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Water market architecture: Issues & options

Input into ACCC market architecture assessment | 26 October 2020

Disclaimer

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About this report

This report has been prepared to provide input into the ACCC's inquiry into markets for tradeable water rights in the Murray-Darling Basin.

One set of issues which the ACCC is examining as part of its inquiry relates to the 'market architecture' or design elements of this market. This includes:

- system operation, trading and other rules and regulatory settings that influence the opportunity for trade, the level and location of trade, and manage the impacts of trade on other water users and the environment
- governance, including institutional make up, roles, functions and decision-making processes.

Against this background, Frontier Economics has been engaged to provide expert advice and analysis to provide input into the ACCC's assessment of whether or how the existing architecture or design of the southern connected Murray-Darling Basin (scMDB) water markets are constraining or distorting water trading activity and competition including whether or how:

- there is a 'gap' or 'disconnect' between the trade and operational rules in the scMDB and the hydrological realities of the physical system
- closing such a gap or otherwise changing market rules and design, to better reflect and manage the flow constraints and operational requirements, could improve the operations, transparency, competitiveness or efficiency of scMDB water markets.

Where potential issues are identified with market architecture, the ACCC is also seeking input on potential solutions and improvements to this architecture that would improve the functioning and competitiveness of water markets, including a conceptual discussion of the relative merits or drawbacks associated with the potential solutions identified.

Key findings

Our review has found that some elements of the trading architecture are undermining the achievement of the Basin Plan trading objectives. 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 water use, increasing costs/losses of system operations, and/or adverse environmental impacts. Our review considers in detail three elements relating to:

- Interregional trade
- Delivery arrangements
- Carryover and individual storage arrangements.

In addition, our review found that the water trading architecture is underpinned by governance arrangements which are complex, fragmented, and subject to overlaps and gaps and lack of consistency.

Interregional trade

Several different mechanisms have been developed to give effect to water trading. These can be categorised as:

- exchange rate entitlement trade
- interregional water allocation trade
- tagged entitlement trade.

In addition, water accounting arrangements support trade between zones, including intervalley transfer (IVT) accounts to track water 'owed' from one system to another.

Interregional trade occurs on a 1:1 volumetric basis regardless of the distance between the storage and the user. Hence, a simplifying assumption for interregional trade is that the marginal losses from the delivery of individual water parcels is zero. For the most part, this is not unreasonable.

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 certain seasonal conditions. The Murray Darling Basin Authority (MDBA) river operations has indicated that it is increasingly challenged to deliver large and growing volumes downstream.

The river operations of the MDBA, as set out in annual system planning and updates, are required to make trade-offs between potential losses and minimising shortfall risk for downstream users. Pursuit of an objective to meeting demand and resultant increased conveyance loss risk has distributional consequences. The immediate benefits of meeting demand downstream are realised by the users downstream, but increase the risk of losses which are socialised across all entitlement holders.

Using IVTs to reconcile trade across seasons (i.e. the IVT account ends the year in credit, and this is carried forward to the next water year) may lead to third-party impacts. Specifically, the storage of IVT could impact on the reliability of water entitlements held by others in the systems between which water is being traded. This is a larger risk if IVT volumes are consistently held high at the end of the season as has occurred in recent years. The reliability impact occurs because IVT credits that have been carried over from a previous year are subject to spill rules whereby a proportion of water carried over would be lost if a physical spill occurs in the storage.

Trading restrictions are currently used to reduce the risk of third-party impacts from IVT. However, trading limits constrain opportunities to trade which will affect the pattern of trade. In the absence of any other pricing or rationing mechanism for managing this scarcity, the result will be a rush to undertake trades before the constraint becomes binding.

An incremental reform option would involve revision of Basin Plan Water Trading Rule (BPWTR) 12.23 to allow tagged delivery when water allocation trade is restricted, if the tagged delivery does not significantly contribute to the stated reason for the trade restriction. The effect of this would be to recognise that where allocation trade is constrained to protect against IVT spill risk, tagged delivery (and in-river environmental delivery) allows beneficial movement of water

downstream that does not contribute to spill risk. Water trade policies would need to consider the potential for strategic behaviour by water users who can use a mix of tagging and allocation trade, so that unintended consequences do not result, such as peak flow or delivery risk.

Communication and legislation could also be improved for the language to be more closely aligned with how tagging is implemented. For example, BTWTR 12.23 only refers to 'tagged water access entitlement' and does not refer to tagged water allocation trade. This would involve revisions to cover all tagged delivery (delivery from tagged water allocation trade and tagged water access entitlement trade) given that these are implemented equivalently in NSW and Victoria via tagged water accounts.

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.

We also recommend that IVT limits be clearly linked to their underlying purpose (such as conveyance losses and spill risk) and that the effect of IVT limits on trade be aligned with the stated purpose — or that the trade restriction/limit be revised to more closely address the underlying concern or an alternative approach be used to manage the concern.

Delivery shortfalls

A large number of water users seeking to draw on the volumes in their allocation accounts at a particular time leading to localised peaks in use may mean demand cannot be fully met without compromising minimum environmental flows. This inability to meet demand is referred to as a shortfall event.

The *likelihood* of a shortfall is largely driven by climatic conditions causing a demand spike which was not anticipated by the river operator). The *consequences* of a shortfall will depend on the time when it occurs and the nature of the water use or irrigation operations affected. For the most part, system shortfalls can be expected to occur during peaks in irrigation demand. Production losses as a consequence of a delivery shortfall could be significant particularly for certain water users.

While the risk of delivery shortfall exists in the scMDB regardless of trade, to date this risk been low. However, changes in irrigation in the scMDB have concentrated the location and timing of water demand further downstream. This is likely to have exacerbated the risk of delivery shortfall by creating the potential for higher localised peaks in demand.

Current arrangements are not addressing this increased shortfall risk:

- Essentially 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.
- Instead, trade rules are used to protect third party delivery reliability and to mitigate the growing risk of system shortfalls. Trade rules are inherently blunt instruments and because they operate on a first in basis would be expected to be preventing some net beneficial trades from occurring.

- These trade rules would also not be effective in managing short-term shortfalls (as may occur with a string of extreme hot days during peak summer irrigation season). In these circumstances it is a peak in demand from existing downstream users (already holding allocations within the system) that would be driving the shortfall.

Of the potential solutions for managing shortfall risk there would be merit in adopting an incremental approach to reform. This would include:

- Formalising and communicating how extraction will be managed or controlled during a shortfall event, including the role extraction shares will play in this
- Investigating further the significance of the risk of system shortfall across the scMDB by identifying where in the system the risk may be relatively high as a result of physical delivery constraints and the nature of water use.
- Exploring the use of exchange rates and trade levies for managing delivery shortfalls instead of the more blunt and restrictive trade rules currently applied.

This is a no regrets solution that would help clarify:

- whether (and where in the network) further far reaching reforms such as defining in-river delivery rights or introducing peak delivery charges would be valuable; and
- whether there might be value in investing in elements of the system (such as physical infrastructure to bypass constraints or increase capacity) to relieve capacity constraints.

On balance there is unlikely to be sufficient benefit in acting immediately to create in-river delivery rights or introduce peak delivery charges. Both options would enable some trading rules to be removed which would create efficiencies. However, 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.*

We do not consider that controls on wate use would be an effective mechanism to manage impacts on third parties' delivery reliability. These are blunt instrument that once implemented would be difficult to adapt should circumstances change in the scMDB in the future. Measures of this nature could be considered a backwards step.

Carryover and individual storage arrangements

Under existing arrangements water access and water storage are managed as one property right. Water access entitlements have been adapted to include carryover provisions, including rules to provide access to other available airspace.

Carryover arrangements can have negative third-party impacts if individual carryover decisions impose higher storage losses or costs on others, or if storing the carryover volume leads to lost opportunities to harvest resource inflows.

In general, individual carryover is permitted under rules that intend to manage the significant risks of third-party impacts by applying the principle that unused water can be stored in the available airspace of a storage, but it cannot displace additional storage inflows. The individual decision to carryover adds to water held in storage and may be expected to share responsibility for evaporation losses in storage, so carryover arrangements can also include loss factors and fees to avoid such third-party impacts or free-riding.

However, all sets of current arrangements do not manage all potential third-party impacts and water users have expressed concerns that reliability may be undermined by the change in behaviour that carryover enables.

In addition, current carryover arrangements are susceptible to change and may introduce new risks.

An incremental reform would be to fine-tune existing carryover arrangements such as:

- Individual evaporation loss deductions from carryover in NSW and SA, to ensure that socialised losses do not negatively impacts other entitlement holders. If incremental storage losses are minimal then this may not change the efficiency of storage decisions (but may increase the equity of sharing storage losses).
- Communication/clarification of how carryover volumes will be treated — including policies for quarantining carryover in NSW system under dry conditions.

A far-reaching reform would be to implement capacity sharing arrangements in the scMDB. However, there would be significant challenges to implementation, including:

- There are multi-storage systems in the scMDB — this increases the required accounting complexity and entitlements are defined by the water resource rather than a specific storage. For example, the NSW Murrumbidgee has two major storages (Blowering and Burrinjuck dams) and a connection to the Snowy Mountains hydroelectric scheme.
- There are systems where some resource improvements do not enter storages in the scMDB (such as mid system unregulated flows). For example, in the Victorian Murray flows out of the Ovens and other Victorian tributaries might go into Lake Victoria but they can also meet Victorian diversion and flow to South Australia requirements.

In our view, there is unlikely to be sufficient benefit to justify implementing capacity sharing arrangements in the scMDB — given that current carryover arrangements already provide access to airspace beyond entitlements in a low-cost way that is not expected to have significant negative third-party impacts. Any benefits would have to outweigh the potentially significant costs of addressing the complex implementation challenges.

Rather, we recommend that any reform to carryover arrangements focus on fine-tuning arrangements in South Australia and NSW — to improve protection against third-party impacts and improve communication of carryover risks.

Governance

The scope of the governance analysis in this report does not consider market governance as a whole, but is limited to governance issues arising out of the market architecture issues considered within this report.

Based on this scope, we have identified three key aspects of governance that are impeding efficient operation of the water markets. These relate to:

- Market rules
- The coordination of river and market operation
- Poor market information provision.

The current market governance arrangements are complex, with multiple jurisdictions and parties undertaking common roles (e.g. rule-making and market operation) and that a high degree of cooperation is involved. Multiple parties make and enforce these rules, including the MDBA, the Basin States and the Irrigation Infrastructure Operators (or IIOs).

When considering both potential deficiencies with the current arrangements and potential solutions to improve the water market governance arrangements we have had regard to well-established principles for effective institutional arrangements and good governance namely: clear roles and responsibilities; effective management of conflicting objectives and functions; effective mechanisms for accountability; and effective processes for collaboration.

The current processes for making market rules follow a range of processes depending on the party that is making the rule and whether there is a relevant process defined that must be adhered to (e.g. a Regulatory Impact Statement process).

We have identified a number of issues with the current governance arrangements whereby current market rule making does not align with principles of good governance:

- While the rule making powers and functions are quite clearly defined, where there is a need for collaboration and agreement among governments on water trade issues the current collaborative processes have not had sufficient clarity of responsibilities and roles, or sufficient clarity of the process, leading to delays.
- The MDBA is involved in making water trading rules, but also has responsibilities for reviewing and approving rules.
- There is no consistent and clear process for rule-making — meaning that it is often not timely and lacks transparency. Further, consultation on potential rule changes does not consistently allow for the involvement of all market participants and there is not consistent analysis and consideration of market-wide as well as more localised impacts of any proposed rule change.
- Many of the trading rules are contained in legislation, which creates inflexibility.

It is recommended that the rule making process be redesigned to address the significant shortcomings of the current process.

At a minimum, we consider that these changes could be made while retaining the existing roles and functions, and with only minor changes to the regulatory framework to place an obligation on rule makers to follow that rule making process.

While multiple rule makers can remain, a single rule making/rule change process should be followed. The desired features of the standardised process are that the process should be clearly defined, allocate clear roles and responsibilities, be highly transparent and consistently include sufficient consultation, require presentation of evidence and be timely.

Legal advice would be needed on how to ensure that a standardised process could be enforced on the range of rule makers in the MDB, which includes the Commonwealth, State Government and IIOs. This may require a legislative solution, such as the specification of the rule change process defined in Section 98 of the *Water Act 2007* for making water market rules.

