain harvesting measurement at on-farm storages.

Queensland has committed to measuring overland flows in priority floodplains (including Border Rivers and Moonie floodplains) by 31 December 2022.

After these policies have been implemented, there will be a need to continue to monitor the outcomes of these policies. These policies need to be monitored to ensure that they are achieving the outcomes intended, or if there is a need to move towards more widespread telemetry. This may be a role for the Water Markets Agency or an updated Basin Compliance Compact.

15.3.8 Compliance and enforcement action on metering and illegal take builds confidence in the market

Water users must have confidence that the rules are being applied to all other water users and enforced appropriately. Recent incidents and reports have undermined this confidence, particularly in New South Wales. Multiple levels of government have taken action since these allegations were made, with the Australian Government creating the role of the Interim Inspector General, and announcing its intention to split compliance functions from the MDBA, and Basin States increasing their compliance and enforcement activities.

In 2017 New South Wales created an independent regulator known as the Natural Resources Access Regulator (NRAR), responsible for enforcing compliance with metering requirements, licence conditions and water account limits, which has rapidly increased enforcement action in New South Wales. In 2019–20, NRAR issued 152 infringement notices and commenced 15 prosecutions. NRAR proactively detects and investigates breaches of overdrawn accounts, with support from WaterNSW.

Victoria has a zero tolerance policy for unauthorised take, and in 2019–20 commenced over 2,500 enforcement actions, including issuing 405 notices and recommending 23 cases for prosecution. However the ACCC is also aware of users in Victoria who have on repeated occasions, gone into negative balances. This is able to be detected due to Victoria’s widespread telemetry monitoring of water take and accurate register.

To maintain an effective ‘cap and trade’ system adequate compliance, enforcement and investment in systems and personnel are also needed, in addition to accurate and timely measurement of water take. The ACCC supports Victoria’s ongoing engagement work with stakeholders to ensure compliance, and


its recent ‘zero tolerance on negative balances’ policy, its focus on improving communication with users when their account balance is running low, its more timely enforcement processes so that large volumes can’t be pumped when accounts are negative and its aim to reduce water theft to a target of less than 1% of the rural water volume.  

One of Queensland’s compliance focuses for 2020–21 is unauthorised water take, but it is unclear if this extends to negative water balances. Queensland is currently developing and implementing an assurance framework that enables it to report on its performance as a non-urban water resource manager and regulator by early 2021.

South Australia audited all River Murray Watercourse water accounts to measure compliance with the requirement to provide a quarterly meter reading(s) by the due date as per condition of water resource works approvals and found 94% compliance and issued 53 administrative sanctions or expiations.

South Australian water users have long been prohibited from taking water without authorisation: that is, to extract water, licence holders are required to have water allocation on their water account at all times. In July 2019, South Australia brought in a new policy that increased the frequency of meter readings from annual to quarterly and applies an administrative penalty charge to all unauthorised water use on a quarterly basis. However, until South Australia is able to secure funding for telemetry and monitor usage in real time there is no guarantee that users cannot go into negative balances between meter reads.

The ACCC’s investigation of South Australia’s approach has found that water users were trading after having a negative balance in the lead up to the previously annual meter read (see annual spikes in the turquoise time series in figure 15.17).

Compliance and enforcement roles are discussed further in governance (chapter 17).

**Figure 15.17: Trade into an account after a negative account balance, South Australian Murray, September 2011 to November 2019**

![Trade into an account after a negative account balance, South Australian Murray, September 2011 to November 2019](/image)

Source: ACCC analysis on South Australian response to voluntary information request.

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15.4 Anticipating market architecture issues in developing markets

15.4.1 Basin State governments have the opportunity to develop sustainable market architecture for groundwater and unregulated systems

Given the significantly greater scale of the markets and the prevalence of stakeholder concerns, this report has focused on surface water and regulated markets in the Southern Connected Basin. As such, the ACCC has not had the time and resources available to assess the water market architecture for groundwater, unregulated surface water and occasionally hydrologically connected systems in the Basin. Water markets for most regulated surface water systems are already relatively mature, with likely significant impacts associated with reforms.

However, for many water systems where markets are less developed, Basin States have an opportunity to pro-actively establish effective and sustainable water market architecture and regimes of property rights. This can be done before potentially inefficient market settings and participant behaviours become entrenched and change become more costly. Preventing issues developing by acting early and applying learnings from surface water markets will be easier and cheaper in the long-term than resolving issues as they develop. This should include establishing market architecture underpinned by sound property rights, designing trade rules which effectively address intended issues, creating effective regulatory frameworks, committing to transparent and accessible publication of market and other relevant information, and establishing effective rule making processes and bodies.

While third party impacts from flaws in market design may be negligible where volumes of trade are very small, as trade expands and market behaviours become more sophisticated, these impacts will likely grow. This is a major concern in groundwater systems where the long term environmental impacts of water take, and the interaction with other hydrologically connected surface and groundwater systems are not fully understood, particularly with the additional variable of climate change added in.

As surface water becomes relatively scarcer and water prices rise it is likely that water users will increasingly turn to groundwater usage to meet their water needs. This is already starting to be observed to a certain extent. The ACCC has heard reports that some water market participants in New South Wales are acquiring holdings with groundwater stock and domestic entitlements and converting the licence category to irrigation with limited regulatory oversight. At a small scale this is unlikely to be an issue, but if left without appropriate containment, it is an example of a potential flaw in market architecture that could create large issues over time if not addressed.

Likewise, the ACCC generally supports intervalley trade between hydrologically connected water sources where third party impacts are minimised. The ACCC encourages market arrangements to develop and facilitate these movements of water at appropriate times between intermittently connected water sources. However, appropriate arrangements should be put in place to ensure that private incentives align with social benefits and only trades that truly move water to its highest value use. Otherwise, third parties are going to be impacted and the net benefit will be reduced. Changes to address this will become progressively more difficult the longer this is left.

1255 Presentation by Claire Smith, Clayton Utz, Annual Water Symposium.
16. Improving the transparency and design of market architecture

Key Points

- The Australian and Basin State governments should act now to address known problems by adopting a range of remedies which build on and improve existing arrangements, including:
  - committing to improved transparency for allocation determinations and publishing guidance about the management of extreme events
  - ensuring market participants more directly pay for the costs of carryover
  - continuing to more widely roll out improved technology for measuring water use, including telemetry, and harmonising the collection, storage and sharing of water use data, and ensuring compliance and enforcement regimes prevent water users’ accounts going into negative balances
  - supporting improved modelling capability for water trade, delivery and use
  - refining river operations guidance to more effectively and transparently balance trade-offs
  - promptly formalising and publishing plans for managing delivery shortfalls
  - publishing regular information on conveyance losses and other delivery impacts
  - improving inter-valley trade mechanisms, through fixing the ‘fastest finger’ problem and removing the grandfathered tags exemption from trade restrictions
  - implementing clear and integrated arrangements for delivering environmental water
  - reassessing the definition and configuration of geographic units, including trading zones, in the Southern Connected Basin.

- Work should also start now to assess how more ambitious market driven reforms could improve market and water management outcomes. These require information gaps to be filled which depends on investment in more sophisticated models, meters, coordinated registers and other technology. Many reforms which may theoretically increase market efficiency are likely to have high implementation costs and could increase complexity in the market, so will require considered assessment and stakeholder engagement, before being adopted.

- The Australian and Basin State governments should determine the likely costs and benefits of:
  - aligning water accounting with water delivery, to better understand delivery related issues
  - aligning water accounting to reflect dynamic changes in the system, through continuous accounting and/or capacity sharing
  - applying congestion or time-of-use charges, to support the use of water in off-peak periods
  - developing formal markets for rights to delivery capacity and/or water extraction, to allocate this scarce resource more efficiently
  - applying ‘loss factors’ to water trades to account for system losses
  - establishing an alternative market institution to improve the efficiency of water trading. This could be a ‘water bank’ to coordinate trading opportunities, a water market operator or ‘smart market’. The ‘smart market’ could operate at least initially in the Southern Basin system and coordinate water delivery to users to integrate the market and river operations within the system’s physical constraints.

- The Australian and Basin State governments can implement the recommendations for immediate action within existing governance frameworks. However, complementary changes to strengthen and enhance current governance arrangements will support the delivery of these recommendations and provide for more coordinated, strategic development of market architecture in future years.
This chapter outlines the ACCC’s recommendations for market architecture reforms to improve the operation, efficiency, regulation, and transparency of the Basin’s water markets. It describes some design principles, drawn from and updating the National Water Initiative objectives and principles, to guide future market architecture decisions and rule design.

16.1 Setting the direction for changes to market architecture now and over time

Because market architecture issues also concern broader questions of water management, in making the recommendations in this chapter the ACCC has focused on:

- assessing where water management arrangements are intersecting with market operations and inefficiently limiting trade opportunities
- identifying where there is greater potential in the design of the Basin’s market architecture to use market mechanisms and improve price signals, thereby helping governments and water users to make efficient decisions and improve market outcomes.

The ACCC’s assessment is that a range of changes should be made to strengthen current arrangements and build on governments’ existing commitments to improve key elements of the existing architecture.

More significant changes to market design supported by changes to current governance arrangements could provide stronger foundations for efficient trade and resilient water markets. In section 16.3, a reform roadmap describes pathways for advancing robust, efficient and coordinated arrangements for managing trade and its impacts, and integrating market design with other water policies.

Some reforms could be progressed in the short term, while others will require detailed assessment and time to implement. The chapter outlines recommendations for immediate action in section 16.2. These actions will tackle urgent problems with current settings, and lay the groundwork for future improvements.

16.1.1 Benefits of reforms will need to be clearly demonstrated and costs assessed

In feedback on the Interim Report’s market architecture options, stakeholders generally expressed caution about major reforms, favouring incremental improvements to current arrangements, although some individual submitters did endorse some more ambitious reform proposals (see section 13.3.4).

Making some relatively minor changes to the current market architecture will go some way to addressing the current issues with market functioning and negative water management outcomes identified earlier in the preceding chapters. However, policy makers and water users will need to explore more ambitious reforms to address the root causes of current issues and deliver enhanced outcomes from trade.

Current trends point to increased reliance on interzone trade to supply downstream use. If these trends continue, more wide-reaching changes to manage trade and delivery will be needed to ensure the associated costs and risks are appropriately reflected to market participants. Better specifying property rights so that the market sends appropriate price signals can improve market operations and help address externalities. More accurately accounting for the costs of moving, storing and using water will allow more efficient allocation of storage space, delivery capacity and water itself.

The ACCC has recommended governments explore these market design reforms with stakeholders because they offer in principle benefits. Likely benefits include more efficient allocation of trading opportunities or tools that enable costs of trading decisions to be better attributed to the trading parties. Policy makers will need to build support for the more significant changes. Engagement with water users and other stakeholders will need to give careful consideration to benefits and costs of changes, including the potential for dynamic interactions with other policies, behavioural impacts and perverse outcomes.
While offering considerable potential improvements to market efficiency, more substantial reforms may increase complexity in the market and may have high implementation costs, due to their potential to alter the characteristics of the underlying property rights and their requirement for detailed technical assessment and design. As such, more information is required in order to make decisions on which of these proposed options should be adopted.

16.1.2 Information improvements are the key to implementing reform roadmap

Governments and water users should invest in better infrastructure for the collection, sharing and use of reliable data, such as telemetered meters, information technology and registry capability, and improved hydrological and hydro-economic modelling capacity. Investing in these systems should be a priority, as it will support confidence in, and improved operation of, current rules and arrangements, and build the information base for future market design changes. The ACCC advocates for these changes within the current market architecture to be made within three years.

Improving information on the interactions between water trading, river operations and the wider environment, as outlined in chapters 14 and 15, is key to the success of long term reforms. Building this knowledge base will allow policy makers to develop more sophisticated, targeted and evidence based, and market based tools to better manage the impacts of trade and integrate market design with water management.

Determining which of the proposed pathways or combination of reforms offers the greatest net benefits at least cost will also depend on first investing in these necessary improvements to the information base. Support for these improvements should be confirmed now due to their importance in building reform capacity and the long lead times involved in making such investments. The ACCC advocates for these changes to coincide with the next Basin Plan review, in 2026.

16.1.3 Changes to governance processes will increase confidence in markets and improve outcomes for users

If the reform roadmap outlined in this chapter is to deliver the promised benefits, it must be supported by:

- clear leadership, and assignment of responsibility for market design
- coordination
- adequate resourcing
- enhancements to inter-jurisdictional decision making and implementation processes
- evaluation of policy performance and delivery.

The recommendations outlined below can be delivered within existing governance frameworks. At a minimum, Australian and Basin State governments should implement the proposed changes in unified or otherwise closely harmonised form, in consultation and coordination with each other. However, better outcomes will likely result if an appropriate body (or bodies) is given a mandate to design and deliver changes going beyond incremental improvements, and to be proactive rather than reactive in tackling existing and emerging problems. The ACCC has proposed the creation of a Water Markets Agency to perform this role (see recommendation 26, discussed in section 17.4.2).

Action on more ambitious architecture reforms should not rest on the creation of the Water Markets Agency. Basin governments should commit resources to implement changes, because the problems that they seek to address will not diminish with delay. As chapter 17 outlines, the ACCC’s assessment is that Australian and Basin State governments can also improve the coordination, rigour, transparency and robustness of the process for making rule changes and market focused decisions and announcements. Recommendation 27 is discussed in the following chapter at section 17.4.5.
16.1.4 Clear market design objectives & principles should guide reforms

Basin States should be transparent and engage meaningfully with stakeholders about the trajectory that market architecture reforms need to take, and commit to shared principles that will guide reform decisions. The National Water Initiative and Basin water market and trading objectives and principles, underpin the current compact between governments and water users, and should continue to inform the development of market architecture reforms. The ACCC has distilled key elements of these National Water Initiative and Water Act 2007 (Cth) principles to show how they can be specifically applied to guide the current iteration of Basin market architecture and rule design decisions (see box 14.1).

Box 16.1: Market architecture design principles

The ACCC considers the following market design principles should guide the design of Basin water market architecture:

- develop market architecture with a Basin-wide perspective
  - consider impacts on water markets, and impacts of water markets in decisions about water management and river operations, including for decisions that affect water users in other parts of the Basin
- develop rules, charges and tradeable water rights that:
  - better ensure water holders face the full costs of their use and trading decisions
  - appropriately recognise the physical constraints and hydrological connectivity of the Basin’s water resources and infrastructure
- harmonise existing policies, rules and decision making processes
  - reduce or eliminate inconsistencies that are, or have the potential to, distort or constrain water market activity away from efficient outcomes
- build the capacity of water holders to make well-informed decisions about water use and trade
  - simplify, and improve the communication of information about, key market architecture elements
- improve decision making and market design by investing in water data, accounting, monitoring and modelling capabilities
  - fill information gaps, build understanding of interdependencies, improve capacity to model rule changes and market design.

16.2 Enhancing the efficient operation of current arrangements

The following recommendations identify actions that the Australian and Basin State governments should undertake now to strengthen current arrangements, and build on governments’ existing commitments to improve their systems. They propose tackling urgent problems with current settings, and lay the groundwork for future improvements. The ACCC advocates for these changes within the current market architecture, to be made within three year.

1256 Water Act 2007 (Cth), Schedule 3.
16.2.1 Increase the transparency of allocations decisions and the drivers of water availability

**Recommendation 15**

Increase the transparency of allocations decisions and the drivers of water availability

Basin States should increase the transparency of inputs, assumptions and administrative decision making involved in determining allocation announcements by:

- publishing in detail the steps taken and factors considered by relevant authorities
- explaining calculations and how assumptions or inputs, such as conveyance losses and forfeiture rates, have varied over time
- communicating how authorities apply discretion based on their risk appetite.

Basin States should publish accessible and easy to understand guidance, or similar, explaining how states will manage periods of extreme dry conditions and low water availability. This guidance should include the triggers for when special provisions occur and how water access will be affected - that is, how, when and on whom temporary water restrictions will be imposed.

Australian and Basin State governments should help entitlement holders better understand the changes in, and drivers of, entitlement reliability and allocations (including the role of carryover arrangements). A key part of building this knowledge of changing drivers will involve improving the transparency and understanding of how water allocated to different water access right categories is influenced by accounting for conveyance losses, carryover policies and use, and climate variability. Building knowledge in this regard should also be an element of the proposed Water Market Education Program (see recommendation 13).

This information and improved transparency will help stakeholders to interpret market information and understand the drivers of changes, likely supporting improvements to market confidence.

State entitlement frameworks and allocation decisions are water management (not market) decisions, but they significantly influence the market by governing access to and supply of water. Stakeholders are concerned about interactions between allocations policies and other elements of market architecture (carryover, treatment of conveyance losses) and, specifically, the potential for concentration of trade related impacts on low reliability entitlement holders. The ACCC has focused on its recommendations on addressing issues relevant to these stakeholder concerns.

The ACCC recommends that Basin States take a more proactive approach to ensuring water users understand their allocation rules, decisions processes and the trends in, and drivers of, changes in reliability. Targeted communication and greater transparency will improve consistency of access to information, with smaller water users particularly likely to benefit. Currently, sophisticated market participants hold a competitive advantage because they can dedicate greater resources to understanding complex allocations information, enabling them to make more accurate predictions. Improved information would help build predictability and confidence, which should translate to improved efficiency, as water users make more informed decisions.

**Improve understanding of how entitlement reliability, allocations and carryover policies work**

Rules and policies have evolved significantly over the last several decades, along with other substantial shifts in water availability and the agricultural sector more broadly. The rules are also complex, vary greatly between regions and states (the reasoning for which is not always well understood), and simple explanations are not always readily accessible.

The ACCC believes the benefits of improving transparency would be greatest in New South Wales, due to widespread stakeholder concerns about a range of water sharing, entitlement and allocation related
issues. New South Wales should also ensure that stakeholders are aware of the interaction between carryover and carryover parking, and account limits.

Basin States should make attempts to eliminate and reduce the proliferation of myths, misconceptions and conspiracy theories. The best way of doing this is through improved transparency.

**Improve transparency of decision-making on allocations**

The ACCC acknowledges that Basin States already make significant efforts to publish information about the inputs used in determining allocation announcements. However, stakeholders still feel that the decision making methodologies are insufficiently transparent. In particular, it can be unclear to water users how much discretion is afforded to water managers in making allocation decisions, how this discretion is being used and whether this is changing over time.

The 2018–19 report from the Independent River Operations Review Group (IRORG) proposed a particular avenue for how transparency improvements could be made:

IRORG observes that if states are using ‘informal’ assessments for water allocation determination or seasonal outlook advice, it may be appropriate for [Water Liaison Working Group] to review the agreed schedule and processes for provision of resource assessments to ensure accurate information is available in a timely manner to support market sensitive water announcements.

In Queensland, the relevant department has published allocation calculations in some valleys and improved the transparency of decision making. The Operations Manual for the Upper Condamine Water Supply Scheme includes the specific calculations undertaken in determining announced allocations.

The department also publishes a downloadable calculation spreadsheet which demonstrates the relevant formulas involved in determining allocation levels for the Pioneer groundwater system.

The ACCC acknowledges that operational processes, modelling and calculations for large and complex surface water systems in the Southern Basin are likely to be more complex than for simpler schemes, such as the Pioneer groundwater system. However, until Basin States commit to taking a less ‘black box’ approach to allocation decision making, water users will continue to mistrust decision makers, and lack confidence in their decisions, with flow on effects for accurately estimating short and long term supply expectations. Basin States should also observe recommendation 9 in this report, about implementing prescribed rules and process for water market announcements.

**Publish simple guidance on the management of ‘extreme events’**

Periods of extreme water shortages have historically occurred intermittently, but their occurrence is predicted to increase with climate change. Basin States will sporadically have to deviate from their usual approach to water sharing to manage these circumstances. This is particularly true in water sources where water sharing decisions are based on inflow assumptions that are held constant, and not updated with climate change.

Consultation revealed that some water users do not appear to understand the rules and decision-making processes associated with how New South Wales manages periods of severely reduced water availability. New South Wales is authorised under incident response guides to temporarily restrict water access (most commonly through restricting carryover access). However, for a user not already aware of these guides, identifying and locating them through the NSW Government website would be difficult. Ministers in other Basin States also have powers to restrict water access in similar circumstances.

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1257 Until 12 November 2020, responsibility for water in Queensland sat with the Department of Natural Resources, Mines and Energy. It now sits with the Department of Regional Development, Manufacturing and Water.


Basin States should build awareness of the management arrangements that will apply in periods of extremely low water availability, the implications for water users, and how and when users will be informed of triggers being met. The ACCC considers this information should take the form of simple and plain English ‘fact sheets’ explaining how water sharing conditions will change during extreme events. Further, the existence and role of the New South Wales guides needs to be more effectively communicated to stakeholders. These could be centralised on the proposed Water Market Information Platform (recommendation 12).

The ACCC also recommends long term reform options in the form of capacity sharing and continuous accounting be assessed on their merits and potential to offer significant improvements to the transparency of allocation announcements. This is discussed in section 16.3.2.

16.2.2 Improve efficiency in accounting for the costs of carryover

Recommendation 16

Improve efficiency in accounting for the costs of carryover

New South Wales and South Australia should update carryover rules and policies to appropriately account for evaporation losses associated with storing water in a dam beyond the year in which that water was allocated, and attribute those losses to the individual.

South Australia should update its registers and trade forms to be able to identify carryover parking trades.

Once robust data on trade for carryover parking is available, Basin States or the proposed Water Markets Agency (if established in time) should assess whether demand for storage space (as measured by carryover parking trade) is such that carryover is generating externalities (such as opening or closing trade barriers) which cannot be adequately managed through carryover policy or rule design.

This is to ensure that individual users face the full costs of their decisions, such as evaporation losses, and the water accounting more accurately reflects the hydrological realities of the system, to drive more efficient decisions by individuals about use of available storage capacity and water.

Basin States should seek to harmonise arrangements for accounting for evaporation losses, both for new allocations and for carryover, and should move towards individual attribution of losses, as far as current accounting mechanisms permit. States’ different approaches to accounting for evaporation losses for water carried over create an uneven playing field, and introduce incentives for users to trade to arbitrage between different arrangements.

Some carryover policies – and water allocation policies – take the approach of socialising evaporation losses amongst water users. With respect to new water allocations, water is set aside to cover predicted evaporation losses before allocations are made to entitlement holders. With respect to water being carried over, Basin States each take a different approach to accounting for evaporation losses, as outlined in section 15.2.5.

Generally, the ACCC found that carryover policies work well in offering a risk management tool, smoothing prices across water years and allowing water users to access water earlier in the year. However, where carryover costs are socialised – that is, not internalised to the person using carryover – they could lead to inefficient outcomes and reduce other water users’ allocations. The ACCC found that spill risk is generally well accounted for by carryover policies or account limits.

Victoria’s policy of deducting 5% from individual volumes carried over comes closest to the ideal of individual attribution; although this policy still does not account for how long carryover water actually remains in storage within the new water year. Also, as identified in section 15.2.5, the ACCC considers that the 5% deduction rate may actually exceed likely true evaporation, and as such may need to be revisited.
Ideally, accounting for evaporation losses would occur at the level of individual entitlement holders, taking into account the actual length of time that water is held in storage. However, the ACCC acknowledges that current accounting arrangements – particularly the inability to track water parcels from the time they are issued as new water allocations to the time they are used – currently prevents such an individualised approach to attributing evaporation costs. The ACCC has recommended Basin States develop the ability to ‘track and trace’ allocations – see recommendation 11. Improving accounting mechanisms, including the ability to ‘track and trace’ allocations, and more frequent accounting reconciliation (such as continuous accounting, discussed in section 16.3.2), would enable a move towards more individualised attribution of evaporation costs, over the longer term.

The ACCC understands that South Australia is currently investigating opportunities to amend trade application forms to capture carryover as one possible ‘reason for trade’ and record this data as part of the Water Management Solutions project. Victoria and New South Wales have already implemented changes to their trade forms and registers to identify ‘carryover parking’. Improvements to the ability to identify carryover parking trades (see recommendation 6 – reasons for trade) will have multiple benefits, including helping market participants with carryover parking price discovery, facilitating more informed trading behaviour. They will also help river operators better understand the delivery implications of traded water (that is, whether water traded will actually be used in its new location or will be traded back to its original location).

Even though carryover parking is a “paper” trade, and the water remains sitting in the dam, this can still have implications for river operations, trade rules, account limits and other accounting mechanisms. Capturing better data on the demand for carryover parking and demand for storage access will also permit more accurate assessment of the market impacts of carryover parking. Current volumes of carryover parking appear to be small. However if carryover parking grows, it may result in trade flows that affect the broader market, including by opening and closing trade limits. Once there is adequate data, the proposed Water Markets Agency (see recommendations 25 and 26) or, in its absence, Basin States could examine whether the impact of carryover parking on trade limits, water accounting and river operations, is great enough to justify the transition towards capacity sharing and continuous accounting.

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16.2.3 Strengthen metering and monitoring

Recommendation 17
Strengthen metering and monitoring

Australian and Basin State governments, and the MDBA should strengthen existing commitments to better metering and measurement of water take across the Basin through:

- continuous improvement and harmonisation of the metering standards and technology in use in the Southern Connected Basin. In particular, South Australia should commit to upgrading its metering standards to require telemetry where cost effective
- implementation of telemetry across the Southern Connected Basin, where technologically possible and cost effective
- monitoring progress on the measurement and outcomes of overland flows/flood plain harvesting. In particular, Queensland and New South Wales should continue efforts to more accurately measure overland flows/floodplain harvesting using new technologies; and to bring these forms of water take into the licensing framework
- Basin States, in consultation with the MDBA and the proposed Water Markets Agency should implement a consistent approach across jurisdictions and reporting agencies for the collection, storage, transmission and reporting of usage data. This should be consistent with existing Basin Compliance Compact commitments on the automation of reporting of water take, and with any relevant proposed Water Market Data Standards (see recommendation 7)
- Basin States should improve compliance and enforcement programs and invest in systems to identify and prevent water users being able to go into negative balances by extracting more water than is available in their account.