More fundamentally, consideration could be given to moving to a rule making governance model similar to the national energy market, whereby there is a single rule maker. This may make the most sense if there is also a move to remove the rules for water trading from legislation into a consolidated set of rules.

This would require the agreement of the Basin States, as there would be some transfer of power. However, having a single rule maker would not undermine the fact that the Basin States would retain constitutional powers over water, could request rules be made and could have strong inputs to any rule making process.

In terms of practical arrangements for a single rule maker, while these have not been considered in detail, possible arrangements could be achieved as follows:

- The arrangement for a single set of rule and single rule maker could be established as part of cooperative arrangements under the Basin Plan
- The rule maker could be a new statutory entity or the ACCC
- By considering any necessary implications for the work of the Ministerial Council and the Basin Officials Committee.

There are also governance issues relating to objectives and outcomes for river operations. There are multiple objectives for river operations, and there are competing objectives that require trade-offs to be made (i.e. meeting demands for water and minimising losses). There are also gaps because these objectives include environmental assets and ecosystem functions within the River Murray system — but there is no clear identification of who is responsible for managing how river operations affect environmental assets and ecosystem function in the Goulburn system, Murrumbidgee system, or other tributaries of the Murray River.

A reform pathway

This report proposes a number of changes or reforms to the current water market architecture and related governance arrangements.

A number of these proposed reforms are interrelated whilst some have prerequisite conditions which would need to be met before they could be implemented.

We also recognise that some changes would take time to develop in detail and implement and there is a need to take action in the meantime in order to address some emerging issues.

In other cases, it makes sense to adopt some readily implementable measure and then ascertain how well they address the underlying problem before considering further measures towards what might be seen as 'first best' solutions.

The potential solutions can therefore be seen as sitting on a spectrum ranging from relatively incremental changes to more far-reaching reforms.

1 About this report

1.1 Background to ACCC inquiry into water trading

Water trading has been progressively introduced in the southern connected Murray Darling Basin (scMDB) since the late 1980s. As a result of reforms undertaken by State Governments and through the Council of Australian Governments, trading in both water entitlements and allocations (separate from land) is now possible within State boundaries and between States.

The reallocation of water resources through water markets has undoubtedly been a key instrument in helping to optimise the economic, social and environmental outcomes from the management of water resources as envisaged under the National Water Initiative.

The water markets in the scMDB are based on a 'cap and trade' system where the cap represents the total pool of water available for consumptive use (a 'sustainable level of take'). Further, trade rules (including between zones and States, and for carryover of water) in the scMDB have been established to protect against negative third-party impacts on other water users, including the environment.

However, water markets have evolved significantly in scale and complexity in recent years, and the volumes being traded (particularly between valleys) are far exceeding volumes anticipated when many of the rules governing trade were introduced.

In recent years with onset of drought and other factors leading to less water being available, prices in markets for water allocations and high reliability water entitlements have risen significantly. Water markets have also been increasingly impacted by inter-valley constraints on trade and issues of river operations. Concerns have also been raised about the lack of transparency around water trading and the role of non-water users in the market.

In August 2019 the Treasurer requested the ACCC to hold an inquiry into markets for tradeable water rights relating to water in the Murray-Darling Basin. The terms of reference require the ACCC to consider:

a. market trends since 2012, including demand for water, changes in the location where water is used, the quantity of water traded, water availability, changes in water users and their communities, development of new trading products, and the number of participants and sectors participating in the water markets

b. the role of carryover arrangements, and the trading of water allocations which have been carried over, on water markets

c. the role and practices of market participants, including water brokers, water exchanges, investment funds and significant traders of water allocations and entitlements

d. the availability to the public of information on water market activities and tradeable water right holdings

e. the timeliness, accuracy, and completeness of public information released on water market activities and tradeable water right holdings, including true trade price reporting and the types of trade (for example, immediate purchases, forward contracts, leases)

f. barriers to entry, expansion and exit, including transaction costs

g. the management of constraints on the storage or delivery of water, including adjustments made to give effect to trades and intervalley transfers.

The ACCC has been asked to recommend options to enhance these markets, including options to enhance their operations, transparency, regulation, competitiveness and efficiency. The ACCC is using information, data and other evidence obtained from a broad range of sources to inform its reports and recommendations.

1.2 Purpose and scope of this report

One set of issues which the ACCC is examining as part of this inquiry relates to the 'market architecture' or design elements of Murray-Darling Basin markets for tradeable water rights. This includes:

- **system operation, trading and other rules and regulatory settings** that influence the opportunity for trade, the level and location of trade, and manage the impacts of trade on other water users and the environment
- **governance**, including institutional make-up, roles, functions and decision-making processes.

Against this background, Frontier Economics has been engaged to provide expert advice and analysis to provide input into the ACCC's assessment of whether or how:

- the existing architecture or design of the scMDB water markets are constraining or distorting water trading activity and competition
- there is a 'gap' or 'disconnect' between the trade and operational rules in the scMDB and the hydrological realities of the physical system
- closing such a gap or otherwise changing market rules and design, to better reflect and manage the flow constraints and operational requirements, could improve the operations, transparency, competitiveness or efficiency of scMDB water markets.

Where potential issues are identified with market architecture, the ACCC is also seeking external input on potential solutions that would improve the functioning and competitiveness of water markets, including a conceptual discussion of the relative merits or drawbacks associated with the potential solutions identified.

The remainder of this report is structured as follows:

- Section 2 provides an overview of the existing market architecture for water trading in the ScMDB
- Section 3 outlines our approach to reviewing this market architecture
- Sections 4 through 6 diagnose the underlying problems with market architecture affecting trade and identify potential solutions.
- Section 7 identifies potential problems and solutions relating to governance of trading rules
- Section 8 draws together the key findings and recommendations to map a potential pathway for reform.

1.3 Conduct of this study

Undertaking this study has entailed:

- Our own independent review and analysis
- Close interaction with the ACCC including through workshops, data discussion and progress reports
- Targeted consultation with key stakeholders including NSW Department of Primary Industries and Energy, WaterNSW, Victorian Department of Environment, Land, Water and Planning (DELWP), South Australian Department of Water, MDBA River Operations and MDBA Trade Group.
- Collation and analysis of key data and other evidence.

2 Overview of current market architecture

2.1 Underlying purpose of the market architecture

Enabling water trade (the change in ownership and/or the location of extraction of water volumes) through a network of natural waterways and channels, and offtake and regulation structures (dams and weirs), has required a characterisation of hydrological issues and potential environmental impacts. A range of simplifying assumptions has been made to facilitate/enable trade.

The market architecture for water trading established the definition of a number of types of homogenous products and rules for how these products can be traded. There are also trade adjustments and reconciliations that take place 'behind the scenes' to operationalise the reallocation embodied in trade.

The objective of the market architecture is to simultaneously:

- Facilitate water trading to re-allocate water to higher valued uses
- Protect against potential third party impacts associated with water trading which could adversely affect other entitlement holders not party to the trade and/or adversely impact the environment.

Water trade is driven by fundamentals such as the value of water in alternative uses, and demand and supply conditions for every user. With an efficient water market, trade should reallocate water to its highest valued uses and lead to allocative efficiency. Because it also enables water allocation to adapt over time in response to changing values, an efficient market will also achieve dynamic efficiency[1].

However, where users and market participants are not facing all the costs and benefits (including those imposed on third parties and the environment) of their use or trading decisions, then these decisions can become inefficient from a social perspective.

Interregional trade, in particular can accelerate changes to the location and timing of water extraction if the new owner wishes to use the water in a different region and/or at a different time (given differences in water demands of crops prevalent in different regions). The change in location and timing may alter the pattern of water releases / delivery for use within a water year (related to crop demands) or may change the timing of delivery to a later year via carryover (discussed in more detail below).

Changes to conveyance patterns or instream flows within the river network can potentially impose external costs on the environment or other users (or can potentially change flow patterns or losses for the better and produce benefits or reduce losses). For example, increasing the peak

[1] The focus of allocative efficiency is the efficiency of how water is allocated between and within industries. The focus of dynamic efficiency is maximising the benefits to the broader economy because water can be put to different value uses by different users, and price signals provide water users an incentive to invest in the development of new water-saving technologies.

flow between two points may in turn result in overbank flows and lost water which will affect the deliverability of all users' allocations. This can also have environmental effects such as unseasonal flooding. In addition, increasing localised demand could affect the delivery reliability of other water users.

The potential negative third-party impacts from trades that change the location of use and source of water include:

- **Resource risk** — a trade into a zone can create a resource risk for that zone that undermines the reliability of supply for other entitlement holders in that zone. This will occur when trade into a zone, which creates the commitment to supply water to the purchaser in that zone, is not underpinned by an equivalent increase in the water resource for that zone.
- **Deliverability** of water for water users – where trade subsequently leads to demands for water delivery in a location which cannot be met.
- **Environmental impacts** – this occurs when movement of water associated with a water trade impacts an environmental asset. Where such an environmental impact is managed though a constraint on the operation of the system / river, this in turn may led to an inability to meet delivery commitments.

There are already some arrangements in place for managing these impacts and so the extent to which the problems described above remain depends on the effectiveness of the market architecture and the implicit trade-offs it embodies.

Carryover arrangements can also have negative third-party impacts if individual carryover decisions impose higher storage losses or costs on others, or if storing the carryover volume leads to lost opportunities to harvest resource inflows. Carryover rules are in place to manage these potential impacts.

Other third-party impacts of water movement, such as socio-economic impacts on communities are not managed by water trade rules and are not considered further in this report.

2.2 Key elements of the market architecture

This section outlines the key elements of the current market architecture which are assessed in this report. These include:

- Property rights associated with water
- Trading zones
- Mechanisms for effecting trade between trading zones
- Trading rules and limits
- Managing water delivery and river operation
- Water resource accounting adjustments.

Each of these elements involves some simplifying assumptions which have been made in order to facilitate workable trading arrangements in the scMDB. These are discussed in turn below.

2.3 Property rights associated with water

Under the Australian Constitution, rights to the use and control of water rest with the Crown (i.e. the States), who then confer certain rights or entitlements to water on other parties from the State's share of the water resource.

Water trade was enabled through a series of reforms:

- First, water was separated from land with separate titles now recorded on State registers. However, water rights remain vested in the State with water access entitlements granting the holder access to a share of the State's share of the water resource.
- Secondly, the entitlements to water access were further unbundled into constituent elements.

While this unbundling differed slightly by state (see Box 1)[2], it typically involved separating the traditional water rights into:

- Water access rights — high-reliability, and low-reliability water shares
- Delivery rights — delivery shares within irrigation districts
- Water use rights — water use licences based on land characteristics[3].

There are two main types of access rights which are held and traded by market participants:

- Water access entitlements — rights to an ongoing share of the water resources available in the source system.
- Water allocations — the actual volume of water available under water access entitlements in a given season.

The water markets in the scMDB are based on a 'cap and trade' system where the cap represents the total pool of water available for consumptive use (a 'sustainable level of take').

2.3.1 Simplifying assumptions

Embodied in the above property right specifications — together with the consequences of policy decisions relating to river operations and carryover in the scMDB discussed in more detail below — are the assumptions that:

- Allocations can be delivered any time in the water year (and not tied to a particular season)
- Trade between trade zones does not result in incremental/additional losses and therefore trade occurs on a 1:1 basis

[2] This has also resulted in a different treatment of delivery rights within irrigation districts as compared to in-river delivery rights. It should also be noted that rights to water storage have remained tied to water access entitlements in the scMDB.

[3] In some areas (such as Victoria), further unbundling has involved the specification of extraction shares which are similar to delivery rights in irrigation districts, but which relate to management of issues relating to in-river delivery capacity. As part of the unbundling process, conditions associated with works licences (the right to pump water) were revised to include information on the associated extraction share. The extraction share can be used as a basis for managing extraction volumes in the case that rationing is required.

- Delivery/conveyance losses are socialised (i.e. shared across all entitlement holders)
- Rainfall rejections (where a water user places an order for water, but then no longer requires it because their water needs are subsequently met by rainfall) are permitted
- Shortfalls in delivery are managed via rationing of water extractions
- Rights to storage can be combined in one instrument with rights to inflows
- The period of water management is the water year from 1 July to 30 June.

Box 1: Constituents of water property rights in different States

The unbundling of the entitlements to water access into constituent elements varied somewhat by State.