This could be achieved by extending and expanding the scope of the Basin Compliance Compact.

These measures will provide a foundation for good management of markets and water resources, increase the confidence and trust of market participants and water users generally, and support other improvements to market architecture, modelling and water information.

The Basin Compliance Compact has driven major improvements in metering policies by the Basin States in recent years, and the ACCC commends states for their considerable progress against their commitments. However, Basin States risk not meeting their commitments under the Compact within the given timeframes. The ACCC sees a need for the extension and expansion of these commitments.

Accurate measurement of extraction supports the effective operation of water markets by maintaining the value and integrity of trade and entitlement frameworks, and helps to ensure water take remains within sustainable diversion limits. Additionally, more comprehensive use data – obtained through metering and other technologies to measure water take – will support better understanding of water movements, water use and the relationship between trade and delivery, improving river operations decisions and tools to manage water delivery and conveyance losses.

In particular, telemetry will facilitate more robust compliance and enforcement monitoring, allowing easier prosecutions for water theft (which are challenging due to the highly technical nature and high burden of proof required) and the collection of real time usage data. Addressing stakeholders’ concerns that some states’ metering policies can allow users to go into negative balances due to the lag in reporting of usage will build confidence in the market and improve market integrity. For South Australia, this will likely require widespread telemetry and more timely use data.
16.2.4 Improve modelling of delivery and trade

Recommendation 18

Improve modelling of delivery and trade

Australian and Basin State governments should improve modelling of water use, delivery and trade across the Basin, including through improving linkages between models. Specifically, this can be achieved by working with and supporting:

- the MDBA, and relevant industry and academic bodies, to continually improve hydrological and river modelling capability and research
- the MDBA, the Australian Bureau of Agricultural and Resource Economics and Science (ABARES), the Bureau of Meteorology, and relevant industry and academic bodies, to improve hydro-economic modelling capability and research.

This will help policy makers better understand and predict the impacts of water trade and associated changing patterns of usage on conveyance losses and delivery risks; improve and update water user behavioural assumptions; and strengthen the capability to forecast and incorporate trends in crop mixes and climate change scenarios.

Modeling capability is a significant influence on the quality and timeliness of water management decisions and their acceptance by stakeholders. Modelling and information gaps presently impede the assessment of trade’s contribution to emerging problems. They inhibit water managers’ ability to assess the merits and proportionality of potential longer term reforms to market architecture. With more accurate use information and model enhancements, water managers will be able to undertake more accurate and sophisticated scenario planning, which may help run the river more efficiently within its hydrological constraints and ecological tolerances.

Noting the significant existing modelling capability across the Basin, Australian and Basin State governments nonetheless need to commit to supporting continual improvements to modelling capabilities, in particular for river operators and water managers. Improvements to hydrological and hydro-economic models will support more efficient markets by helping water managers evaluate risks and assess the costs of current market architecture flaws, and informing the development of better design options for Basin market architecture.

Models need to continually improve the way they represent trade and water user behaviours in order to accurately reflect the current settings to provide an up-to-date basis for comparison with scenarios that test different elements of the system. A better ability to represent how water users behave will put river operators and policy makers in an improved position to manage long term risks and assess policy options to manage issues at lowest cost.

The ACCC is aware of the significant modelling capability of the ABARES, including ongoing work on the behaviour of water users in accessing carryover. There may be a role for ABARES, the Bureau of Meteorology, and other industry or academic bodies to assist in the development of more accurate water use behavioural profiles and forecasts of crop types.

The ACCC also understands that some progress is being made by the MDBA and Basin States in developing consistent modelling software which allows for the effective linking and interaction between different Basin State and MDBA models. However the MDBA submitted that:

All Basin States have committed to transitioning their river systems models to a SOURCE modelling platform. However, progress to this transition and consequent revisiting of model calibrations, especially for low flow periods such as millennium drought, has been slow.

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Key water management, sharing and compliance decisions are based on these models. As such, it is important that these models are recalibrated using a contemporary modelling platform; and that the models are made publicly accessible for transparency, and available to the research community for furthering science and improving predictive capability.\textsuperscript{1263}

This work will be crucial to establishing a common modelling framework for assessing the effects of policy changes, climate impacts and other developments on Basin water markets. Aligning various Basin models will help improve the consistency of information released to the market, with likely benefits for market confidence. For these reasons, supporting work to improve the compatibility and integration of Basin models should continue, with the long term aim of building a current, consistent, transparent and fully integrated Basin hydrological model.

Understanding the impact of climate change is also going to become increasingly significant. There is a need to better incorporate climate change modelling in a standardised and holistic way across the Basin. The MDBA’s ability to incorporate climate change forecasts into Basin-wide forward planning models is currently limited, and work should be done to develop a common approach between the MDBA and Basin States for considering whole-of-Basin climate change impacts.

The MDBA stated in 2019 that it needs to ‘understand specifically what climate change is likely to mean for the hydrology of our rivers, the way we operate them, the effect on water quality and water-dependent ecosystems and how water markets and trade will operate in the future’.\textsuperscript{1264} The ACCC acknowledges and supports the ongoing work between the Bureau of Meteorology and the MDBA, to incorporate more dynamic streamflow forecasts based on global climate models.\textsuperscript{1265}

### 16.2.5 Formalise and communicate plans for managing shortfalls

**Recommendation 19**

**Formalise and communicate plans for managing delivery shortfalls**

Basin States and the MDBA should move promptly to:

- formalise their arrangements for managing shortfall events, including how they will enforce those arrangements
- publicly release plans, or a joint plan, that clearly and with consistent messaging, describe:
  - the delivery risks faced by water users, and how these will be communicated to users in a timely fashion
  - how a shortfall would be managed by authorities, including the mechanisms and approaches that will be used to ration water use
  - how water users can take steps to mitigate their own risks or potential impacts of shortfall events based on their location in the river system.

This will give irrigators more certainty about how water deliveries will be managed in times of high demand and potential shortfall. This will help irrigators make decisions about, for example, whether they invest in water storages on their farms.

In recent years, the MDBA as river operator has had to manage an increasing risk of delivery shortfall\textsuperscript{1266}, driven by multiple factors including changes in water use due to trade. Trade restrictions, which are used as a proxy to manage delivery obligations, do not directly manage shortfall risk.

\textsuperscript{1263} MDBA, Submission to Murray–Darling Basin water inquiry issues paper, 13 February 2020, p. 11.
\textsuperscript{1266} Delivery shortfall arise when demands for water unexpectedly spike in the short term because of a period of hot weather and these demands are unable to be fully met requiring short-term (temporary) restrictions to deliveries.
Shortfalls are likely to manifest quickly and require rapid responses. A major shortfall event occurring in the absence of well-defined processes to manage it, will likely result in significant impacts on the environment (as extractions exceed environmental tolerances) and unequal impacts on water users (such as greater impacts on those further downstream).

Rights to on-river water delivery are generally not separately defined or capped in the Southern Connected Basin, and the conditions on, and rights contained in works licences are not defined in a way that would enable them to be readily used for rationing or sharing if a shortfall occurred. The specifics of how rationing mechanisms would be imposed are not well specified or communicated to the market. Further, it is not entirely clear how operational measures could be used to complement the use of rationing arrangements.

The Frontier Economics’ report proposed options including formalising how extractions will be managed or controlled during a shortfall, communicating how shortfall events will be managed, and investigating further the significance of the risk of system shortfall across the Southern Connected Basin.1267 The Independent Panel for Capacity Projects Review came to similar conclusion and stated that ‘communication needs to be planned carefully with a view to providing stakeholders and communities with the best available information on the current understanding of system and delivery shortfall risk and a clear pathway for input into decisions on management options’.1268

This recommendation focuses on improving information about delivery risks and the steps that will be taken by water managers in a shortfall event to give additional certainty to irrigators around their delivery reliability. This will enable irrigators to better determine whether they should have more on-farm storage to reduce shortfall risks given the nature of their operations and water holdings. Strengthening modelling capability and committing to further investigation of the proportional impact of water trade on delivery risk, will help develop the evidence base for considering whether more significant reforms are needed.

While the proposed recommendations do not address the underlying drivers of increased delivery risk, they help clarify how risks will be mitigated and the impacts of a shortfall shared, rather having those losses borne largely by water users of particular types or in particular locations.

The ACCC also recommends investigation of longer term reforms to address the underlying flaws in market architecture to address delivery issues, such as time-of-use charging, further unbundling of on-river delivery rights and investigation of alternative market models. These are outlined in section 16.3. More substantial reforms to fix underlying flaws in the market architecture would be costly, add significant complexity to the market and require pre-requisite reforms to be implemented first (such as mechanisms for tracking allocation trade).

The ACCC is supportive of the work being done and the options being investigated by the Independent Panel for Capacity Projects Review.1269 The ACCC does not purport to make recommendations about the operational and infrastructure based options being considered by the panel (supported by the Capacity Policy Working Group). Nevertheless, many of these offer promising solutions that will help alleviate delivery issues over the medium term. It should be noted that infrastructure solutions (such as to expand the delivery capacity of the Barmah Choke, or building bypasses) will not address the underlying flaws in the market architecture.

Likewise, the ACCC understands that there would significant benefit to alleviating delivery pressures from progressing the constraints management strategy. While the ACCC appreciates the sensitivities and challenges of progressing this work, it is likely that doing so will significantly reduce the risk of environmental water and consumptive water use competing for channel capacity and generally assist with the delivery of environmental water, helping to reduce shortfall risks.

16.2.6 Refine river operations guidance to more effectively and transparently balance trade-offs

**Recommendation 20**

Refine river-operations guidance to more effectively and transparently balance trade-offs

River operations guidance should be refined, to more effectively and transparently balance trade-offs. Specifically, that the MDBA and Basin States, through Basin Officials Committee, should work together to:

- update key governance documents and operational guidance to clarify how important ‘trade-offs’ between operations, market activity, trade opportunity and the impacts on third parties and environmental risks will be managed
- better integrate consideration of impacts on and of trade and market design into operational decision making
- establish ecological tolerances within which to operate in the Southern Connected Basin, and enshrine these in whole-of-system operational guidance for river operators
- ensure that reviews of river operations also include a section which analyses the market effects of river operation decisions and the way decisions are announced.

This is to improve guidance to river operators and policy makers on how to manage operational, environmental and market trade-offs, more effectively integrating and improving understanding of the interaction between water management and water markets and the management of connected systems in an integrated way.

River operators face conflicting objectives and trade-offs in trying to maximise delivery reliability, minimise conveyance losses and protect the environment. They must assess and decide how to manage these trade-offs, which mean that some impact on users or the environment will be inevitable. While avoiding trade-offs is impossible, formalising and communicating the guidance and processes for managing these trade-offs through more transparent decision making will help river operators when making trade-offs and give users more certainty about how decisions will be made.

The scheduled review of Schedule D to the Murray-Darling Basin Agreement (due to be completed 2022) offers an opportunity to focus on how best to align and formalise linkages between Schedule D protocols and the River Operations Objectives and Outcomes documentation.

Revised guidance may involve specifying more prescriptive and risk-based parameters for balancing conflicting objectives, through the review and amendment of these key governance documents. Changes need to continue to provide some flexibility and ability for river operators to make ‘emergency’ decisions in exceptional circumstances, but overall should offer improved transparency and predictability to the market, which will likely improve market confidence.

A similar idea was raised in the IRORG 2019–20 report:

IRORG recommends that the MDBA consider adopting a more quantitative risk assessment approach to provide improved clarity and assist in making complex river operations trade–off decisions

Volumes of intervalley trade (IVT) have grown to a substantial volume, far beyond what was initially anticipated when markets were established. Expanding the scope of river operations guidance to better and more holistically incorporate handling of traded volumes of water (such as intervalley trade) will help integrate water management with water market. This will help address some third party impacts and provide more certainty to the market. River operators also need to be aware of the potential market

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impacts of river operations decisions (such as calling out IVT water, which opens up trade opportunities) and take this into account when making announcements around actions being taken (these announcements could potentially fall within the scope of proposed recommendation 9 – Implement prescribed rules and process for water market announcements).

Changes to guidance should also be supported by further work to establish ‘ecological tolerances’ of the Southern Connected Basin, including how these will vary with climate change. While the Victorian Government has been clear about the 940 ML/day threshold for environmental impacts in the Goulburn, the NSW Government stated it has not considered it necessary to undertake a similar formal assessment for tributaries in New South Wales. The case for incorporating ecological tolerances, or sustainable flow limits, into river operations guidance is made in the 2018–19 IRORG report:

This highlights the sometimes conflicting objectives in the [River Operations Objectives and Outcomes] document, and the difficulties inherent for operators in trying to meet a range of objectives when the sustainable flow limits through key parts of the system are not well codified. [Basin Officials Committee] may also need to determine which outcome(s) should be the higher priority when such conflicts occur and set clear limits for acceptable river operations where appropriate.