- In NSW[4] this led to the creation of:
  - Water access licence(s) (where a prior licence has more than one 'purpose', a separate water access licence will be created with a corresponding category)
  - Water supply works approval for the operation of all works associated with the taking or storing of water accessed via a water access licence (for example for pumps, dams, bores etc)
  - Water use approval if the water is used for irrigation or town water supply (a water use approval is not required for uses such as domestic, stock or some industrial purposes)
  - Delivery Entitlement (DE) is an entitlement to have water delivered to land in an IIO.
- In Victoria[5] this led to the creation of:
  - Water shares: high-reliability, and low-reliability where people have had access to sales water
  - Delivery shares in districts, or extraction share on waterways
  - Water-use licence or water-use registration for non-irrigators, which include annual use limits (AULs) which define the maximum allowable use (from the combination of allocated volumes, storage and trade) allowable under the licence.
- In SA[6] this led to the creation of:
  - Water access entitlements (water licence): a right to a specified share of available water
  - Water allocations: a right to take a specified volume of water in a specified period
  - Water resource works approvals: a right to construct, operate and maintain infrastructure to take water
  - Site use approvals: a right to use water at a particular location.

Source: Frontier Economics

[4] https://www.industry.nsw.gov.au/__data/assets/pdf_file/0007/155239/guide-to-the-conversion-of-water-licences.pdf

[5] https://waterregister.vic.gov.au/about/water-reform-history

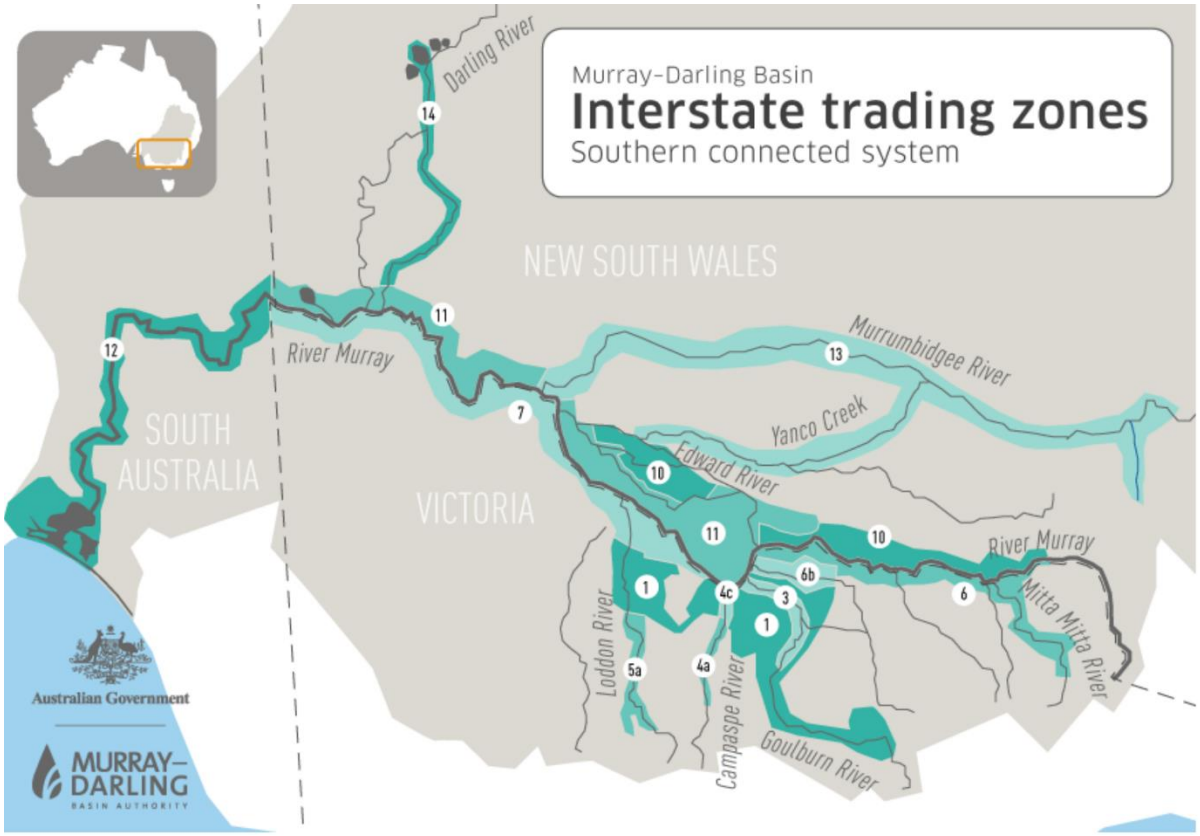
[6] https://www.environment.sa.gov.au/topics/water/water-licences-and-permits/unbundling-water-rights

2.4 Trading zones

Trading zones are defined on a hydrological basis to describe areas within which water trading would not cause any significant adverse impacts on third party property rights (including the environment). This means that trade within trading zones is free of constraints.

The trading zones in the scMDB are shown in **Figure 1**.

Figure 1: Trading zones in the scMDB



Source: https://www.mdba.gov.au/managing-water/water-markets-trade/interstate-water-trade

A number of separate trading zones are defined along the Murray due to the existence of State borders. Although all Murray zones source water from the Murray system, they draw on the different state shares of the NSW Murray, Victorian Murray and SA Murray (as originally set out in the River Murray Waters Agreement 1915). This means that for trade and water accounting purposes (see below) these are treated as different water sources.

Trading zones generally relate to the characteristics of the water resource available for use. However, there are examples where multiple trading zones share the same water source. It is the definition of different trade zones that encapsulates the differences in the hydrological connectivity between these areas. The prime example is the division of the NSW and Victorian Murray regions being separated into zones above and below the Barmah Choke:

- NSW Murray —
  - Zone 10: Upstream of River Murray at Picnic Point (above Choke)

- Zone 11: Downstream of River Murray at Picnic Point (below Choke)

- Victorian Murray —
  - Zone 6: Dartmouth to Barmah (above Choke)
  - Zone 7: Barmah to SA (below Choke)

Another example is that while Zones 1A and 3 are both Victorian Goulburn source zones, water demands in zone 3 are partially met by unregulated catchment inflows to the lower Goulburn River, in addition to regulated volumes released via the Goulburn Weir.

2.4.1 Trading across zones – mechanisms/simplifying assumptions

In order to enable a change in the ownership and/or location of extraction of a water access right through interstate or inter-valley water trading *between* zones, there some prerequisite structures and mechanisms required. In particular there is a need for:

- transfers of water allocations and entitlements to be legally permitted
- mechanisms for transferring ownership of allocation and entitlements from one user to another as recorded in registers or other instruments
- mechanisms for the physical delivery of water across valleys and States
- reconciliation of State and valley water accounts to reflect inter-valley and interstate trades of the available resource to ensure that no water is lost or created by trade processes (this is discussed in section 4).

Schedule D of the MDB Agreement provides the structures and mechanisms for interstate and inter-valley trade. A central document is a protocol under schedule D of the Murray–Darling Basin Agreement that outlines the allowable trade directions between zones in the scMDB.[7] This is known as the 'Permissible Transfer between Trading Zones' protocol. This protocol also outlines conditions for trade and backtrade between certain trading zones.

Trade between zones can (and has) occurred via a number of mechanisms (a more detailed discussion is at chapter 4):

- Conventional allocation trade
- Tagged entitlement trade
- Tagged allocation trade
- Exchange rate entitlement trades (which are a legacy of historical decisions and no longer used).

When a transfer occurs, the following assumptions are in place:

- Trade occurs on a 1:1 basis — Under the current arrangements for inter-valley and interstate trade, an allocation of a volume of water in the valley/State of origin is transferred to an allocation for an equal volume of water in the destination valley/State and held in a water account in that valley/State. Similarly, delivery of water under a tag entitles the water user to

[7] www.mdba.gov.au/sites/default/files/pubs/Allowable-water-trade-direction-southern-basin.pdf

extract an equal volume of water, at a location remote to the valley/State of the water resource.

- The delivery of the water can occur at any time within the water year
- Water allocation trade volumes transferred into a zone are treated in the same way as other allocations in the zone (such as from resource improvements or from carryover).

2.5 Managing water delivery and river operation

The delivery of water resources across States in the southern Murray-Darling Basin (MDB) is managed in a coordinated way by state governments and the MDBA. Under State and Commonwealth legislation there is a clear definition of the rights of entitlement holders including environmental water holders.

States make seasonal determinations of allocations to a given water entitlement based on the characteristics of each of the respective water systems and the reliability of the water entitlement. NSW, Victoria and SA work together to facilitate interstate southern MDB trade, with each State being responsible for developing and maintaining the rules on water access, allocation, intrastate and interstate trade, and water use on their side of borders.

The MDBA has the role of monitoring and enforcing the Basin Plan Water Trading Rules (BPWTR). As discussed further in section 7, the BPWTR apply to the Commonwealth (including the MDBA), Basin States, irrigation infrastructure operators, and individuals participating in water markets and address three broad aspects of market operation, namely reducing restrictions on trade, Improving transparency and access to information, and maintaining market integrity and confidence.[8]

The MDBA is also responsible for managing river operation of the Murray River System on behalf of the states in accordance with jointly agreed objectives and outcomes. These objectives and outcomes are specified in the Basin Officials Committee's (BOC's) Objectives and outcomes for river operations in the River Murray System document and are given practical effect in the River Murray System Annual Operating Plan (see further discussion in section 7.6).

There are many challenges to river operation, including uncertainty of demand and water resources in a variable climate, and responding to these given the long travel time for water to flow between major water storages and the location where it is used. For example, it takes approximately 25 days for water released from Hume dam to reach the water users who live and farm around Mildura (see **Figure 2**).

[8] Murray-Darling Basin Authority, *Guidelines for Water Trading Rules*, viewed 14 September 2020, https://www.mdba.gov.au/sites/default/files/pubs/01_WTG-REFERENCE_final.pdf.

Figure 2: Flow times from storages to the Lower Murray

Source: DELWP 2018, Understanding delivery shortfall risks in the Lower Murray, https://waterregister.vic.gov.au/images/documents/Water_delivery_fact_sheet.pdf

It is important to note that the MDBA does not receive water orders from individual users, but rather receives information from Basin States and determines the volume of water released to meet expected demands.

Many other challenges, including the constraints on system flow capacity and other considerations are outlined in the River Murray System Annual Operating Plan.

The MDBA river operators manage operation of the River Murray system (including releases from Hume dam) and work with State river operators to coordinate regulated tributary inflows from the Victorian Goulburn River, NSW Murrumbidgee River and Billabong Creek, and other sources (releases from the Snowy Mountains Hydro-electric Scheme, unregulated tributary inflows from the Kiewa and Ovens Rivers, and the Darling River in NSW).

This includes the ability for river operators to draw on the water held in the Goulburn IVT account and the Murrumbidgee IVT account.

The MDBA calls on the water from IVT accounts (discussed below) when they need it to manage system operations. Responsible state agencies work with the MDBA to meet these requests.

2.6 Water resource accounting adjustments

Another key element of the existing market architecture is the water accounting arrangements that support trade between zones, including intervalley transfer (IVT) accounts to track water 'owed' from one system to another.

A key feature of water markets is that while transactions occur between water access right holders at the retail level (i.e. between individuals), the assets being traded (i.e. entitlements and allocations) are dependent on the shares of water which are controlled by the States. This means that for interstate trade there is a need for water accounting at the wholesale level to ensure that the shares of water held by each State is adjusted through the bulk State accounts to reflect individual trades. Otherwise, the transaction would impact other entitlement holders who also draw on the relevant resource. (Similarly, the share of water available to individual valleys within the same State must be adjusted to give effect to inter-valley trade.)[9] It is important to note that the accounting arrangements relate to water volumes, not to the underlying rights to inflows of water and shares of storage capacity as specified in the Murray-Darling Basin Agreement.

Trade adjustments for managing inter-source transfers reflect the simplifying assumptions used to create accounting mechanisms to reconcile water resources between different sources such as annual accounting of water resources and allowing for 'paper' trade to occur in advance of water delivery.

Water resource accounting trade adjustments occur in two different forms:

- **IVT accounts** — for reconciling trades involving tributaries of the Murray in the scMDB.
- **State transfer accounts** — for the purpose of reconciling and adjusting State shares for water delivered or stored as a result of transfers of entitlement or allocations.