The MDBA recently decided to publish the Annual Summary of River Operations and IRORG’s Review of Performance against Objectives and Outcomes for 2019–20 on its website. The decision to publish these reports is a significant and valuable contribution to improving transparency of river operations, which will benefit the market through improved confidence and participant understanding. The annual publishing of these reports would reinforce these benefits.

The ACCC believes a useful addition to IRORG annual reports would be an assessment of how river operations decision making, and the communication of these decisions, affected water markets. To improve predictability and market confidence, river operators should communicate clearly, transparently and as early as possible about the actions they are taking which may influence markets (such as by influencing trade opportunities or highlighting expectations of increased shortfall risk). Including this assessment in annual review documentation will help improve the understanding of how operational actions affect markets, and inform better communications to market participants in the future, leading to improved market confidence and business decision making.

Recommendations to improve modelling capability (see section 16.2.4) will also assist river operators to manage trade–offs between competing objectives by allowing improved understanding of conveyance loss impacts and delivery risks. Similarly, formalised plans for managing shortfall events (section 16.2.5) will improve operational flexibility, by better positioning water managers to mitigate the impacts of a shortfall if one does materialise.

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1271 In this context, ecological tolerances refer to the limits of what the river system can withstand without sustaining unacceptable environmental damage.
16.2.7 Improve transparency of conveyance losses and other delivery impacts

**Recommendation 21**

**Improve transparency of conveyance losses and other delivery impacts**

The MDBA and Basin States should improve the transparency of conveyance losses and other delivery impacts. Specifically, that the MDBA should commit to the active and ongoing monitoring, and communication about trends and drivers, of conveyance losses through the annual publication of the 'River Losses in the River Murray System' report, in a timely manner following the finalisation of each water year. Basin States should also consider releasing similar reports to explain the nature and drivers of conveyance losses in other rivers where concerns are present, such as the Murrumbidgee.

This will help water users and their communities better understand the relevant issues and operational considerations, and provide further evidence to water managers in considering potential avenues for revising how these losses are accounted for within the market architecture.

The 2019–20 IRORG Report called for the MDBA to continue to focus on enhancing the monitoring, analysis and reporting of losses in the River Murray system, noting 'a good understanding of losses and the drivers of loss in river systems will assist in better forecasting the volumes of water needed to cover losses and improve system management'.

In March 2019, the MDBA released the Conveyance Losses in the River Murray System 2018–19 report, which has proven to be an informative and useful resource shedding light on how conveyance losses are monitored, calculated and influenced. The ACCC understands the MDBA was planning to update this report for the remainder of the 2018–19 water year, and to release subsequent report on an annual basis. However, no further reports in this series have been published at the time of writing. There would be value in these reports becoming a regular and timely annual release. Similarly, the ACCC considers release of similarly focused reports explaining the nature and drivers of conveyance losses in other rivers where concerns are prevalent, such as the Murrumbidgee, would help improve understanding of the drivers of changes.

The ACCC also notes that other recommendations listed in this chapter will assist with transparency and understanding of conveyance losses including increased transparency of allocation policies (section 16.2.1), strengthened metering (16.2.3), changes to river operations guidance (16.2.6), and reviewing geographic units (16.2.10).

Improved modelling (16.2.4) will also strengthen the evidence base for the appropriate long term solutions to managing conveyance losses. It is extremely unlikely that modelling will ever be able to accurately calculate the conveyance losses associated with every individual water use decision. However, there is scope for additional scenario analysis to be undertaken to help reduce information gaps about the aggregate impact of trade on conveyance losses.

The ACCC also recommends investigation of conveyance loss factors that could be applied to water trade and delivery as more direct long term options of better attributing conveyance losses to those that incur them. This is discussed in section 16.3.2.

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16.2.8 Improve intervalley trade mechanisms

Recommendation 22

Improve intervalley trade mechanisms

Basin States and the MDBA collectively and, where required, Victoria and New South Wales separately, should improve and harmonise the operation of the rules governing intervalley trade and trade through the Barmah Choke, by:

- improving the efficiency and equity of access to the opportunity to trade, which are currently largely ‘first in, first served’
- removing the exemption in Basin Plan water trading rule 12.23 for ‘grandfathered’ tagged water access entitlements, because it affords a small number of market participants an inequitable exemption from restrictions on trade
- considering if current ‘rolling’ intervalley trade limits can be replaced with ‘dynamic limits’ – to develop trade rules that better match opportunities to trade with the constraints of the physical system.

Revising intervalley trade arrangements so that trade opportunities more accurately reflect the benefits, costs and risks of water use and delivery will encourage market participants to make efficient usage, trading and investment decisions. Dynamic limits that change to increase trade opportunity at times when there are fewer impacts on the river system, such as during late winter in alignment with natural flow patterns, and to reduce trade when there are negative impacts on the river system, such as at times of peak demand in summer, will help with this. Removing exemptions that undermine effective operation of limits will also improve market operation and outcomes.

The ACCC found that the current market architecture of the Southern Connected Basin does not strike an appropriate balance between encouraging trade opportunities, accounting for impacts on the other parties and protecting the environment. In particular, the ACCC is concerned about two key imbalances:

- Current mechanisms for interzone allocation trade and delivery of traded water are allowing localised environmental impacts in the river system, which are not adequately controlled in the current system.
- Current mechanisms for interzone allocation trade and delivery of trade are causing third party impacts in the form of increased delivery risk to water users. This risk is inadequately communicated to users, and (as outlined in section 14.2.2) Basin State policies for managing shortfall events are not well specified and poorly communicated to the market, contributing to further uncertainty.

The ACCC is aware that Victoria and New South Wales have considered IVT issues recently, including discussing them in the intergovernmental Trade Working Group. A first step may be for Basin States to more formally task and resource this committee to continue to advance these issues, prior to transferring this work to the proposed Water Markets Agency.
The ACCC considers that the following objectives should guide reform of intervalley trade rules:

- rules should be dynamic – that is, not designed for an assumed pattern of water availability, use or trade
- rules should allow equitable access to intervalley trade opportunities
- rule design should aim to maximise opportunities to trade, subject to physical constraints and environmental limits
- rules should allow users to more directly experience the costs and benefits of their own (trading and use) actions and not to shield them from shortfall risk, as occurs under current policies
- rule design should be robust:
  - rules should not allow some users to operate outside the mechanism, especially in ways which undermine the integrity of that mechanism
  - rules should effectively manage environmental impacts through timely and responsive actions to limit damage.

Proposed reforms to intervalley trade arrangements have three main dimensions: improving efficiency of allocation of trade opportunity; removing the exemption for grandfathered tags that hampers the fair and efficient operation of water markets, and considering if rolling IVT limits can be replaced with dynamic limits.

**Improve the efficiency and access to trade between valleys and through the Barmah Choke**

Current IVT operation results in inefficient outcomes. The opportunities for intervalley trade operates on a ‘first come, first served’ queuing system. This favours well-resourced participants and trades may occur that are not efficient. There is also widespread concern that IVT operation is not transparent, and may be unfair or inequitable.

The ACCC recommends use of a market based mechanism for allocating the capacity for trade through IVT restrictions and the Barmah Choke. This is likely to be more efficient, as well-functioning market based mechanisms will allocate the capacity to those who value it most. Gaining access to IVT allows parties to purchase water in one zone and sell it in another. Market forces would be expected to value this right at the price difference between the source and destination trading zones.

The objective of using a market mechanism to allocate IVT opportunities is to ensure that only ‘efficient’ trades take place (that is, trades that provide a net benefit to society). In addition, by ensuring that these rights are allocated through a price based mechanism – not first come, first served – the incentives to invest to obtain the ‘fastest finger’ should be eliminated.

Under the ‘first come, first served’ approach, considerable time and resources may be spent by multiple parties – even those who are unsuccessful – in attempting to gain access to IVT opportunities. For example, multiple brokers might all invest in information technology hardware or algorithms in an attempt to be at the front of the queue. This expenditure is inefficient; those resources would be better off devoted to something else.

The ACCC does not recommend a ballot or lottery to allocate the trade opportunity as, this mechanism does not provide certainty for water users. It is also less ‘efficient’ in that it awards a windfall gain of the opportunity to trade on a random basis, not via a mechanism such as a market-determined price, which takes into account supply and demand factors, including individual valuations of intervalley trade opportunities.

The ACCC acknowledges that applying a pure market mechanism to IVT openings means allocating IVT opportunities to those who are prepared to pay the most for them. The ACCC’s view is that efficient allocation of IVT opportunities is an appropriate objective, and is consistent with the National Water Initiative.

However, it is worth noting that equity considerations are also relevant. Currently, IVT opportunities are rationed using time and resources. The market participants who are able to gain successful get access to the intervalley trade opportunity are those that can afford to have a full time staff member or
program to constantly check the trade opportunities. This highlights the difference between the ideas of ‘equity of access’ (where all market participants have equal ability to bid for trade opportunities) and ‘equity of outcome’ (where all market participants would receive an equal share of trade opportunities).\textsuperscript{1273} The ACCC notes that market mechanisms can be designed to incorporate equity considerations, but it is a matter for governments to clearly identify how these considerations should be addressed in design of the allocation mechanism.

The ACCC notes there are various different kinds of mechanisms that could be adopted in preference to current arrangements:

- an auction mechanism, where IVT capacity is auctioned off at a specific time
- a ‘water bank’ or ‘water market operator’ who moves water from sellers in the source zone, and auction off water to buyers in destination zones. A more comprehensive version of this which redesigns how all water moves (not just traded water), is discussed within option 6, in section 16.3.2).

**Removing the exemption for ‘grandfathered’ tagged water access entitlements**

Because the current arrangements for ‘grandfathered’ tagged water access entitlements afford a small number of market participants an inequitable exemption from restrictions on trade, the ACCC recommends that the Australian and Basin States governments work collectively to remove the current exemption, with legislative amendments to be made as soon as possible.

Conclusively removing the exemption would require amending the Basin Plan Water Trading Rules 12.23. Amending an aspect of the Basin Plan is a significant process requiring the MDBA to consult with stakeholders; and to seek ACCC advice.\textsuperscript{1274} If the necessary legislative changes are delayed, the process for removing the exemption should be rolled into the scheduled review of the Basin Plan in 2026 at the latest.

In the meantime, Basin States should consider whether there are alternative steps available to address these issues under State water management law in a way which is not inconsistent with Rule 12.23. Specifically, the ACCC recommends that the Basin States consider whether all water entitlements for which grandfathered tagging has been claimed are, in fact, entitled to the benefit of Rule 12.23(2). For example, the ACCC understands that this question has been raised in relation to the transfer of water onto a number of tags in the Murrumbidgee water source that are related to ‘zero–share’ Water Access Licences, because they are not subject to a water allocation. The ACCC recommends that the Basin States and MDBA seek advice about the validity of these and other grandfathered tags to consider the question of whether the tagging is consistent with Schedule D of the Murray–Darling Basin Agreement.

**Review whether current ‘rolling’ inter-valley trade limits can be replaced with ‘dynamic limits’**

As explained in section 14.1, water authorities use IVT accounts to track the bulk movement of water between systems – what one river ‘owes’ to the other – and to ‘ensure there is sufficient supply as a result of a sale to meet the purchaser’s demand’.\textsuperscript{1275} The use of IVT limits as a water delivery and trade management mechanism, and their current numerical values, are routinely justified on the grounds of protecting the environment and providing ‘appropriate protection of third party interests’.\textsuperscript{1276}

The ACCC recommends that the Basin States, particularly New South Wales and Victoria, review whether these current ‘rolling’ inter-valley trade limits can be replaced with ‘dynamic limits’, to develop...

\textsuperscript{1273} Note that higher willingness to pay of market participants does not constitute a lack of equity of access, as long as market participants are equally able to enter their bids and trade applications.

\textsuperscript{1274} This inflexibility prompted Frontier Economics to recommend consideration of moving the water trading rules out of prescriptive, inflexible legislative instruments. Frontier Economics, *Water market architecture: Issues & option, input into ACCC market architecture assessment*, 26 October 2020, p. 97.


\textsuperscript{1276} Murray–Darling Basin Plan 2012 (Cth), Schedule 5 – Water Trading Rules, Objective s5.05 (1e).
trade rules that better match opportunities to trade with the constraints of the physical system and third party impacts.

If IVT limits are retained as a mechanism for managing inter-valley trade and delivery, Basin States should investigate using more dynamic IVT limits that align with changing system conditions to allow beneficial trades while restricting harmful trades. This could involve:

- allowing different monthly, seasonal or quarterly figures for IVT account balance limits, depending on what risk the IVT limit is controlling
- using improved water accounting such as tagged allocation trade or lifetime tracing, to allow water to be traded when it does not contribute to the risk that the IVT is controlling for, and place the limit on the delivery. For example, if the IVT is primarily to limit spill risk, trade of water for immediate delivery could be allowed, as this kind of movement would not exacerbate spill risks in the origin valley. If the IVT was being used to limit delivery capacity (at the time the traded water would be delivered), then this trade would be refused as it would contribute to worsening this issue.

### 16.2.9 Implement clear and integrated mechanisms for delivery of environmental water

Recommendation 23

Implement clear and integrated mechanisms for delivery of environmental water

Basin States, in collaboration with the MDBA and the Commonwealth and State environmental water holders, should better integrate environmental watering arrangements into trading arrangements and market design, including by:

- ensuring that trading and delivery arrangements are not contingent on the intended use of the water, including by making available arrangements currently only open to environmental water holders to consumptive water users, where possible, and ensuring neither consumptive or environmental users are given preference over the other
- committing to explicitly assess and address likely impacts on water markets, landholders or the environment, of any new trading or delivery arrangements developed in future
- clearly and consistently accounting for environmental trade and delivery across Basin States
- developing a transparent policy position on how and when environmental water holders, and consumptive users, should use trade mechanisms to move water, and clearly articulating how movements of water within and outside of the trading framework affect trade opportunities, particularly for interzone trade opportunities governed by restrictions.

This will contribute to developing arrangements and tools to deliver environmental water in ways that help improve transparency and confidence, and alleviate system congestion.

Concerns with how effectively the EWHs’ delivery needs are being met – and with the transparency of trade (and other mechanisms) used by EWHs to deliver water – signal the need to assess how the operating framework and trade arrangements manage environmental water. This is in keeping with the ACCC’s view that it is timely to reconsider the arrangements for interzone trade more broadly. It would be appropriate for this assessment to be conducted ahead of the review and development of the next Basin Plan in 2026.

As outlined in section 14.2.5, environmental water is delivered by river operators within the same operating framework that applies to all types of water deliveries. Environmental watering strategies have evolved since the main elements of the market architecture were established.277 EWH holders have different needs to extractive water users and require some unique delivery services, reflecting that

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environmental water stays in (or returns to) the river instead of being extracted. River operators and EWH have reported encountering issues with delivering environmental water due to the prioritisation of consumptive water deliveries.

The operating framework has been incrementally adapted, as environmental watering strategies and arrangements for the trade and delivery of environmental water have evolved. EWHs have identified the need for the continued evolution of the operating rules that manage deliveries and enable water use to ensure arrangements can meet the needs of all water users. As noted above at 16.2.5, progress on the constraints management strategy would assist with alleviating the risk of environmental water and consumptive water use competing for channel capacity and generally assist with the delivery of environmental water, helping to reduce shortfall risks.

In 2020, the ACCC provided advice to MDBA on the operation of section 12.02 of the Basin Plan, which provides an exemption from certain Basin Plan water trading rules for trades of environmental water (when the relevant tests for the exemption are met). In that review, the ACCC identified that there is a lack of clarity about whether some of the new arrangements being developed for delivery of held environmental water should, or should not, be considered a trade of environmental water. Developing a transparent policy position on how and when environmental water holders, and consumptive users, should use trade mechanisms to move water will help provide improved transparency of arrangements and build stakeholder understanding of and confidence in these arrangements. Clearly articulating how movements of water within and outside of the trading framework affect trade opportunities, particularly for interzone trade opportunities governed by restrictions, will also help.

16.2.10 Assess whether the current configuration of geographical units remains fit-for-purpose

Recommendation 24
Assess whether the current configuration of geographical units remains fit-for-purpose

Basin States, together with the MDBA, should assess the appropriateness of the current set of, and spatial definitions of, geographical units used in water management and river operations and as the basis for trading zones.

This is to ensure that the spatial boundaries of geographical areas relied upon to manage water remain fit for purpose; assess whether new geographical units may be required; and to assess whether and how the current spatial definitions may need to be formalised and aligned across agencies.

Stakeholders expressed concerns that conveyance losses are being incurred as a result of trade within some of the longer trading zones in the Southern Basin, such as the Murrumbidgee and the New South Wales and Victorian Murray below Choke zones. Further, some stakeholders considered that trades between certain trading zones have non-negligible impacts, and therefore ought to be more restricted than they currently are.

Trading zones have been used to define areas within which there is generally no restriction on changing the location at which water available under the tradeable water right may be taken.

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1281 ACCC post-Interim report consultation with stakeholders, 26 October 2020.
1282 Trading zones were established to ‘simplify administration of a trade … so that trade can occur within and between zones without first having to investigate and establish the details and rules of the system in each zone’. Water Act 2007 (Cth), schedule 3.
Interzone trade, in contrast, is often subject to restrictions. The logic underpinning this approach is that while interzone trades may change the relevant location at which water may be taken, trade restrictions should ensure they do so in a way that impacts arising from this change are sufficiently small. Conversely, the assumption is that intrazone trades have negligible impacts on third parties or the environment. This is a somewhat artificial distinction, as in practice a trade involving two locations in adjacent trading zones may involve a smaller change – and less third party impacts – than a trade involving two locations at opposite ends of a single trading zone.

Basin States should consider whether current definitions of trading zones remain fit-for-purpose for managing all the potential third party impacts of trade.

The Basin has also been broken up into other smaller geographic units for water management and related purposes, sometimes overlapping, sometimes aligning, including water sources (defined largely by the location of storages and inflows and generally aligned with trading zones, with some exceptions), water resource plan areas, statistical units, and various other specifications of river reaches with a range of purposes.

In New South Wales, water supply works approvals provide locational information to water managers which allow them to track usage by river sections within a water source. These river section definitions are used to report usage data for regulated water sources on the Department’s Water Usage Dashboard and the WaterNSW WaterInsights portal and can be used for declaring when users can access supplementary water. In Victoria, extraction shares are also expressed on works licences, and issued for sections of the river on a finer scale than trading zones. Borders of these river sections appear to be defined variously by towns, gauges, weirs and other landmarks.

While the ACCC has not been able to conclusively establish the magnitude of trade-related impacts, because impacts of trades which involve a change in location may not be constant (for example, evolving rates of conveyance losses due to climate change), a revised or new regime of spatial boundaries may help with creating instruments to better manage impacts of trade and delivery. For example, ‘sub-zones’ are in place in some systems in Queensland like St George and Macintyre Brook. The sub-zone a user is located in is based on their distance from the storage and influences the volume that can be taken against an allocation (that is, subject to loss factors). Similarly, the creation of new geographic units based on delivery considerations could facilitate the introduction of an administrative time-of-use delivery charge which vary by location to address externalities of delivery (such as conveyance losses, environmental impacts and delivery congestion), or other mechanisms to manage deliverability issues in specific locations.

Work to consider the most effective definitions of these geographical units and to establish more consistent and formally applied definitions of river sections will be an important step in preparedness for managing delivery shortfalls. The impacts and management of delivery shortfalls will vary considerably based on users’ location relative to their water source’s storages and inflow points, weirs and other infrastructure that can regulate the river, and other water users. As noted in section 14.2.2, during delivery shortfall events, restrictions on water extraction may need to be imposed on users at a geographical scale finer than current trading zone definition, however the spatial boundaries that would be used for this are not well established.

The ACCC also understands that the current regime of geographical units used to divide the river system poses challenges for modelling and the assessment of the impact of trade in the Southern Basin. Currently, there is some inconsistency in the spatial definitions used for the trade and use data

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1283 “River section: a portion of a (usually) Regulated Stream which is controlled by artificial means, such as between two Weirs for instance. It often – but not necessarily – correlates to a Metering Section. It is a fundamental entity within River Operations. Also referred to as Stream Section.” WaterNSW, Glossary of Water Terms, https://www.waternsw.com.au/customer-service/service-and-help/tips/glossary, viewed 7 February 2021.
reported to the MDBA by Basin States, with some data provided at a bulk ‘valley’ or ‘water source’ level, and other data reported at a finer scale (noting that some water sources comprise multiple trading zones). The ACCC understands that, as the water market and water management needs evolve and new informational requirements arise, somewhat ad hoc spatial definitions have been applied to group data by location on an ‘as needs’ basis. The MDBA has indicated that the changing patterns of irrigation development in the Murray (such as the significant growth in horticulture in Sunraysia), has prompted it to revise the resolution of the geographical units used in modelling water use. Having a more formally defined, and universally used regime of geographical units would assist with modelling of trade and use, and coordination between States and the MDBA.

16.3 Determine the best paths for the long term development of efficient, resilient water markets

The recommendations outlined above will go some way to addressing current inefficiencies in the operation of the Basin’s market architecture. But recent trends point to the impacts of trade intensifying and, without intervention to improve current arrangements, foreshadow deteriorating efficiency of market operations and outcomes.

The ACCC recommends that the Australian and Basin State governments work together to assess, develop and implement a roadmap for more wide-reaching changes to market architecture, to improve price signals, create appropriate incentives and develop tools to facilitate trade that more closely aligns with the physical characteristics, while managing the negative risks it can pose.

The ACCC has developed recommendations on the basis that its role is to:

- encourage a stronger emphasis on markets and trade opportunities in consideration of the Basin’s architecture, as it is not clear that market considerations are sufficiently embedded into existing governance arrangements and market design processes
- identify issues where water management arrangements are intersecting with market operations
- identify important decisions that governments need to make in this area; and promote preferred options.

The ACCC’s intent is not to promote market concerns above water management more generally, but to encourage a systems thinking approach. This approach involves the impacts of water management on markets being considered, and appropriately recognising the usefulness of market-based mechanisms as tools for delivering efficient water management.

The tools and approaches explored in the following sections draw on economic theory about how to design market mechanisms that work efficiently in practice. There is an opportunity to make greater use of market mechanisms, which could, in theory, bring significant efficiency gains if successfully implemented.

However, the ACCC recognises that the costs of developing and delivering these reforms may offset many of the potential benefits. Considering interactions with other water management policies and allowing for stakeholder engagement in the decision process will resolve likely barriers to successful implementation and operation.

This roadmap builds on work already underway but also requires governments to test new ways of thinking about market arrangements. Due to the time required to assess and - if appropriate - implement these measures, the Australian and Basin States governments should start work on developing these solutions now. The ACCC advocates for these changes to coincide with the next Basin Plan review, in 2026.
16.3.1 Developing new tools will require better information and water accounting, and will be complex to implement

There needs to be careful consideration of the nature and magnitude of changes, the costs, and to consider intended and potential unintended consequences. These decisions need to be made collaboratively by the Australian and Basin State governments in close consultation with all affected parties. This is likely to entail:

- the appropriate policy agencies (including the proposed Water Markets Agency) undertaking detailed and rigorous assessments of the feasibility and merits of adopting potential solutions
- the Australian and Basin State governments together resolving which measures to implement; and doing so.

A number of these proposed reforms would potentially alter existing water users’ property rights, meaning modelling would be required to ensure any impacts from changes were identified, understood and appropriately managed in policy design. For example, for delivery focused recommendations, Frontier Economics notes that:

Without further investigating the significance of the risk of system shortfall across the [Southern Connected Basin] it is difficult to identify where specifically in–river delivery rights could be valuable.\(^{1287}\)

Assessing the feasibility and benefits of these measures is difficult in the face of existing information gaps. The current state of registers, metering and operational models means Basin States, approval authorities and river operators do not have information necessary to undertake such assessments with confidence. This is particularly so when it comes to determining the contribution of traded water versus general water deliveries to the underlying problems. For example, river operators and approval authorities do not have a consolidated, ‘real time’ daily water use data set for the Southern Connected Basin. Implementing the recommendations outlined in sections 16.2.4 and 16.2.7 and elsewhere in this report will improve the information available to decision makers.

16.3.2 Designing a reform roadmap for efficient markets now and into the future

Recommendation 25

Develop a reform roadmap for designing and operating efficient markets now and into the future

The proposed Water Markets Agency should work with the Australian and Basin State governments and the MDBA to undertake a work program to progress a long term reform roadmap that better integrates water market design with water management and aligns market architecture with the hydrological realities of the natural system.

This work program should consider how more fundamental reforms of the market architecture may drive improved market efficiency, such as through creating appropriate market based incentives and reducing generation of externalities. Informed by improved information gathering stemming from other recommendations in this report, this should include assessing the feasibility and merits of adopting new market mechanisms, pricing measures or complimentary policies within the Southern Connected Basin or across the whole Basin, as appropriate. Potential mechanisms to explore include, but are not limited to:

- applying water accounting that better aligns with the physical transfer of water, such as through ‘tagged allocation trade’
- applying congestion or time-of-use charges
- developing formal markets for rights to delivery capacity and/or water extraction (for example, ‘constraint rights’, ‘on-river delivery rights’, ‘extraction shares’)
- applying ‘loss factors’ to water trades in the Southern Connected Basin
- adopting ‘capacity sharing’ – where each water user is allocated with a share in storage capacity and a share in water inflows – in the Southern Connected Basin, including its potential to offer long term alternatives to intervalley trade account-balance limits
- considering the potential use of ‘water banks’ to fulfil roles like coordinating particular trading opportunities, such as allocating out IVT capacity, and holding and redistributing water rights as a ‘safety net’ in the markets
- developing a water market operator / smart market to operate the Southern Basin water markets and co-ordinate water delivery to users as one integrated system, matching bids for water with offers of supply, within the physical constraints of the system.