The extent/complexity of the trade adjustment required (water accounting between water sources to reconcile trades) depends on the extent of the resource movement:

- Trades within a valley — may be reconciled within the shared source resource.
- Trades between valleys and between zones within a State — generally reconciled using IVT accounts.
- Trades between States sharing the same source (such as the Murray) — reconciled according to state water sharing agreements.
- A trade that occurs across valleys in different States (such as from the NSW Murrumbidgee to the Victorian Murray, or from the Victorian Goulburn and to the SA Murray) involves reconciliation via a combination of IVTs and State shares.

Schedule D of the MDB Agreement sets out the arrangements for trade adjustments, primarily the *Adjusting Valley Accounts and State Transfers Accounts (Valley Accounts) protocol 2010*. The protocol does not, however, contain any information on limits on IVT accounts (such as those imposed on the Goulburn and Murrumbidgee IVT accounts), rather these are State policies.

[9] Schedule D requires the Murray-Darling Basin Agreement to account for interstate water transfers and in particular to adjust the delivery of State entitlements to reflect transfers of entitlements and allocations between the States and to ensure that water made available in each valley reflects the transfers of entitlements and allocations under the Schedule, consistent with any relevant Protocols.

2.7 Trade rules and limits

Intervalley trades are commonly subject to trade rules and limits designed to manage conveyance losses, spill risk and/or physical flow constraints that may result from excessive water trade in one direction (as discussed further in chapter 4). These rules and constraints (set out in protocols and State policies) include:

- Backtrades — where trades in an 'upstream' direction are allowed because they are offset by previous trade downstream. In this case, physical constraints on the movement of water are not a concern nor are conveyance losses and there will be no impact on third parties in these circumstances. This can be practically achieved by setting limits on the IVT account balance. By way of example, allocation trade from the Murray to the Murrumbidgee is suspended when the Murrumbidgee IVT reaches zero because water cannot practically be delivered from the Murray to the Murrumbidgee. When trades from the Murrumbidgee to the Murray occur then trade in the reverse direction (backtrades) can open up again.
- Fixed limits — volumetric limits are imposed where a defined volume of trade is reached in a water year, or trades are denied where they would push IVT accounts above a given volumetric threshold (upper or lower volumetric limits which apply to the balance of the IVT account). The limits are in place to address physical flow or volume constraints in the infrastructure connecting the two water resources and to avoid potential impacts on water availability for other water allocation holders by virtue of an increased risk of spill.
- Dynamic limits — related to the hydrological risk. For example, part of the NSW to Victoria trade limit is to limit trade to a volume that keeps the risk of spill in Victoria's share the Murray system below 50 per cent.

Access to trade within limits currently occurs on a 'first in' basis.

2.8 Governance

Governance relates to:

- **Institutions**: That operate, oversee and facilitate the market
- **Roles and responsibilities**: Allocation of roles and responsibilities (i.e. the powers and function of each institution including in relation to policies/market development, rules and rule-making, market operation, enforcement and compliance, etc)
- **Decision-making and collaboration**: Collaboration is crucial in the scMDB water markets given the involvement of multiple parties including the States, Commonwealth, MDBA, infrastructure operators, etc
- **Market rules**: In the context of markets, governance is also fundamentally concerned with establishing and enforcing sets of rules that facilitate exchange between market participants (including buyers and sellers).

For this study we have focused on governance related to system operation, trading and other rules and regulations that influence trade where governance may be contributing to market architecture issues and impede implementation of solutions. We discuss this in detail in chapter 7.

3 Approach to assessing current arrangements

Our approach to assessing the current market architecture involved two key steps:

- Identifying problems
- Identifying and assessing potential solutions.

3.1 Identifying and diagnosing problems

Our approach to the market architecture assessment is to examine the simplifying assumptions that have sought to balance the potential conflicts between increasing trade opportunities and protecting property rights. In doing so we consider whether these arrangements and regulations continue to support water markets, given the expansion of transactions within markets, and changes in the distribution of water use and mix of market participants.

The objectives of the water market and trading arrangements for the Murray-Darling Basin are set out in Basin water market and trading objectives from Schedule 3 of the Water Act 2007) (see **Table 1**).

Table 1: Characterising the role of market and trading objectives

Role	Basin water market and trading objectives	Overarching questions for the review
Optimise trade / increase trade opportunities	To 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	*Does the market architecture facilitate the operation of efficient water markets and the opportunities for trading, within and between Basin States?* Clearly an important part of the market architecture is to facilitate opportunities for inter-valley and interstate trade, and thereby promote the efficient allocation of the scarce water resources of the Basin. This means that the supporting administrative and operational arrangements should not unnecessarily restrict inter-valley and interstate trading of water entitlements and allocations between individuals where such trading is economically efficient, and ideally should facilitate it.
	To minimise transaction cost on water trades, including through good information flows in the market and compatible entitlement, registry, regulatory and other arrangements across jurisdictions	*Does the market architecture minimise transaction costs on water trades?* Transaction costs refer to the costs of participating in the market. At issue here is the extent to which the arrangements and processes under the market architecture enable timely and cost-effective water trading, including providing clear information to market participants on how trading works.
	To 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	*Does the market architecture enable the appropriate mix of water products to develop?* While entitlements and allocations are the key products which are traded in the Murray-Darling Basin, efficient markets are characterised by the development of new products which best suit the needs of market participants. It is therefore pertinent to ask whether the market architecture facilitates (or at least does not impede) the development of new water products.

Role	Basin water market and trading objectives	Overarching questions for the review
Protect property rights	To recognise and protect the needs of the environment	*Does the market architecture appropriately recognise and protect the needs of the environment?* A long-standing concern with water trading, particularly where it entails major changes in the location of extraction and/or use or patterns of river flows, has been the potential for adverse environmental impacts. The advent of environmental water managers as active participants in the market has also raised questions as to how well arrangements for trade and delivery of water meet their needs. In this regard, this review examines the extent to which the market architecture contributes to protecting the needs of the environment.
	To provide appropriate protection of third-party interests	*Does the market architecture provide appropriate protection of third-party interests?* Water trading is generally associated with promoting the efficient allocation of a scarce resource. However, this may not necessarily hold true if trades have adverse and unacceptable impacts on third parties.

Source: Frontier Economics.

The expansion of transactions within markets, and changes in the distribution of water use and mix of market participants underpins the need to ensure that arrangements and regulations continue to support effective water markets. In particular, it is critical that rules governing water trading in the scMDB continue to strike an appropriate balance between providing opportunities to access a larger pool of water and protecting the reliability of entitlements and environmental water needs.

The appropriate balance between increasing trade opportunities and protecting property rights changes as the utilisation and potential external impacts of water markets change. Three examples are discussed below, and these issues are explored throughout this report.

- If trade volumes are small, there may be significant flexibility in the management of the system to accommodate the reallocation and consequences of trade without undermining property rights of other water users, including the environment. Further, the benefits of these initial trades may be high — economic theory suggests that for a given distribution of resources, it is the first trades that lead to the largest efficiency gains. In fact, the final trade to equalise prices leads to a negligible efficiency gain from the reallocation.
- If trade volumes are larger, the use of trade limits may ensure that trades do not result in unacceptable impacts or risks, on the occasions that trade limits are being neared or reached. If trade volumes only occasionally reach the limits in place, then this may not significantly constrain trading activity and the benefits trade provides.
- If trade volumes are very large and the trade limits are frequently being reached, then the risk management embodied in the limits may not be realised. Further, traders would be expected to respond to the expectation of reaching trade limits — such as by seeking to trade prior to the constraint being reached and/or exploring ways to 'work around' the constraint.

This report presents evidence that the latter situation is becoming increasingly prevalent and that now may be an appropriate time to reassess the simplifying assumptions embodied in water market architecture.

The following chapters examine the range of simplifying assumptions that have been put in place to facilitate/enable water trade in the scMDB and the potential consequences of these assumptions for achieving these underlying water market and trading objectives.

In particular, our approach has been to consider whether these arrangements and regulations continue to support water markets (and Basin Plan trade objectives) given the expansion of transactions within markets, and changes in the distribution of water use and mix of market participants.

3.2 Identifying and assessing potential solutions

3.2.1 Types of potential remedies considered

In considering how to best address the identified problems we have considered a range of types of potential solutions (see **Figure 3**).

Figure 3: Alternative types of remedies considered

Source: Frontier Economics

3.2.2 Criteria for assessing potential remedies

We have identified a number of criteria for assessing potential solutions. These are:

- **Addresses the problem**: Does the solution facilitate efficient markets by addressing the underlying cause of the problem (i.e. 'market failures' such as externalities, informational issues, search costs)?
- **Adaptable**: Does the solution adapt to changing market drivers? Can it be easily adapted to any changes in circumstance? Does it enable water products and trading options to evolve over time?
- **Proportionality**: Is the regulatory burden and ongoing administrative and compliance costs created by the solution proportional to the problem?
- **Ease of implementation and enforceability**: Can the solution be practically implemented within the scMDB? Will the solution be costly to implement? Can it be effectively enforced? Will it be easily understood by market participants?
- **Complementarity with existing rules and policies**: Is the solution internally consistent with the wider operation, rules and policies of the scMDB? Will it duplicate or cross over with any existing arrangements?

4 Interregional trade

This chapter:

- Outlines the current arrangements for facilitating interregional trade including:
  - mechanisms for enabling water trade between individuals in the scMDB including exchange rate entitlement trade, interregional water allocation trade and tagged entitlement trade
  - the associated water accounting adjustments for trade
- Examines the problems which arise under these arrangements given present conditions.
- Identifies and assesses alternative reform options.

4.1 Current arrangements for interregional trade

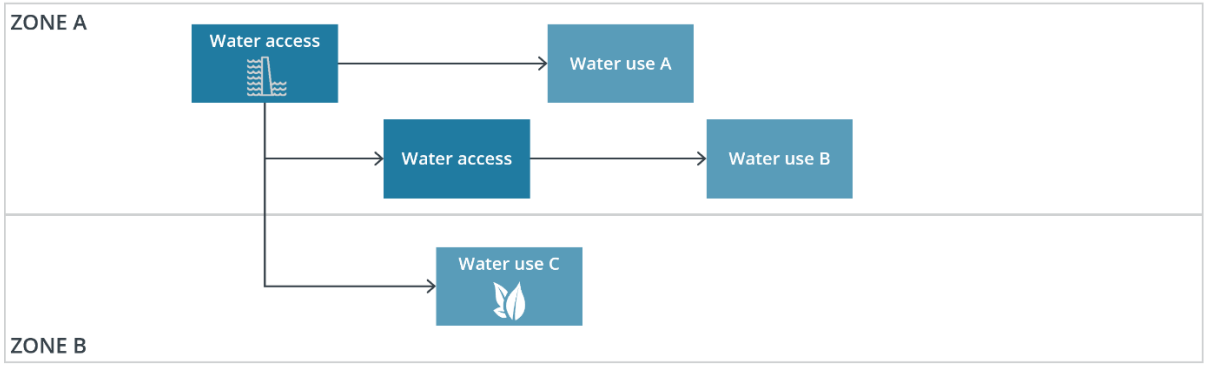
4.1.1 Mechanisms for enabling individual trades

Trading arrangements were established to facilitate the reallocation of water between alternative uses, to increase the resource-use efficiency across the scMDB.

As noted in chapter 2, a number of different trading zones have been established across the scMDB. As shown in **Figure 4**, water trading can involve trade either within or between these zones:

- the trade of water between users with the same zone, to facilitate water to be reallocated from use A to use B
- alternatively, trade could enable water access in zone A to be reallocated to water use C in a different zone.

Figure 4: Water access to provide water for use

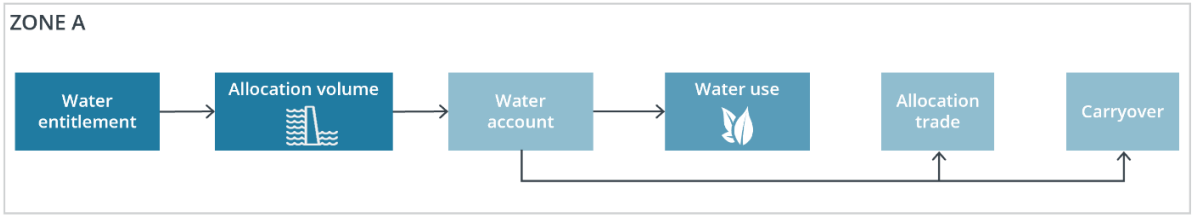


Source: Frontier Economics

The market architecture needs to accommodate the complexities which arise because when water is available for use in a particular zone, it may also be available for water allocation trade and for carryover in that zone. **Figure 5** sets out the general process by which an allocation

announcement/determination makes available a volume of water allocation to a given water entitlement. This volume is credited to a water account in the water resource zone and can either be used, traded or carried over.