Developing the roadmap and considering longer term reform options will provide pathways and timeframes for continued improvement of markets through improved design and integration of the rules and arrangements for trade across the Basin.

Section 16.3.2 sets out some information on the possible paths or mechanisms listed above.

Option 1 – Align accounting with delivery

The Australian and Basin State governments should investigate water accounting that better aligns with the physical transfer of water. There is currently no link between the time of water trade and the time of delivery, meaning trade rules are ineffective mechanisms for managing many delivery issues, such as shortfall risk, environmental degradation and conveyance losses.

Under current conventional water allocation trade between zones in the Southern Connected Basin, such as between the Goulburn River and a Murray zone, water moves:

- ‘on paper’, in accounting terms, the water moves on to the accounts of the destination zone by effectively being cancelled in the source zone, and reissued in the destination zone. In this way, with regard to intervalley trade, the transaction will be added to the IVT account balance and may
contribute towards closing IVT, until it is drawn down when the river operators calls water out of the IVT account for delivery.

- ‘in the real world’, in physical terms, the notional amount of actual water may not be delivered at the time of recording the transaction; and may remain in the origin storages or wider source.

Figure 16.1 represents this. The diagram also notes that the water takes on the ‘characteristics’ of the destination zone, such as its carryover rules. The diagram highlights that the retail trade adjustment (when the volume in accounts on state registers are updated) occurs at the time of trade. The MDBA accounts for trades at a bulk level by making adjustments to intervalley and state transfer accounts on a monthly basis. In this way, traditional allocation trade is a factor in the ‘disconnect’ explained in section 13.1.3.

**Figure 16.1: Interregional trade via conventional allocation trade**

![Diagram](image)

Source: Frontier Economics, 1288

Basin water market architecture needs water accounting that better aligns with the physical transfer of water. Currently, with no link between the time of water trade and the time of delivery, trade rules are inefficient, ‘blunt’ and badly calibrated mechanisms to managing the delivery issues they are ostensibly intended to address. Further, the inability to track water trades and link the time of trade to the time of use prevents the implementation of other reforms to market architecture aimed at addressing delivery issues.

One option may be to conduct all Southern Connected Basin interzone trade as what is called ‘tagged allocation trade’, where the allocation issued in the origin zone is ‘tagged’ for use in a destination zone. The key differences between the current model and the tagged allocation trade model are that in the latter, water allocations do not ‘move’ in accounting terms to the destination zone until they are delivered there. They also maintain the characteristics of the source zone, such as the source zone’s rules for carryover. Figure 16.2 represents this, noting the trade adjustment would occur at the time of use.

This change of accounting practice would involve changes to registry arrangements and, most importantly, to how market participants trade.

While there are various different approaches that could be followed to operationalise this trade, one option would be expanding the scale of arrangements used to give effect to the movement of water between tagged entitlements. This would likely require all water users who wished to trade water between zones to have established a water account (a water access licence in New South Wales, or an Allocation Bank Account in Victoria) in both zones prior to trading. This additional administrative burden may act as a barrier to trade, which would be undesirable. Frontier Economics flagged these concerns:

A more far-reaching reform option would be to rely on tagging as the primary (or only) mechanism for enabling trade between zones. Our concern is that doing this prematurely would jeopardise the economic benefits from interregional trade – especially trade between resources in different States – because the processes to administer interstate tagging are not sufficiently developed.\textsuperscript{1290}

The ACCC notes such concerns from market participants. New South Wales Irrigators’ Council submitted to the ACCC in response to the interim report that it would be unworkable to introduce reforms that include traded water remaining in the seller’s catchment account until it is physically delivered at the destination.\textsuperscript{1291} The ACCC caveats this recommendation to apply water accounting that better aligns with the physical transfer of water with a requirement that authorities adopt a regime that facilitates the opportunity to trade, on long term sustainable foundations that adequately take into account the impacts of trade on third parties and the environment (see section 16.1.4 above).

The ABARES submission to the Interim Report also contemplates a tagged allocation model, flagging such a regime could potentially replace the existing system of IVT limits and instead allow river operators to be responsible for determining interregional trade flows at all times. In contrast to the Frontier Economics’ proposal, ABARES’ conceptualisation of this model would be that the trade adjustment occurs at the time of physical delivery of the water.\textsuperscript{1292}

Victoria’s Department of Environment, Land, Water and Planning (DELWP) has previously considered the plausibility of various different models of tagged allocation trade. These assessments identified

\textsuperscript{1289} Frontier Economics, Water market architecture: Issues & option, Input into ACCC market architecture assessment, 26 October 2020, p. 36.

\textsuperscript{1290} Frontier Economics, Water market architecture: Issues & option, Input into ACCC market architecture assessment, 26 October 2020, p. 55.

\textsuperscript{1291} NSW Irrigators Council, Submission to Murray-Darling Basin water inquiry interim report, 13 November 2020.

\textsuperscript{1292} ABARES Submission, Submission to the Murray-Darling Basin water inquiry Interim Report, 18 December 2020, p. 20.
that tagged allocation trade is ‘fundamentally more robust’ than current arrangements, as it links the applied carryover and spill rules to the water system in which the allocation is actually stored rather than effectively transferring these rules to a remote storage, as is the case under current arrangements. This means the risk of a loss of resources from storage spills would be more directly assigned to the individuals directly involved in these trades, rather than socialised across all water users. It could also enable more consistent treatment of all forms of trade, and may assist in achieving full compliance with Basin Plan rule 12.23.

However, advice to DELWP acknowledged the complexity and likely cost of adopting such a reform. In addition to the increased complexity for market participants outlined above, identified barriers to implementation included the need for southern Basin States to cooperatively adopt the new model and for modifications to be made to water register functionality.

The ACCC recognises that moving to a tagged allocation trade model will not directly resolve all of the issues with the way water market architecture currently accounts for trade, and handles the delivery of water. However, moving to a tagged allocation trade model would provide the basis for introducing additional mechanisms, if further analysis demonstrates these are justified. This includes issues such as loss factors and trade restrictions which more effectively target the delivery related impacts of these trades.

Given the potentially long lead times associated with designing and implementing this kind of reform, that work should commence immediately so adoption can occur as soon as the necessary pre-requisites (such as updated register capability) have been achieved. Addressing pre-requisite steps and ensuring adoption is collaborative between the States will minimise the risk that a tagged trade model will ‘jeopardise the benefits of trade’.

Complementary to the tagged allocation model is the recommendation, discussed in chapter 12, that Australian and Basin State governments implement lifetime traceability for water allocations when implementing the proposed Digital Messaging Protocol (see recommendation 14). Lifetime traceability will improve the information base about where water is moving to and from, where it is currently being held, and when and where it is being used. This information is valuable, and will help differentiate allocated water, intrazone and interzone trades’ impacts on the river system and water users. It may also assist with the implementation of potential instruments to address delivery impacts, such as a conveyance loss factor.

However, moving to a tagged allocation model would go a step further, completely reforming how intervalley trade operates and providing the basis for the implementation of rules to more directly manage the delivery of water (by applying interzone restrictions to interzone delivery, rather than interzone trade).

Option 2 – Reform storage rights and water accounting to be directly linked to what is occurring in storage space and inflows

The ACCC recommends that Basin States and the MDBA investigate continuous accounting and capacity sharing to better align water accounting with what is occurring hydrologically in the system. Capacity sharing and continuous accounting both align property rights and water accounting closer towards what is occurring hydrologically in the system. This reduces the likelihood that third party impacts will arise, and helps users to make better choices that result in more efficient outcomes.
**Capacity sharing**

Capacity sharing, already in place in the St George and Macintyre–Brook water systems, is where each water user is allocated with a share in storage capacity and a share in water inflow. Currently the right to inflows and storage space are bundled together in water entitlements. Splitting these two different rights into different products would result in more transparency in allocations, more efficient use of storage space and less trade restrictions.

Capacity sharing would function in place of current carryover and allocation policies, addressing concerns around the complexity and opaqueness of allocation policies and a lack of predictability of allocations. The changing relationship between storage volumes and allocations, and a lack of clarity over the allocation decision making is inhibiting effective business planning. Capacity sharing of inflows would more directly link inflows to allocations, resulting in more transparent and intuitive allocations.

The 2019–20 IRORG report also makes this argument in stating ‘in such a dynamic environment, there is a high need for adaptive, responsive capacity sharing solutions that provide sufficient flexibility to meet the changing needs of water users in an equitable manner’.

ABARES, in response to the Interim Water Inquiry Report submitted:

Under a capacity sharing approach, water users receive a percentage share of system inflows (as recorded in official stream flow gauges). This closer connection between user allocations and physical water supply, helps to reduce uncertainty and improve transparency. In practice, system inflows can be defined as an aggregation of multiple inflow sources (i.e. dams and or tributaries), with various allowances for fixed environmental or human water needs, such that the approach can be applied in complex water supply systems. Inflow sharing also requires a system of periodic reconciliations to ensure total user water allocations continue to match physical water storage.

ABARES notes the potential welfare effects (such as changes in entitlement reliability) of such a reform, though notes it has been achieved previously. They note that a more ‘modest’ reform could be making allocations using simpler and more transparent functions of physical water availability, similar to continuous accounting in northern New South Wales. ABARES goes on to state:

> There is a significant body of evidence, including both modelling and real-world observation to establish capacity sharing as a ‘best practice’ approach to water property rights in storage-controlled water supply systems.

Carryover parking (or trade to access carryover) may create a need to move towards capacity sharing. The use of carryover parking represents a ‘missing market’ where users demand a trading product which does not formally exist under current market architecture (that is, trading for storage space). If carryover parking trades start to impact trading restrictions (which are already predicted to become more binding), this demand may not be able to be met efficiently within current market architecture. This may provide the impetus for moving to a capacity sharing model which allows trade and/or leasing of dam space in a more direct manner.

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1293 “A capacity sharing approach to water property rights and markets includes the following key features:

- Water rights defined as percentage shares of system inflow and storage capacity
- Continuous (i.e., daily) water accounting with periodic reconciliations to ensure physical water supplies match user accounts
- User carryover subject to storage capacity (account) limits and ‘internal spills’
- User level delivery capacity rights and delivery loss factors…”


1295 In the context of the Southern Basin, for example, individual users on the Murray need not have explicit shares in storage capacity and inflows of specific dams (as is the case with state level water sharing arrangements, between NSW and Victoria). Rather end-users could have shares in the total available Murray inflow and storage capacity of their respective state.


In a journal article, academic Donna Brennan highlights the issues that carryover policies will face in light of increasing trade:

This analysis demonstrates the nature of the missing markets problem. There are third party effects from broadening the spatial scope of trade when the entitlement system is based on centrally planned storage decisions, rather than a storage market. Existing entitlement holders are currently the beneficiary of ‘residual storage’, which underwrites the reliability of entitlements. The introduction of broader spatial trade exacerbates the problem of the missing market because it creates greater opportunity for current season use. In contrast, the introduction of clearly defined property rights to storage would allow for the development of a storage market which would then allow for the gains from trade – in both spatial and temporal dimensions – to be achieved.\footnote{D Brennan, 2008, Missing markets for storage and the potential economic cost of expanding the spatial scope of water trade, Australian Journal of Agricultural and Resource Economics, 52(4), pp. 471-486.}

Further, a major benefit of capacity sharing would be removing trade limits that currently control for spill risk related to trade, such as IVTs. If delivery and timing of use and conveyance loss issues are dealt with by a mechanism which directly limits these issues, then IVT and state trade limits could potentially be removed. This would be done by moving the spill risk currently managed by IVT limits, to individuals who would need to have appropriate dam capacity to store the water (if it were not being used immediately).

Capacity sharing would likely result in more efficient use of dam space and reduce the risk of spills from dam as well as more trade. Capacity sharing allows individuals to manage their spill risk rather than shutting the IVT account to manage it at a wholesale level.

However given the large transition costs and questions of feasibility in an interconnected and complex system such as the Southern Connected Basin, the ACCC is not recommending transitioning towards this model at this point in time. The ACCC is recommending further investigation into implementing capacity sharing in the Southern Connected Basin and merits of refashioning entitlements into shares of the capacity of specific storages or water sources. Capacity sharing could also make the market more complex by adding a new product or may simplify the market by changing differing carryover rules into one product.

**Continuous accounting**

Continuous accounting operates as an annual allocation system with an allocation account limit and no carryover limit, just with more frequent water use accounting. Under continuous accounting, the concept of a water year becomes irrelevant, except where used to enforce a use limit.\footnote{N Hughes, M Gupta, K Rathakumar, Lessons from the water market: The southern Murray–Darling Basin water allocation market 2000–01 to 2015–16, Department of Agriculture, ABARES, 2016, p. 22.}

In the Southern Connected Basin, water accounting largely occurs on a yearly basis. Previously, this meant water that remained in water users’ accounts at the end of the year was forfeited. However, this was inefficient as it created an artificial time constraint on how water users were able to use their water, resulting in inefficient use of water at the end of the water year as users adopted a ‘use it or lose it’ mentality. Carryover was introduced to allow water users access to water earlier in the season, though is only required because of the artificial constraint of the water year.