Figure 5: Water for use may be available for further allocation trade and carryover



Source: Frontier Economics

Several different mechanisms have been developed to give effect to water trading[10]. These can be categorised as:

- exchange rate entitlement trade
- interregional water allocation trade
- tagged entitlement trade and tagged allocation trade.

4.1.2 Exchange rate entitlement trade

The first mechanism for enabling water trade between regions/zones was exchange rate entitlement trade – where an entitlement in one water resource zone could be traded/converted into an entitlement in another source/zone. As shown in **Figure 6**, this type of trade changes the zone of use, and also changes the source zone of the entitlement, including any further allocation trade and/or carryover.

Exchange rate entitlement trade is no longer permitted given the impact on third parties that can result from the change in the source zone of the entitlement. Because water resource allocation announcements differ between individual water resources to reflect differing circumstances, a fixed exchange rate will not, in any given period, accurately represent the properties of the original water access entitlement once traded to the new location (ACCC 2010).[11] When the allocation announcements for the original and new location entitlements deviate from each other, then a third-party impact occurs on water entitlement holders in the new location.

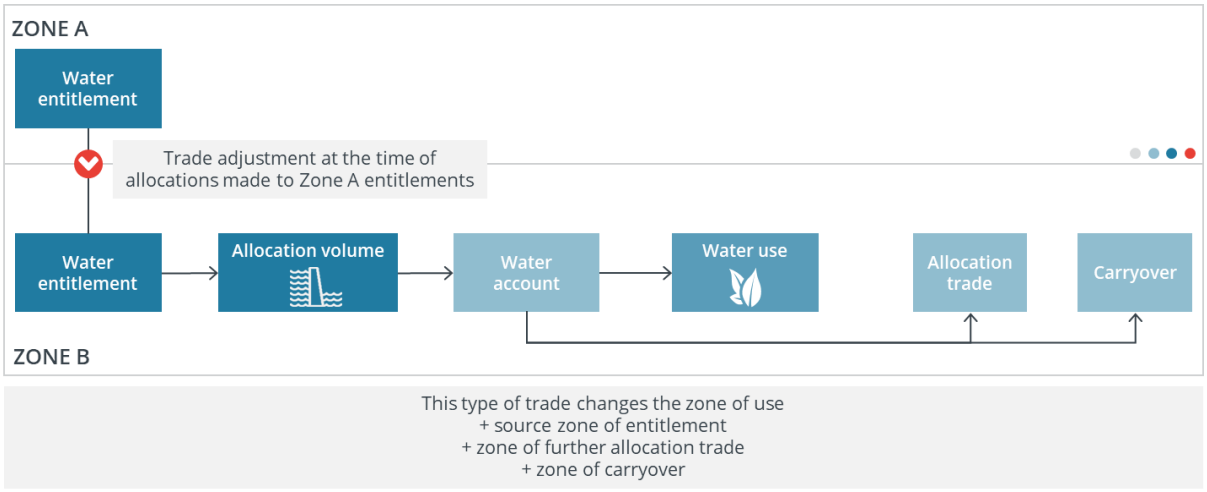
The only exchange rate entitlement trades that remain as permitted transactions are ones that are 'backtrades' in the opposite direction to previously allowed exchange rate trades. The MDBA has declared the use of exchange rates is allowable for water entitlement trades from the Victorian Murray and South Australian Murray to the Victorian Goulburn, Campaspe and Loddon systems — because such trades redress the impacts of previous exchange rate trades. [12]

10 Not all mechanisms are currently in use in all jurisdictions.

11 Australian Competition & Consumer Commission 2010, *Water trading rules: Final advice*, ACCC, Canberra, March.

1212 MDBA 2014, Declaration of Exchange Rate: Victorian Murray and South Australian Murray to the Goulburn, Campaspe and Loddon systems. https://www.mdba.gov.au/sites/default/files/water-trading/declaration-exchange-rate.pdf

Figure 6: Interregional trade via exchange rate entitlement trade

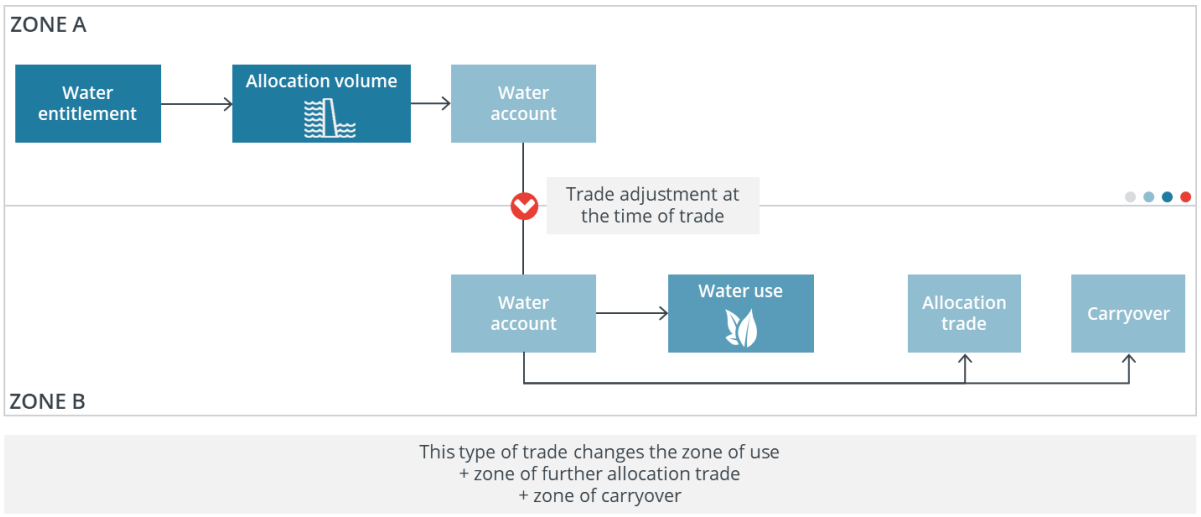


Source: Frontier Economics

4.1.3 Interregional water allocation trade

The next mechanism for trade between regions/zone (that was an alternative to exchange rate entitlement trade, and remains currently available) is interregional water allocation trade. This type of trade changes the zone of use, and also changes the zone of any further allocation trade and/or carryover (as compared to if the interregional water allocation trade had not occurred). Interregional water allocation is illustrated in **Figure 7**.

Figure 7: Interregional trade via water allocation trade



Source: Frontier Economics

4.1.4 Tagged entitlement trade and tagged allocation trade

Developed as a replacement to exchange rate entitlement trade, tagged entitlement trade does not change the source zone of a water entitlement. Rather, under tagged entitlement trade, the entitlement and its allocations continue to be identified as being from its source trading zone,

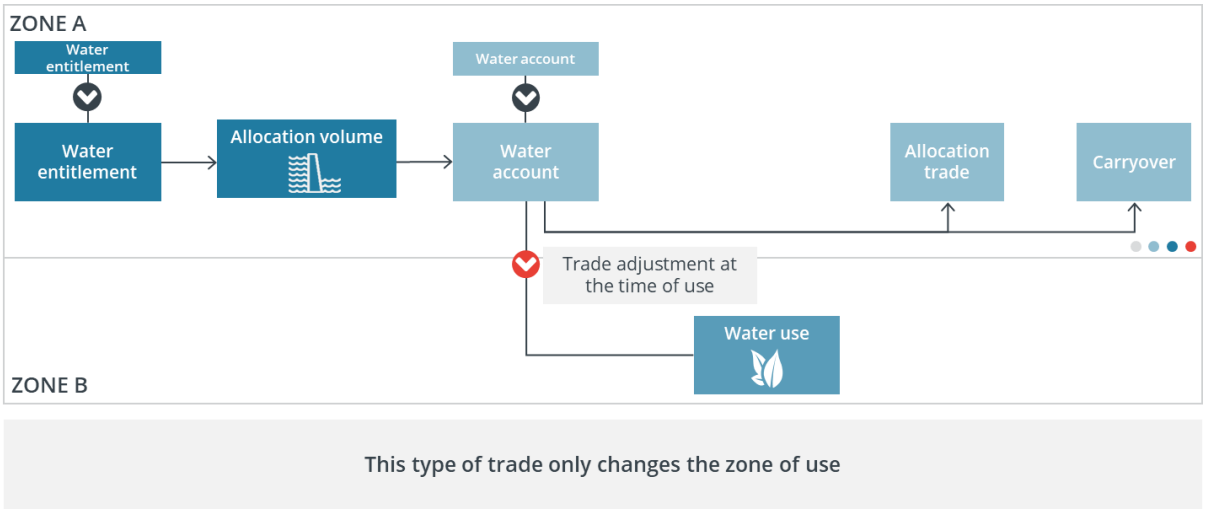
until the volumes are ordered for use. Establishing a tag on a water entitlement involves linking/tagging the water entitlement to an account that is tagged for use in the destination zone when it is subsequently ordered.

'Tagged allocation trade' is an approach to inter-valley/interstate allocation trade. Under this concept, the allocation continues to be identified as an allocation in its source trading zone, subject to the carryover and allocation management rules in that trading zone, until it is actually ordered for use. Establishing a tag on a water allocation involves the specific water allocation volume being transferred into an account that is tagged for use in the destination zone when it is subsequently ordered. This is in contrast to the standard approach to interstate allocation trade described in section 4.1.3 above which moves water into a system of destination account at the time the trade occurs.

The implementation of tagging in NSW and Victoria is equivalent to the tagging of a water account (so that water in the account is available for delivery to another zone), such that tagged water entitlement trade and tagged allocation trade are alternative mechanisms for making water volumes available in a tagged account. In our experience, the only difference is that tagging an entitlement trade is an ongoing arrangement such that all future allocations accruing to the entitlement are available in the tagged account, whereas allocation trade into a tagged account is only for the volumes of the tagged allocation trade.

As shown in **Figure 8**, using tagging (tagged water entitlement trade or tagged allocation trade) to reallocate water for use into a different region/zone only changes the zone of use. It does not change the source zone of the entitlement, nor the zone for any further allocation trade nor the zone in which carryover may occur.

Figure 8: Interregional trade via tagged use



Source: Frontier Economics

4.1.5 Comparison of different water trade mechanisms

Table 2 compares the types of trades and their outcomes. Where a trade results in changes in the zone of use (or other function), this will need to be supported by changes in delivery and river operation (as discussed in the following section).

Table 2: Characterising outcomes of different types of trade

Type of trade	Source zone of the entitlement	Zone for use	Zone for further allocation	Zone for carryover
Intraregional entitlement trade	No change	No change	No change	No change
Intraregional allocation trade	No change	No change	No change	No change
Interregional exchange rate entitlement trade	**Change**	**Change**	**Change**	**Change**
Interregional water allocation trade	No change	**Change**	**Change**	**Change**
Tagged water entitlement trade	No change	**Change**	No change	No change
Tagged water allocation trade	No change	**Change**	No change	No change

Source: Frontier Economics

4.1.6 Water accounting adjustments for trade and IVT limits

As noted in chapter 2, another key element of the existing market architecture is the water accounting arrangements that support trade between zones, including intervalley transfer (IVT) accounts to track water 'owed' from one system to another.

IVTs are credited in perspective to the resource they owe to downstream systems. This means, for example, that water in the Goulburn IVT is a Murray resource that can be drawn upon to meet deliveries to Murray water users (it cannot be used to support Goulburn system allocations or deliveries). This means that trades and water management decisions will credit or debit the IVT:

- IVT credits — actions that increase the volume owed to the downstream system, such as trade out and orders of tagged use out of the tributary.
- IVT debits — actions that decrease the volume owed to the downstream system, such as call-out by river managers to meet demands in the downstream system (such as from trade out and tagged use), or 'backtrade' from the downstream system up into the tributary.

Allocation trades between parties in the New South Wales (NSW) and Victoria (VIC) Murray are reconciled at the bulk or wholesale water management level through adjustment of State's water shares in the storages of the Murray and its tributaries.