Water accounting has primarily been used for river operations and water management but with increasing trade there is a need for more timely data to prevent users over-drawing their water accounts. Continuous accounting would better align water accounting with what is occurring in the river system and allow more granular costing of evaporation losses across all water held (rather than just at the end of the year) and potentially conveyance losses. This would require investment in telemetry and investment in registers.

**Option 3 – Congestion or time-of-use charges**

The ACCC recommends that the Basin States work together to investigate implementation of a time-of-use charging regime in the Southern Connected Basin which reflects the relative costs of water delivery to different locations and at different times of the year and the relative scarcity of on-river
delivery capacity to those locations at those times. The ACCC envisages this could be achieved through revision of the current suite of bulk water charges imposed by Basin State governments upon water users in their jurisdiction.

The current charges imposed on water users in the Southern Basin do not incorporate timing factors such as congestion and the physical costs of delivering water (in the form of conveyance losses and environmental damage). As such, they do not send effective price signals to encourage users to incorporate these into their decision making. Currently, charges set by Basin State governments in New South Wales, Victoria and South Australia generally include a mix of variable charges (for example, per ML of use) and fixed charges (for example, per ML of entitlement) in addition to various transaction charges (see chapter 10). While these charges vary between sources and zones, they do not currently vary based on the location of a water user within a particular zone, or the time of year extraction occurs.

The introduction of a time–of–use charging regime would create water use charges that are higher during ‘peak’ times of the year (such as November to April), when relative scarcity for on–river delivery infrastructure and the potential for impacts (such as conveyance losses, environmental damage, and shortfall risks) are highest. Additionally, water users extracting water in reach of the river system which are located further from storages (increasing conveyance losses), or in more constrained reaches of the system (where delivery capacity is most scarce) would also face higher per unit costs for water use than other water users.

Short term impacts of such a charging regime may be small but in the long term, the aggregate effect (all other things being equal) would likely be for some irrigation developments to shift further upstream and above constraint points. Where possible, usage would also shift away from peak times (either through changed business practices, like increased use of on–farm storage, or changes to the cropping mix towards uses like dairy which are less aligned with the summer peak). The impact of any change to the charging regime would likely only affect businesses operating at the margin.

The ACCC acknowledges that government-imposed administrative charges are more rigid and less likely to accurately reflect the true cost of certain impacts, or the true value of delivery capacity, than a market mechanism such as a cap and trade regime for on–river delivery rights.

However, given the difficulties with introducing a regime of on–river delivery rights (see option 4), the ACCC proposes that this kind of charging regime should be considered as an alternative solution. The ACCC considers that even if the administrative charges are not fully accurate, they will almost certainly be more efficient than the status quo, where charges remain constant temporally and spatially (within zones). These charges could also be revised over time. Frontier Economics articulates the challenges here:

A challenge with this option comes in setting the charge so that it ensures peak spot demand does not exceed the maximum desirable level of extraction in locations through the network. To get this right the level of the charge would ideally be readily adjustable. This can cause concerns for users who understandably want certainty in terms of the charges they face. Ultimately, a balance would need to be reached between balancing supply and demand through the network and providing charging certainty for diverters.\footnote{Frontier Economics, Water market architecture: Issues & options, Input into ACCC market architecture assessment, 26 October 2020, p. 69.}

Frontier Economics also found that the introduction of peak delivery charges would ‘result in more efficient outcomes... because extractors would be required to internalise the impact of their ordering decisions.’\footnote{Frontier Economics, Water market architecture: Issues & options, Input into ACCC market architecture assessment, 26 October 2020, p. 69.} However, Frontier ultimately concluded ‘on balance there is unlikely to be sufficient benefit in acting immediately to creating in–river delivery rights or [introducing] peak delivery charges [as] they would be complex to define and implement and could create significant administrative costs in an attempt to address third party impacts that are poorly understood and hard to define ex ante.’\footnote{Frontier Economics, Water market architecture: Issues & options, Input into ACCC market architecture assessment, 26 October 2020, p. 71.}
Basin State investigation of this option should consider the issues and challenges outlined above, and the magnitude of identified externalities so as to devise the most accurate regime of charges, if and when the pre-requisite reforms are implemented. Basin States will need to work together to ensure the implementation of charging regimes would be harmonised and not create market distortions. Alternatively, Basin States could take the intermediate step of implementing just one half of this recommendation, and revise charging arrangements to vary either by time or by location.

**Option 4 – Formal markets for rights to delivery capacity and/or water extraction**

The ACCC recommends that Basin States and the MDBA investigate the development of a regime of property rights for the delivery of water through on-river infrastructure which are to be unbundled and operate separately from water access rights (entitlements). These property rights should be tradeable and capped at a level that reflects the sustainable delivery capacity of the on-river delivery infrastructure.

The ACCC considers that further work is needed to investigating the feasibility and possible avenues to implementation, for a regime of separate property rights for the on-river delivery of water in the Southern Basin. This would involve further unbundling of existing water rights, given the right to have water delivered on-river is currently still bundled in with water access entitlements. The ACCC considers this would essentially take the form of a ‘cap and trade’ regime for delivery capacity, similar to the regime of water delivery rights that exist in off-river IIO networks. Frontier Economics explains the differences between water delivery rights in off-river networks and potential on-river rights.1303

As noted in chapters 13 and 14, there are limited mechanisms to effectively and efficiently ration and allocate the scarce and valuable capacity for water to be delivered through the network of on-river delivery infrastructure, which includes natural river channels and man-made canals. The ability to have water delivered through particularly constrained reaches of the river, such as the Barmah Choke or through the Lower Goulburn into the Murray is particularly valuable, but also prone to potential externalities where sustainable flow rates are exceeded for long periods of time.

In order to set the ‘cap’ of volumes that could be delivered through any point of the river, the issuing authority would need to limit the number of delivery rights offered to the market for a given time period, likely between a day and a month. In order to have water delivered to an on-river extraction point, water users would need to hold the corresponding volume of delivery rights for that section of the network at that time or face substantial penalties. Water users could enter the market to purchase additional delivery rights from water users who have surplus rights.

The ACCC notes that delivery rights would not need to be defined for the entire network and for every month of the year. Rather, delivery rights could be defined for locations on the network and times of the year when flow constraints are binding, such as during peak irrigation months. The issuing authority would need to have some flexibility to vary the volume of delivery rights on issue between years (and possibly within year), based on prevailing conditions across the system. This would require sufficient transparency and communication would be needed to provide relative certainty to the market.

The establishment and enforcement of water delivery rights would have several benefits. These include internalising the delivery costs, improving the efficiency of water trade and water use decisions, eliminating third party impacts in the form of environmental damage and increased delivery risk, and allowing for the elimination of administrative constraints on water delivery. It is possible that on-river delivery rights could be combined with a mechanism to account for conveyance losses as well.

In addition to the above, delivery rights would provide water users with a mechanism to manage their own delivery risks. Those users whom most highly value ensuring they will be able to have water delivered during a particular time of year (such as permanent plantation operators) will be able to enter the market to sure up their delivery rights ahead of time, assisting with planning. As long as the cap is set at an appropriate level, the value of these rights should, as a result of market forces, reflect the true value of delivery capacity.

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Frontier Economics discussed the significant complications of defining a system of on-river delivery rights, stating ‘it may not be possible to clearly define an in-river delivery right as a share of flow in a segment of the network or a share of capacity in a weir pool, lake or choke. Put another way, determining the actual flow/capacity at which the level of extraction may be creating a shortfall risk for other users would be challenging.’ Frontier also notes that a network of delivery rights would require water users to be manage the timing of their water ordering and their approach to delivering it through the network. Frontier argues ‘it is not clear that individual water extractors are best placed to do this’.

In addition to these considerations is a fundamental concern that introduction of on-river delivery rights would add substantial complexity to a market already perceived by many to be excessively complex to understand and navigate. This added complexity could potentially present a barrier to participating in the market for some users and possibly increase the competitive advantage for sophisticated water users. South Australia’s Department for Environment and Water expressed concern over the feasibility of such a model.

There are a number of significant considerations which would need to be resolved in order to effectively, and fairly, implement such a regime. These include:

- How would southern Basin States share the delivery capacity through constrained reaches? The ACCC understands that Victoria and New South Wales have different views on the potential sharing of the delivery capacity of the Barmah Choke and are working on achieving a resolution.
- How would on-river delivery rights be allocated in the first instance? Some options include allocating them pro-rata based on water access entitlement holdings, or via an auction.
- How could trade for delivery rights operate efficiently? Relevant governments would need to consider how water registries and trade approval processes would need to be set up, while also limiting ‘excludability’ of water delivery rights.
- How would environmental water holders would fit into this regime given their fundamentally different delivery demands to consumptive users?
- How would the time of use effectively translate to the time of delivery through constraints given the lags in delivering water downstream and the nature of aggregated bulk water deliveries?

**Extraction rights**

An alternative to on-river delivery rights could be a cap and trade regime for extraction rights. Rather than directly allocating a share of available delivery capacity in a specified segment of a river or other delivery channel, this would provide holders the right to extract a certain volume of water, at a certain location, over a given period of time. This final point is significant, as a simplifying assumption of establishing tradeable water access rights has been that water use can occur at any time of year and delivery will in general be guaranteed. An extraction right would aim to indirectly cap and define the volume of water being delivered downstream through constrained river reaches at sensitive times, via capping the extractions downstream of these reaches in defined time periods.

The foundation for these rights already exists within Basin State legislation. Victoria has ‘extraction shares’ for on-river water users, expressed as a condition on a works licence. In New South Wales, the ‘individual daily extraction component’ or ‘individual daily extraction limit’ is a component of the water access licence, and is already used in unregulated systems to manage the timing of water take. However, in NSW regulated systems, the individual daily extraction component is generally specified

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1304 Frontier Economics, Water market architecture: issues & options, Input into ACCC market architecture assessment, 26 October 2020, p. 66.
1308 To limit the potential for users to create water shortages and price increases downstream, one user owning but not utilising their delivery rights should ideally not prevent the delivery of water downstream.
in a manner which does not constrain take. In South Australian legislation, the ‘delivery capacity entitlement’ represents the ongoing right to access a proportion of the capacity of a water distribution system; however, South Australia to date has not yet defined these entitlements in practice, considering them an ‘optional’ water right provided under the Natural Resources Management Act 2004 (SA).

As noted in section 14.2.2, extraction shares in Victoria have not been capped (until the recent decision by Minister Neville to directly review any works approval applications) and the volume on issue has outstripped the volume of water access entitlements on issue (figure 14.7 represents the growth in these rights). The implication of this is that there would likely be significant challenges for Victoria to reduce the extraction share on offer, and New South Wales and South Australia to implement an effective regime for allocating their respective instruments.

Option 5 – ‘Loss factors’ on water trades

The ACCC recommends that Basin States and the MDBA investigate the implementation of loss factors which would apply to traded water in the Southern Connected Basin, so as to attribute increased conveyance losses associated with water trades directly to those incurring them.

As flagged in the ACCC’s interim inquiry report, a number of stakeholders have called for the implementation of loss factors to be applied to water trades that increase conveyance losses.

The introduction of policy mechanisms such as conveyance loss factors applied to the movement of water in the Basin offer the potential to address flaws in the market architecture regarding the accounting and attribution of conveyance losses. As noted, applying a loss factor to all water delivery, applied at the point and time of extraction, is likely to offer the greatest efficiency gains. However, this would require a decision from governments on whether existing rights holders, or just those trading water downstream should be subject to a loss factor.

The magnitude of the impact of market driven trends on conveyance losses is as yet unknown. Section 16.2.4 notes the challenges to determining accurate conveyance loss factors for every individual water use decision, which would likely mean any factor would have to take the form of an estimate or average. Any consideration of these kinds of policy mechanisms should balance the challenges to, and market disruption of, their implementation against the potential efficiency gains they offer. Policy makers may also need to consider if some ‘second best’ policy approaches which are more practical, may be preferable to optimal but challenging policy solutions.

Conveyance loss factor – allocation trade

A proposed solution to deal with conveyance losses was through the introduction of conveyance loss factors onto allocation trades. Doing so, would essentially represent an exchange rate allocation trade, defined by Schedule 3 of the Water Act 2007 (Cth) as the ‘rate of conversion to be applied to water to be traded from one trading zone and/or jurisdictions to another’. Note, that this differs to exchange rate entitlement trades.

Conveyance loss factors for allocation trade could theoretically be applied to water trades which would increase conveyance losses (by changing the location of extraction). This would involve one ML of water sold from an upstream water user converted to less than one ML received by the downstream

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1309 For many water access licences in regulated systems, this component is specified as ‘Subject to conditions water may be taken at any time or rate’. ACCC analysis based on NSW Water Registers, https://waterregister.waternsw.com.au/water-register-frame, viewed 2 February 2021.