Generally, IVT credits/debits occur at the respective time of trade or the time of use. In contrast, the adjustment of State shares of the Murray occurs over a period of time (the remaining months

of the water year or, in certain circumstances, into the following water year). The timing of the trade liabilities and reconciliation is also highly relevant to water management and depends on the type of trade (**Table 3**).

Table 3: Timing of trade reconciliation

	Conventional / Exchange rate	Tagging
Allocation trade	At time of trade	At time of use
Entitlement trade	At time of allocation	At time of use

Source: Frontier Economics

Using IVTs to reconcile trade across seasons (i.e. the IVT account ends the year in credit, and this is carried forward to the next water year) may lead to third-party impacts. Specifically, the storage of IVT could impact on the reliability of other water entitlement holders in the systems into which water is being traded, if IVT volumes are consistently held high at the end of the season. This is because IVT credits that have been carried over from a previous year are subject to spill rules.

Box 2 provides examples of how inter-valley trades have the potential to impact on third party property rights, including the environment.

Box 2: How can intervalley allocation trades impact on third parties?

Water trades between valleys drawing from separate, but connected, water sources can lead to third-party impacts. For example, where an allocation is traded between these systems this leads to a credit on the IVT account which, if not called out by the resource manager, will be then carried over at the end of the water year. IVT credits that have been carried over from a previous year are subject to spill rules (for example, in Victoria all water volumes in spillable accounts are subject to proportionate losses in the event of a spill).

If there are water losses from the IVT account in the event of a spill, then this is a resource loss to a water source as a whole and therefore less water is allocated to all the water entitlement holders in that source — a negative third-party impact on entitlement reliability. Under current arrangements in Victoria, a spill of IVT represents a loss to all Victorian Murray entitlement holders. In NSW, the incidence of the loss may fall on either the Murrumbidgee or the NSW Murray, and historically it has fallen on Murrumbidgee entitlement holders. The decision as to which of these sources is deemed to have spilled is currently discretionary and based on relative water availability in the NSW Murray or Murrumbidgee. [13]

The potential resource risk of spills in IVT accounts is currently managed by imposing upper limits on trade. The IVT upper limit also represents the volumes that has been deemed an acceptable upper limit on IVT volumes that may be lost in the event of storage spills. For example, the Goulburn to Murray trade limit prevents additional water allocation trade if the Goulburn IVT is in excess of 200GL.

[13] NSW Department of Industry 2018, Murrumbidgee Inter-Valley Trade account, www.industry.nsw.gov.au/__data/assets/pdf_file/0018/209412/murrumbidgee-ivt-fact-sheet.pdf

Downstream water trades can cause congestion in the river at times of high demand within an irrigation season. An example of a policy to manage potential congestion from downstream trades is the Barmah Choke trade limit. The Choke has a trade restriction to protect delivery to existing entitlement holders and to maintain the river environment around the Choke. The restriction means that trade downstream of the Choke may only occur when there is sufficient matching trade capacity available in the opposite direction.

Source: Frontier Economics.

The risk to entitlement holders from lost IVT volumes associated with a spill event is currently managed via the application of fixed volumetric upper limits on the IVTs, at which point further trade is rejected. For example, the Murrumbidgee IVT upper limit of 100GL[14] is rationalised on the basis that the IVT water is occupying Murrumbidgee storage space while it is waiting to be physically delivered:

> *"[the Murrumbidgee IVT upper limit] has been set to minimise third party impacts during very wet or very dry conditions. Under wet conditions, large volumes of Murray water in Murrumbidgee storages can prevent inflows from being captured and stored for the benefit of Murrumbidgee water users. The Murray water can prevent an allocation increase to Murrumbidgee water users. Additionally, if the IVT portion of the storage is determined to be spilled by NSW water managers then Murray water users lose some of their resource and are adversely affected."*

The upper limit is also rationalised on the basis of conveyance losses:

> *"Under very dry conditions significant transmission losses can occur when large volumes of IVT water need to be delivered from Murrumbidgee storages through the length of the system to the Murray. Such losses are socialised within the Murrumbidgee system, meaning reduced water availability for Murrumbidgee water users. Effectively non-trade water users are required to contribute proportionally much more water during very dry conditions to the delivery of trade water. In other words, the 100 GL limit is set to limit the exposure of third-party water users to the 'cost' of high transmission losses associated with trade water delivery to the Murray in very dry times"*

The 100 GL limit represents approximately five per cent of general security entitlements in the Murrumbidgee system and was viewed as 'an acceptable level of risk to third parties'.[15] The proportional limit is set with reference to general security entitlements only, not the total volume of general and high entitlements, because it is allocations to general security entitlements that would be reduced.

Figure 9 shows the Murrumbidgee IVT has ended the water year near its 100GL limit in three years (2014, 2016 and 2017). Similarly, the Goulburn IVT has been consistently near its maximum (200GL) at the end of the water year in the past three years. These high balances:

- mean that trade opportunities in the next year are low

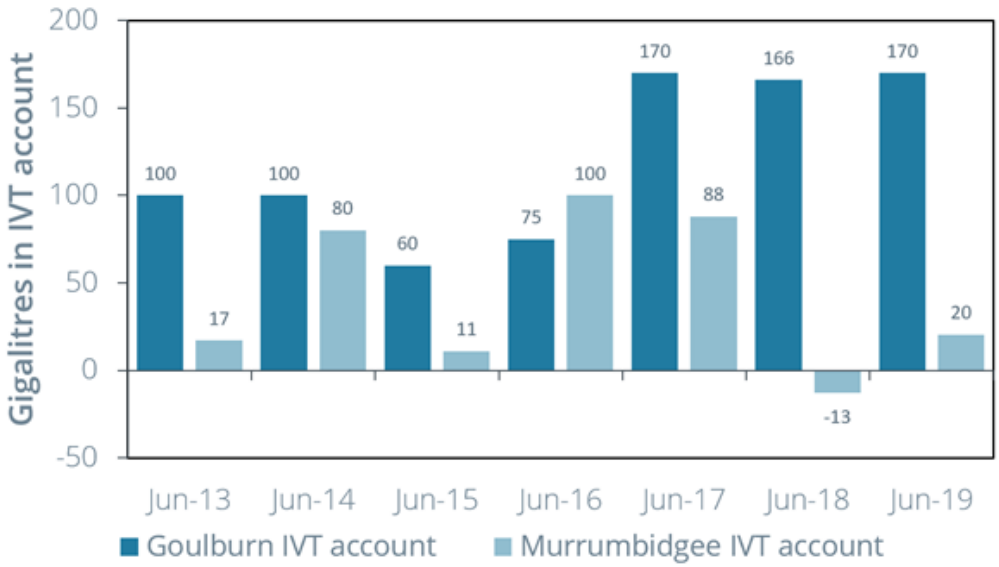
[14] www.industry.nsw.gov.au/__data/assets/pdf_file/0018/209412/murrumbidgee-ivt-fact-sheet.pdf

[15] www.industry.nsw.gov.au/__data/assets/pdf_file/0018/209412/murrumbidgee-ivt-fact-sheet.pdf

- increase the risk of spill or prevent further water harvesting which would reduce future Murray allocations.

If the limit is reached on a regular basis (as observed in recent years), it raises the question as to whether the level of risk is acceptable. This has been a topic for consultation in recent Victorian engagement relating to Goulburn to Murray trade rules.[16] All of the proposed new trade rules involved a 'quarantine rule for legacy commitments' which would have the effect that IVT is less likely to exceed 200GL during the water year. In combination with potential trade rules, this 'quarantine rule' would therefore reduce the expected end-of-year Goulburn IVT balance.

Figure 9: IVT balance at the end of the water year



Source: Frontier Economics.

In summary, IVT limits (outside of which further trades are denied) are put in place for a range of reasons, to protect against the following risks:

- Limited Connection risk — These risks are manged by having lower IVT account limits. Generally, the lower limit on an IVT is zero, because the tributaries are gravity systems and therefore water cannot be moved directly from downstream to upstream.

  It should be noted that managing the limited connection risk is the basis for trade rules underlying backtrade. Backtrade is allowed against IVT credits (undelivered downstream liabilities) above the minimum IVT balance.

- Unacceptable conveyance losses — For example, a maximum balance of + 100 GL applies to the Murrumbidgee IVT account because this is the volume of water that can be physically transferred out of the valley via Balranald in one year without incurring excessive transmission losses.[17]

[16] https://waterregister.vic.gov.au/images/documents/Goulburn-to-Murray-trade-rule-review_consultation-paper.pdf

[17] https://www.waternsw.com.au/customer-service/ordering-trading-and-pricing/trading/murrumbidgee#stay

- Spill risk (potential future resource risk) — This risk is currently managed by upper IVT account limits. The upper limit is an estimate of the maximum amount of resource that can be set aside for future commitments. Part of managing spill risk is also to provide sufficient opportunity for IVT account balances to be called out before the end of a water year. The IVT upper limit also represents the volume that has been deemed an acceptable upper limit on IVT volumes that may be lost in the event of storage spills.

4.2 Problems under the current arrangements

4.2.1 Impacts on system management

Summary

- A simplifying assumption for water trade is that water allocations can be delivered at any time in the water year, and via carryover this extends to any time in future water years unless traded or spilled.
- Trade between zones and reconciliation using IVTs is changing delivery patterns in the scMDB.
- Using volumetric trade limits to manage potential third-party impacts of trade between zones provides an incentive to agents to trade water earlier, before the trade limit is reached.

As noted in chapter 2, current arrangements are based on the simplifying assumption that delivery can occur at any time during the water year as no property right to in-river capacity exists. The availability of carryover opportunities further extends the assumption to one that delivery can take place at any time within the current or future water year.

The rationale behind uncoupling tradeable water entitlements and water allocations from a licence to use and abstract water from a particular location was that it would reduce transaction costs. For example, NWC (2009) noted that 'unbundling may facilitate lower cost and more timely processing of water access transactions by requiring agencies processing applications to consider only issues directly relevant to those trades'.[18]

This occurs by:

- making rights more homogenous and therefore more easily traded
- reducing the complexities associated with the trade approval process, with the presumption being that the third-party impacts of trade are often related to use or delivery, which could be assessed separately to the trade itself. However, while issues relating to water application on land are governed by separate rights such as use approvals, such separate assessments have yet to eventuate insofar as they relate to conveyance losses and delivery issues.

[18] National Water Commission 2009, Australian Water Reform 2009: Second biennial assessment of progress in implementation of the National Water Initiative, NWC, Canberra.

Within irrigation districts, water rights are further unbundled to include a delivery right which provides an entitlement to have water delivered to land in the district via the irrigation network[19]. This means that when an irrigation delivery system is congested, delivery right holders receive a share of the available delivery capacity. Where the conditions relating to use, in district delivery and abstraction are contained in a separate licence or right, trades need only be subjected to minimal approval processes.

Allocation trade between zones can lead to significant changes in water use and therefore delivery patterns. For example, over the last two years there have been very high volumes of trade from the Goulburn to the Murray as a result of drought conditions in NSW. This resulted in high deliveries from the Goulburn Inter-Valley Trade (IVT) account to the Murray system. This has resulted in unseasonal high flows in the lower Goulburn River during summer, which is affecting the health of the lower Goulburn River.

This can arise from two timing differences:

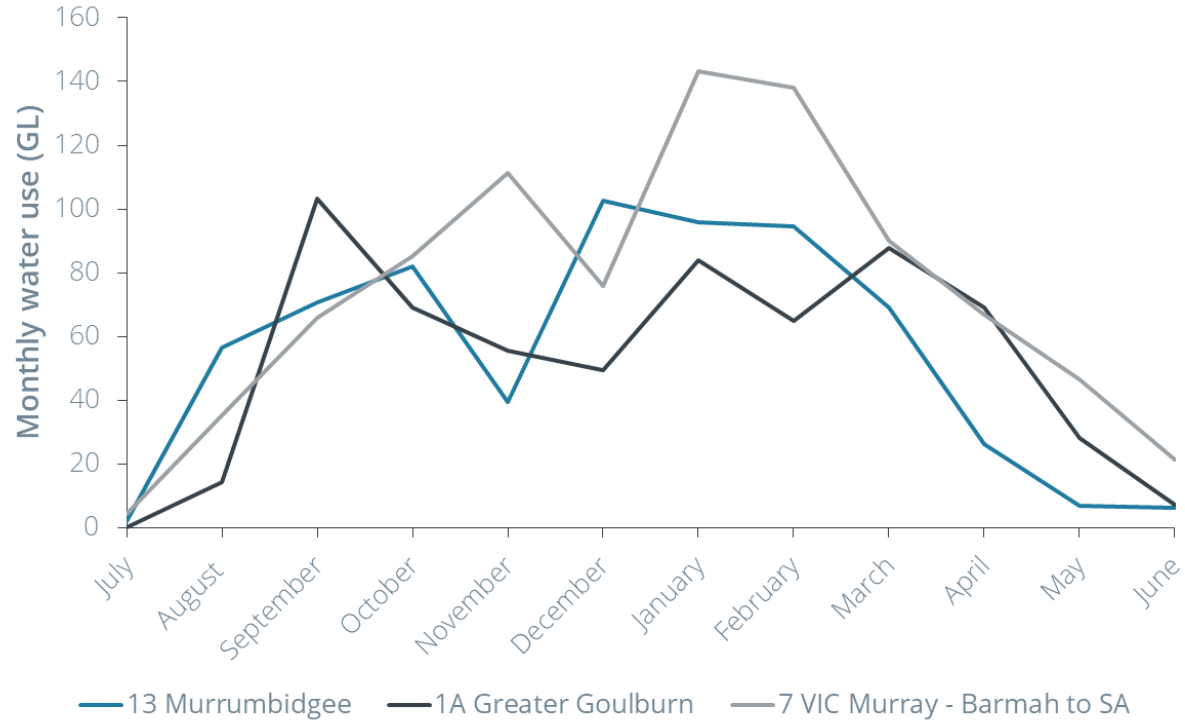
- Differences in the water use patterns in the two districts — The profile of water use across the year differs between the Goulburn and Murrumbidgee, and the downstream Murray (**Figure 10**). Although water use patterns will reflect varying seasonal conditions, the data from 2018-19 is representative of this difference, with water use in zone 7 of the Lower Murray having a stronger peak in summer (January and February are the 7th and 8th months of the water year) than aggregate Goulburn and Murrumbidgee water use.
- Differences in the pattern of delivering the IVT to reconcile the trade, from the timing of the water demand to which it is being delivered — it is apparent that the delivery of Murrumbidgee and Goulburn IVT volumes has been occurring in a pattern that is significantly more 'peaky' that the lower Murray demand to which these volumes have been traded. **Figure 11** shows these deliveries having the majority delivered in the months of December to April.

The MDBA has stated that to avoid any third-party impacts, IVT water should be delivered in a way that matches the use of the water traded from the valleys.[20] However, in practice the IVT accounts have recently been used to also support the supply of peak summer demands.

[19] It is important to note that these delivery rights are only specified in relation to the off-river infrastructure (i.e. they don't extend to delivery of water to the operator's river offtake point).

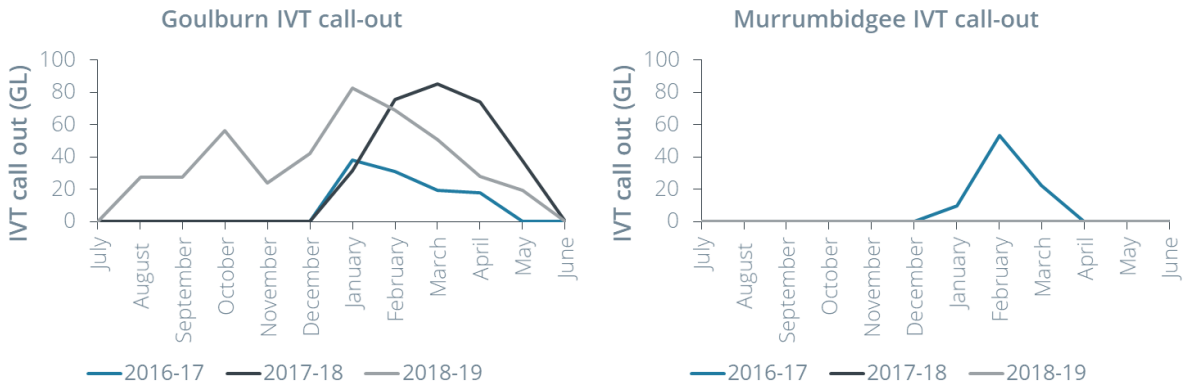
[20] MDBA 2019, Options Paper IVT and RMS Operations.

Figure 10: Monthly water use in Goulburn, Murrumbidgee and lower Murray, 2018-19



Note: Data was prepared using information provided to the ACCC by WaterNSW, VIC DELWP and SA DEW. This data is based on administrative records, which may contain errors or omissions. Notably, in Victoria and SA in particular, water may be recorded as debited from an account in one month in error then credited in a subsequent month to correct the error. This results in a net zero impact throughout the water year, but may cause some months to have higher or lower usage than is actually the case.
Source: Frontier Economics, using data from the ACCC.

Figure 11: Monthly Goulburn and Murrumbidgee IVT delivery



Source: Frontier Economics, using data from the ACCC.

4.2.2 Access to interregional trade opportunities

In the absence of fully defined in-river delivery rights, storage rights or use limits, trading restrictions are currently used to reduce the risk of third-party impacts of water trades described above. However, there are issues associated with the effectiveness of these trading limits.

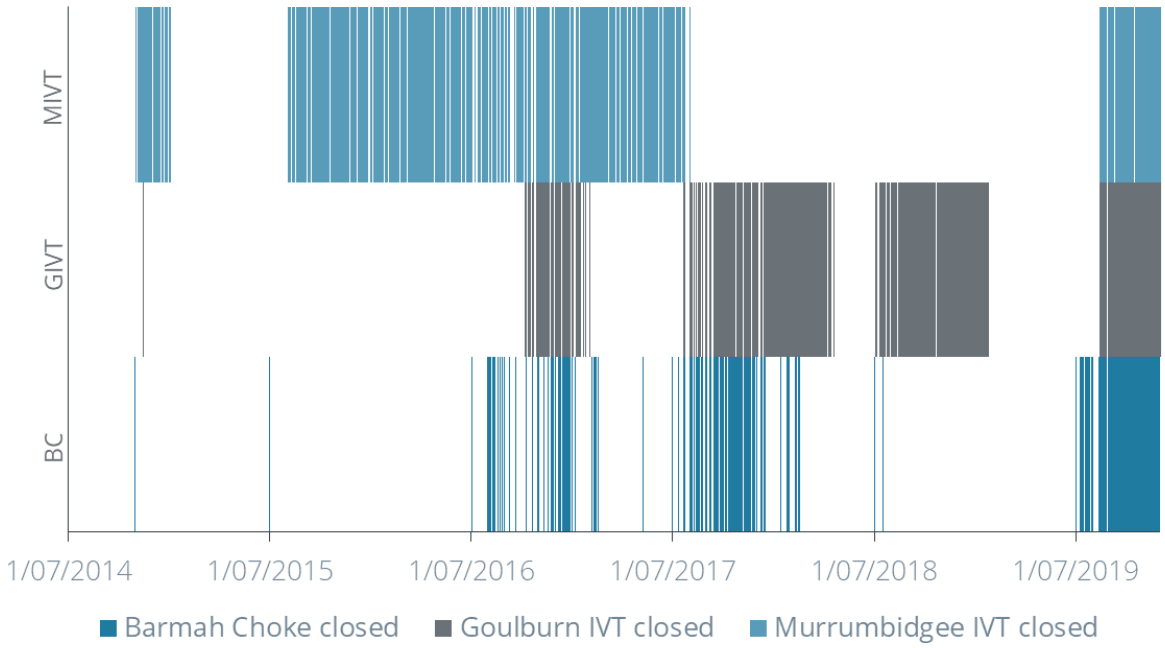
In particular, a constraint on the opportunity to trade will create scarcity which will affect the pattern of trade. In the absence of any other pricing or rationing mechanism for managing this scarcity, the result will be a rush to undertake trades before the limit is reached. Essentially the irrigators, or intermediaries, that are first in will get to trade. If the limits are consistently reached, irrigators will be incentivised to trade earlier in season before the limit is hit. As a repeated game each year, limits can be expected to be reached earlier (assuming underlying conditions remain the same).

Figure 12: Incentives for trader behaviour in response to an expected trade limit

Source: Frontier Economics.

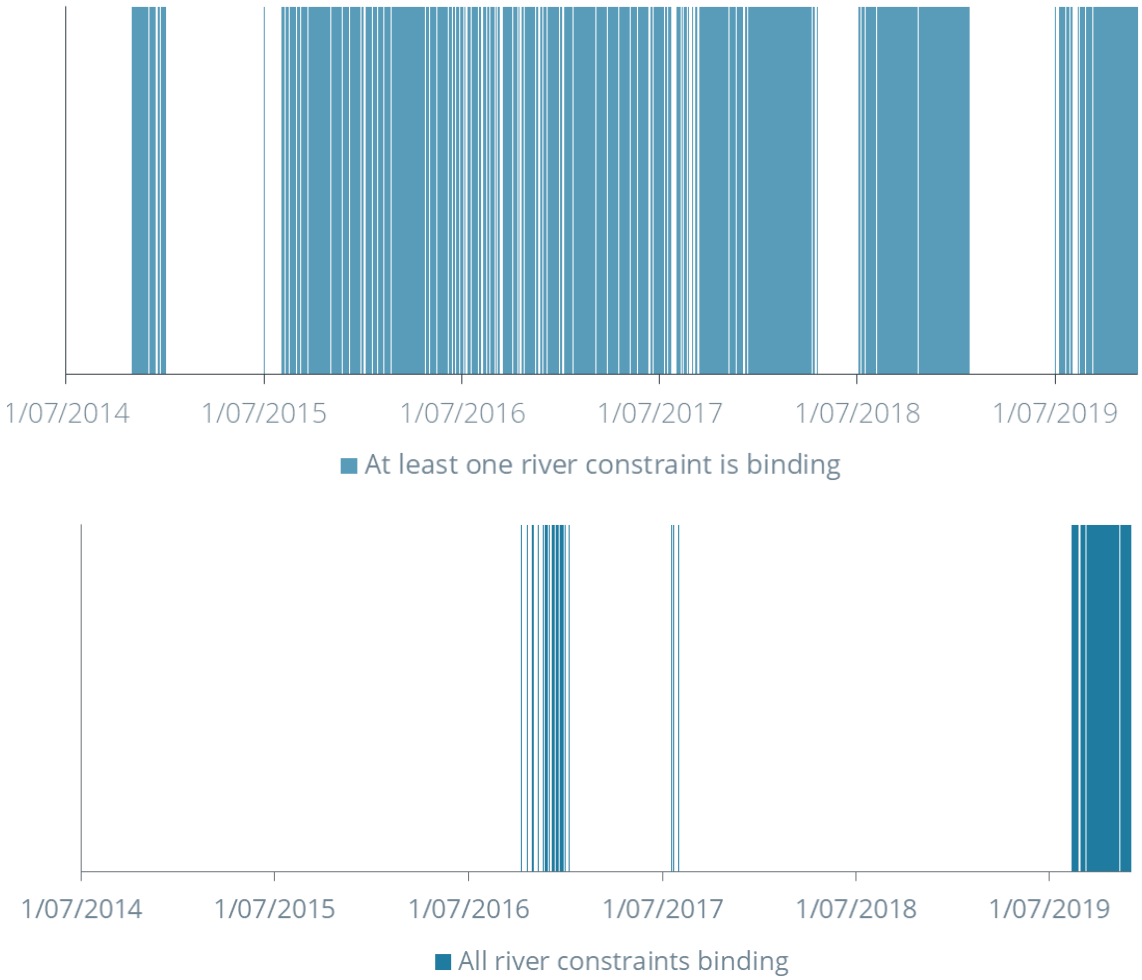
There is some evidence that this rush to trade early may be occurring. For example, the Goulburn is more frequently constrained at the start of the water season until after peak summer demands (**Figure 13**). For much of the time there is at least one significant trade limit restricting trade into the lower Murray water use region (**Figure 14**).

Figure 13: Occurrences of trade limits binding



Source: Frontier Economics. Note: Times where trade is closed for reasons other than the IVT limit being reached may not be reflected in the chart above, for example trade from the Goulburn at the end of the water season. Dataset only extends to November 2019.