1312 Water Act 2007 (Cth), Schedule 3.

1313 A conveyance loss factor being applied to allocation trade is an exchange rate allocation trade, in that the temporary water traded from one zone to another is subject to a conversion rate. Note that this differs from an exchange rate entitlement trade, which is when a permanent right to water is traded between zones subject to a conversion rate, a method of intervalley trade which is no longer used by Basin State governments.
purchaser. The difference between the two amounts would reflect the proportion of water lost to conveyance. Doing so would more effectively attribute the incremental increase in conveyance losses as a result of changing water use activity to those who are benefitting from this change – those involved in trading water downstream.

Examples of this kind of conveyance loss trade factor exist in Queensland’s St George Water Supply Scheme, where the official transfer volume is an ‘at dam’ value but where the volume of water debited or credited from the seller or buyer’s account is an ‘at farm’ value. Under normal climatic conditions and where water is traded from one zone to another further downstream, a loss adjustment (generally 12%) is applied to the volume debited against the seller’s account, providing the buyer’s ‘at farm’ value. Enacting these mechanisms in the St George scheme is administratively much simpler than in the Southern Connected Basin, as the scheme is characterised by one main water source and minimal other inflow points.

Further, there is significantly more trade in the Southern Connected Basin than in the Northern Basin, making conveyance loss factors more complex to implement. Frontier Economics outlined these difficulties in writing:

> Imposing conveyance loss factors...for allocation trade in the Southern Connected Basin would be extremely challenging to implement in practice ... If loss factors were to be considered, research and communication would be required to identify the magnitude of the losses, and how they vary with trading behaviour.

The MDBA and Basin States considered the introduction of conveyance loss factors for allocation trade traded from tributaries into the Murray in June 2018 as part of the Trade Adjustments Project. Simultaneously, the MDBA also considered the concept of a conveyance share which would have to be purchased by water users when purchasing water from upstream. Because of the challenges and complexities to implementation outlined above, the group recommended no change to the current treatment of conveyance losses.

ABARES considered:

> At present, the inability to accurately measure losses in most cases makes practical implementation of loss factors/zones very difficult. There may be specific situations where loss factors could be considered: where average loss rates are known to vary dramatically in different parts of a catchment (on a consistent basis) and/or there is a genuine concern around long-term changes in irrigation development within the catchment (shifts toward higher loss zones). As such, adoption of delivery loss factors would be best considered on a case–by–case (region–by–region) basis.

**Conveyance loss factor – delivery/extraction**

Other stakeholders recommended the application of conveyance loss or ‘freight’ factors applied to all water that is delivered through the River Murray system (as opposed to water traded, as outlined above). Theoretically, a loss factor or adjustment could be applied to the water held by water users in each water source, which would give them an adjusted value representing the volume of water they are allowed to extract. In doing so, water users would directly bear the costs of conveyance losses related to their water use.

Conveyance loss factors for delivery are also applied in the St George scheme. In addition to conveyance loss factors applied to interzone allocation trades, a loss factor also applies to water...
extracted, and converts the water volume ‘at dam’ to an ‘at farm’ volume for extraction based on the
distance of the water user’s zone from the water’s origin points (including within the trading zone).1319

From a market architecture perspective, this kind of loss factor is likely to offer the closest thing to a
‘best practice’ approach by applying the loss factor to all water delivery (rather than just traded water)
at the extraction point itself. The primary concern of this approach would be that it would impinge on
the established rights of water users by effectively reducing the volume of water that all downstream
users can extract, which would reduce the value of those entitlements. The decision on whether
established rights to access water should be impacted by changes to the attribution of conveyance
losses, or whether just water subject to temporary trade should be, is a values based decision
for governments.

Conveyance loss factors on delivery or extraction could be applied to current tagged entitlements, as
loss factors could vary based on the actual time of water use.1320 Imposing a conveyance loss factor only
on tagged entitlement holders, and no other water users, would create a clear market distortion and is
not recommended. However, shifting to a tagged allocation trade model would allow conveyance loss
factors to be applied to water use more universally in the Southern Basin.

**Conveyance loss factors – bulk intervalley trade adjustments**

A more administratively simple mechanism for accounting for conveyance losses than an individual
loss factor applied at the retail level, could be for a loss factor to be applied at the bulk level to the
aggregate volume of IVT in the account. This would mean that if, say, 100 GL had been traded from the
Murrumbidgee to the Murray, that only 95 GL (for a 5% loss factor) would be available for calling out and
delivering to water users in the Murray. The remaining five GL would be used to cover the additional
cost of conveying the traded water through to the end of the tributary.

As this arrangement operates at the bulk level, buyers of IVT water would still receive the full volume
they purchased, but the volume of water resource available to the Murray would be decreased. This
would shift the burden of the additional conveyance losses from being borne wholly by water users in
the tributary, to being borne by users in the Murray. This arrangement would also mean that the loss
factor can be most accurately linked to the real rate of conveyance losses. This is because it would
occur at the time the water is physically delivered through the system at the bulk level from the origin to
the destination valley.

Which valley should bear this cost, be it the valley of the seller or the purchaser, is ultimately an
equity decision which the ACCC considers is a matter for government. The biggest concern would
be the impact on water users upstream in the Murray who are already concerned about the impact
of conveyance losses traded downstream to the lower Murray, and who would now also be bearing a
proportion of trade from the Murrumbidgee to the Murray.

Under current arrangements, the ACCC does not believe this regime would work for water being
traded between NSW Murray zones or between Victorian Murray zones, because in each of these
cases there are two zones within one water source, and there is no “owing” of water from one valley
to another when water is traded between zones 10 and 11, or between zones 6 and 7; that is, the bulk
water resource are shared for those zones. The ACCC acknowledges that this is only a partial solution,
and still retains the assumption that is appropriate to socialise losses associated with transferring water
between valleys.

**Option 6 – Alternative market institutions and models**

The ACCC recommends specific alternative models for market architecture be investigated further
by the proposed Water Markets Agency. The ACCC urges the ongoing consideration of reforms
that focus on delivering effective signals back to water users of the actual costs of use, storage and
delivery decisions.

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1319 SunWater, Application for Temporary Transfer of Water and/or CAP St George Water Supply Scheme, 2009, p. 4.
1320 Note that this would include water rights historically associated with using water in particular reaches, as well as water
access entitlements more recently traded into these reaches.
Schedule 2 Processes – accounting for tagged allocations, step 3, cl. 3.
Long term, the most effective way to do this will be through price signals which accurately represent the real cost of individual water deliveries (incorporating externalities such as conveyance losses, environmental damage, network congestion and delivery risk). Determining the appropriate model for reflecting price signals back to users will require more work.

Currently in the Southern Connected Basin, the MDBA operates the interconnected tributaries and storages in conjunction with the Basin States, trading off different objectives to meet, at the end point, demand for water users. This works well as the MDBA has the best information about what is happening in the river system overall, including likely demands in the future.

However there are issues around these trade-offs and how they are made, discussed in section 16.2.6. There is finite capacity within the river system and third party impacts which are not currently taken into account in market architecture. In the above sections, the ACCC explored ways in which the individuals could be empowered to manage these issues. However, this may result in a market that could be very complex for users and may still not produce an optimal outcome.

The advantage of the following options is that it allows the user who has the most information about risks and what is occurring in the system at a wholesale level, to make the decision. This is similar to the current model, where the river operator makes these decisions, but uses market signals to make decisions about where and when water is most valuable within the constraints of the water market.

‘Water banks’

A water bank can be defined at its simplest, as a single intermediary acting between buyers and sellers of water rights, whether that transfer is temporary (spot) or permanent.1322 In effect, there are already water banks for the environment functioning in the Basin market in the form of the Commonwealth Environmental Water Holder and other environmental bodies that hold water entitlements. The ACCC is also aware of a small scale water bank operating out of Mildura.1323 The Commonwealth Scientific and Industrial Research Organisation has recently studied the potential for groundwater banking, explored in more detail below in box 16.2.

The bank’s purpose could be the efficient reallocation of water between regions within hydrological constraints at a given point in time. However a water bank could go further and help manage risk related to water availability or to act as a safety net for farmers, either by buying water and reselling or selling futures to hedge risk. This would depend ultimately on how the water bank’s purpose is defined when setting up the bank. It is important to note that the water bank would not fix the underlying market architecture issues with delivery and timing of use, unlike the water market operator model, explained below.

Water banks have been used internationally, notably in the United States of America. The Californian Government has implemented water banks for droughts firstly in 1991–92 and 1994.1324 A water bank set up in 2009 was deemed to be less successful, and droughts in 2014 and 2015 did not result in water banks being established.1325

A water bank has also been used for interstate transfers in the USA, to manage the transfer of unused Arizonian water in the Colorado River to southern California. This water bank was created due to rules that had been put in place out of concern that southern Californian demand would result in less water for Colorado.1326 This shows that water banks may also be able to help with concerns about water leaving geographic areas. The Arizona Water Banking Authority’s role has since expanded to include firming up of water supplies in Arizona.1327

Box 16.2: Case study – Commonwealth Scientific and Industrial Research Organisation study on groundwater banking which could be used as a drought protection measure

Aquifers and groundwater are already being used to shore up supply in Australia due to the variable rainfall. In the last drought, they were crucial to farmers in Narromine in helping to alleviate severe lack of water. However there is still not a firm understanding as to how much water take is sustainable and what the rate of groundwater recharge is. There are also fears that groundwater sources are already being over-extracted, as farmers move towards a more reliable water source.

Better modelling and understanding of how the river system and groundwater system works, could allow for better drought prevention by using groundwater banking. This is already in use in Australia, with Perth using groundwater replenishment to firm up their water supplies.

The Commonwealth Scientific and Industrial Research Organisation (CSIRO) conducted a study on the Murray-Darling Basin to identify possible areas that could be used for groundwater banking.

The CSIRO report found that:

- across the Basin, this study identified 96,000 km\(^2\) (almost 10% of the Basin’s 1 million km\(^2\)) where there was potentially suitable geological features for water banking to occur
- a water banking model with recharge and recovery triggered by water trading prices using 11 years of data gave a benefit-cost ratio of approximately two-to-one
- water availability for recharge was a tighter constraint on water banking than aquifer storage capacity at the location chosen
- groundwater banking could potentially be an alternative to Menindee Lakes to help reduce evaporation losses
- there is a need for more site specific work and there are gaps in current information, specifically Lachlan River, Upper Murray, and Murrumbidgee River catchments.

A Water Market Operator and a ‘smart market’

As discussed in Options 3, 4 and 5, there are many complexities around establishing appropriate property rights for delivery. One of the key issues is the dynamic nature of what is occurring in the river system, which would be difficult to reflect without a complex property rights regime. Further, once rights have been established, if conditions were to change substantially, it would be difficult to change or revoke these property rights.

There is another more centralised option, which would add an explicit market dimension to river operations. Using price to identify demand and supply across different trading zones and across time, a market operator could move water around the river system to the highest demand, within set hydrological constraints. The advantage of this model is that it allows the operator to cap delivery dynamically depending on river constraints, and respond to changing conveyances losses, similar to the way river operators make these decisions to move bulk water around the system now. Appendix H explores how smart markets might offer potential long term solution for water trading in the Basin. This

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is one type of model that could be used, and there may be other models that are more appropriate. It still remains to be proven that there are large enough problems with the market operation to justify this reform.

This model also gives the party with the best information about the overall system (the operator), the decision making power on the trade-offs for running the system. In contrast, delivery rights require individual users (who may not have adequate information or the time to become informed) to understand the operation of the river system at a more granular level.

The aim of this model is to operate the Southern Connected Basin water markets and co-ordinate water delivery to users as one integrated system, matching bids for water with offers of supply, within the physical constraints of the system. This model aims to exhaust all potential gains from trade (within system constraints), have effective price signals for use, storage and movement of water across the system, and make individual profit maximising decisions consistent with overall social benefits.

The advantage of this model compared to the status quo is that it also allows users to signal their demand better than in the current system by pricing their demand. This then allows river operators to make better decisions about meeting demand across trading zones and time.

However this requires a key change for users, with all water users being required to engage with the market in order to access their water. Under this model, water users need to order their water in order to be able to extract it, and would no longer be able to take water passively. This allows the operator to better gauge supply and demand at a given point in time, in a given region. In theory, this could be done at a bulk level, however this would likely be less efficient.

Importantly and in contrast to delivery rights, an operator model allows water users to only need to care about their own demand for water at their location, and not about the path that water flows over the network.

All of this would require much more advanced modelling and telemetry than is currently present in the river system and water market at the moment. It would also likely need to decrease the sizes of trading zones to help manage conveyance losses and other capacity constraints.

### 16.3.3 These reforms require Basin-wide coordination

Many longer term reforms require coordination and harmonisation across state borders to gain the full benefits of implementation. Although there is collaboration between states, having an independent body that looks at policies across the Basin as a whole, will improve reform outcomes. The ACCC recommends the Water Markets Agency to be this independent body with a market focus, which is discussed in more detail in the next chapter.