Figure 14: Occurrences of trade to the lower Murray being limited



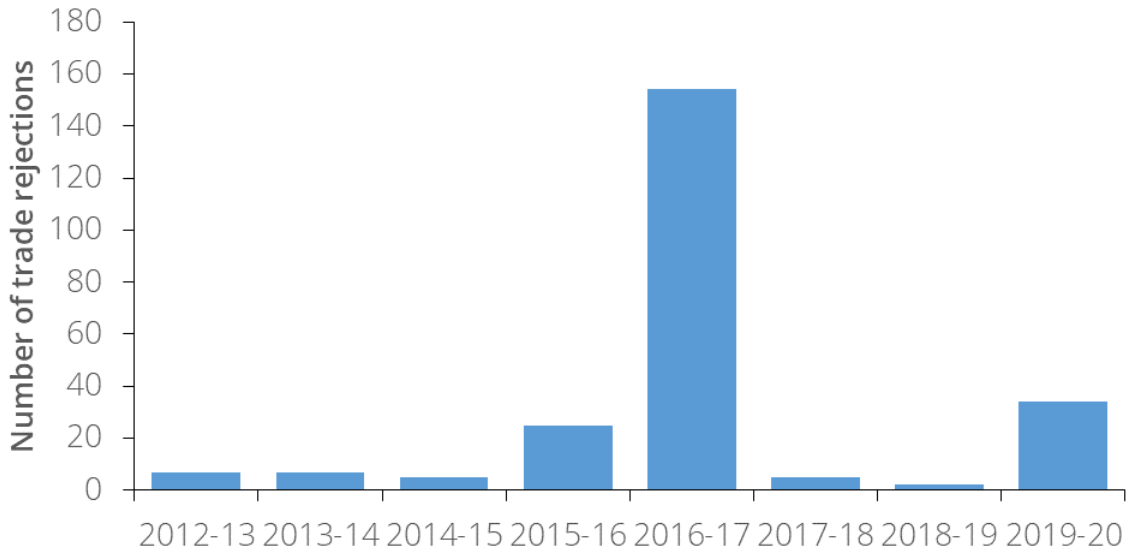
Source: Frontier Economics. Note: Dataset only extends to November 2019.

A similar 'rush' outcome occurs when an IVT call out creates a further limited opportunity for trade. A method to quantify this effect is the number of rejected trades which is summarised in **Figure 15**. For example, the number of rejected trades between the Murrumbidgee and Murray was 154 in 2016-17 where the IVT limit in the Murrumbidgee was reached, and 34 in the Spring of 2019 when the limit was also reached.[21] This compares to a median of seven rejections in the years where the IVT limit was not met as frequently. The ACCC in their interim report identified that is has become somewhat of a 'technological arms race' for traders to be able to identify when a trade opportunity is available and to submit a trade quickly enough for it to be approved before the trade limit rebinds.[22]

[21] Data beyond November 2019 was not available for the analysis

[22] ACCC, 2020, *Murray–Darling Basin water markets inquiry—interim report*, pg. 21

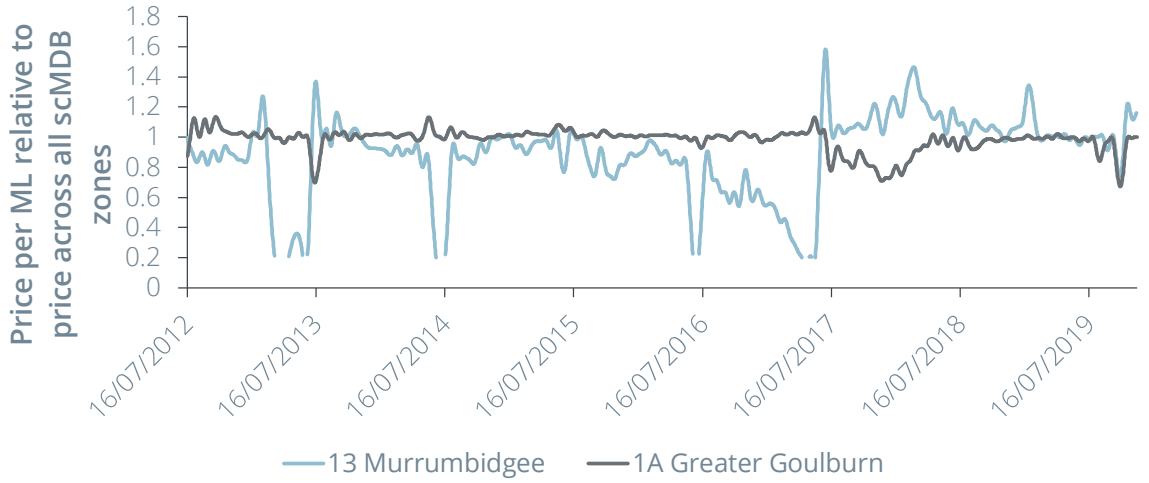
Figure 15: Number of trade rejections (Murrumbidgee to Murray trade)



Source: Frontier Economics analysis of ACCC data. Dataset only extends to November 2019.

This incentive to trade is driven by the demand to access water in the constrained zone and/or the price premium that would be expected to occur in that zone when the trade limit is binding. For example, price premiums are often seen between zones in the scMDB. This is shown for zones 1A and 13 in **Figure 16**. In the Murrumbidgee, prices when the IVT was constrained in 2017-18 were approximately 120-140% of the average price across the scMDB at that time - approximately $30-$50 more per ML.

Figure 16: Average daily price differentials, selected zones compared to average for Southern Connected Basin, 2012-13 to 2019-20



Source: Frontier Economics analysis of ACCC data

Chasing these potential benefits, via an application to trade, is also relatively low risk given that backtrade is generally possible later in the season. For example, the opportunity for backtrade is

demonstrated by the Goulburn IVT account balance which has consistently remained high at the end of the water year. The differential risks of spill[23] (60 per cent risk of spill in the Murray system, and 20 per cent risk of spill in the Goulburn system) would have also contributed to this direction of trade.

The limitations on accessing opportunities for interregional trade mean that opportunities to reallocate water between zones for use may be 'crowded out' by trades that are not closely aligned to improving water resource use efficiency (i.e. meeting competing crop demands and environmental demands in response to prevailing seasonal conditions).

4.2.3 Third party impacts from conveyance losses

Summary

- A simplifying assumption for water trade is that there is no additional water lost to conveyance losses
- However, in reality, the incremental losses associated with altered river management to support *aggregate* downstream delivery when required may not be negligible.
- The Murray Darling Basin Authority is often required to make competing trade-offs between efficiency losses and minimising shortfall risk for downstream users
- The decision to prioritise meeting demand with the result of increased conveyance loss risk has distributional consequences. The benefits of meeting demand downstream are realised by the users downstream, but comes with increased risk for losses which are socialised across all entitlement holders

As described in Section 2, interregional trade occurs on a 1:1 volumetric basis regardless of the distance between the storage and the user. Hence, a simplifying assumption for interregional trade is that the marginal losses from the delivery of individual water parcels is zero. This amounts to assuming no *marginal change* to the net water lost to evaporation or seepage during conveyance of additional water.

For the most part, this is not unreasonable. Marginal losses associated with the delivery of a given parcel of water to a location further downstream are generally considered negligible during normal River Operations. 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. These complexities are detailed in Section 13.5.7 of the ACCC interim report.

Given these issues, 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

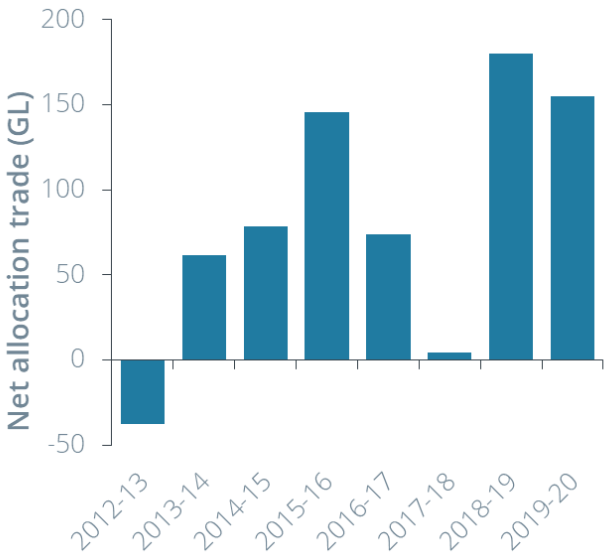
[23] https://nvrm.net.au/risk-of-spill/current-risk-of-spill, accessed 29th June 2020.

incremental losses associated with altered river management to support additional downstream delivery when required may not be negligible under all seasonal conditions.

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. A study undertaken in 2020 for the MDBA indicated that total consumptive use within the Murray region below Barmah to the SA Border has not increased in recent years, as increased demand has been offset by water recovery for the environment.[24] However, a combination of factors in zones 7 and 11 are contributing to challenging delivery conditions for river operators. These factors include:

- Irrigated agriculture in the mid-Murray region has **significantly increased the volumes traded into zones 7 and 11**, which stretch below the Barmah Choke and the confluence of the Murray with the Murrumbidgee and Goulburn. These increased volumes are shown in **Figure 17**, which shows net volumes traded into zones 7 and 11 (but not between zones 7 and 11) for consumptive use. These volumes are being demanded further downstream (e.g. in Sunraysia) in Victoria, largely due to expanded permanent horticulture in the region.

Figure 17: Net allocation trade into NSW and Victorian Murray below Barmah (Trading Zones 11 and 7) (excluding environmental water holders and government trades)



Source: Frontier Economics based on ACCC data. Note: Lesser volumes traded into the zones in 2016-17 and 2017-18 due to wetter conditions in 2016-17, resulting in higher allocations in Victoria and NSW.

- **River system constraints** limit the ability of river operations to deliver water downstream. The Barmah Choke is the main capacity constraint for the Southern Murray Darling Basin. The choke is described as having a nominal channel capacity of 9,000 – 9,500 ML/day for river

[24] HARC (Hydrology and Risk Consulting) 2020, *Review of historical use of water: Barmah to the SA Border*, https://www.mdba.gov.au/sites/default/files/pubs/review%20of%20historical%20use%20of%20water%20barmah%20to%20south%20australia.pdf

management purposes [25], while also described as 'around 7,000 ML/day in other MDBA communication material.[26] There is also evidence to suggest this capacity is decreasing over time. Flows in Summer and Autumn are limited through the Barmah Choke to ensure this capacity is not exceeded. If the constraint is exceeded, overbank flows result which can flood the adjacent Barmah-Millewa Forest, potentially causing significant conveyance losses and environmental damage. In addition, channel capacity between upstream storages, the time required for deliveries to reach their intended destinations, storage capacity and operational limits from the Goulburn, Murrumbidgee and Lower Darling all represent additional constraints for water delivery for downstream users.

- **Water recovered for the environment,** and **increased flows to SA** due to trade and environmental flows.

The combination of both downstream demand trends and river system constraints requires river operators to position large volumes of water in mid-Murray storages. [27] This forces early season decisions to release water from upstream storages to ensure deliveries do not exceed river system constraints. However, this in turn can increase the risks of conveyance losses downstream from river operations, such as increased conveyance losses and increased risks of storage spills.

River operations over the period 2018-19 demonstrate the trade-offs being made between delivery shortfalls and efficiency losses. For example, full channel capacity was required to transfer water below the Barmah choke to support summer operations given that lower tributary inflows and a lack of Menindee and Murrumbidgee resources increased the shortfall risk for downstream users. The ability to transfer water earlier in the season was also limited due to increased spill risk in Lake Victoria. Hot and dry conditions then brought forward peak summer demand, meaning that overbank spillage/losses became necessary to deposit sufficient volumes in Lake Victoria. [28]

Figure 18 summarises the cumulative conveyance losses as estimated by the Murray Darling Basin Authority in March 2019, compared to other years where overbank transfers were required to meet demand.[29] Total conveyance losses are influenced by a number of factors, and the majority of conveyance losses in most years are due to climatic conditions and low inflows. This makes estimating the incremental change in conveyance losses due to altered river operations challenging. However, the figure provides two learnings — cumulative conveyance losses are not zero, and overbank transfers have been more frequent in recent years in part due to increased water delivery below the Barmah choke.

25 Murray Darling Basin Authority 2020, River Murray System Annual Operating Outlook 2020-21.

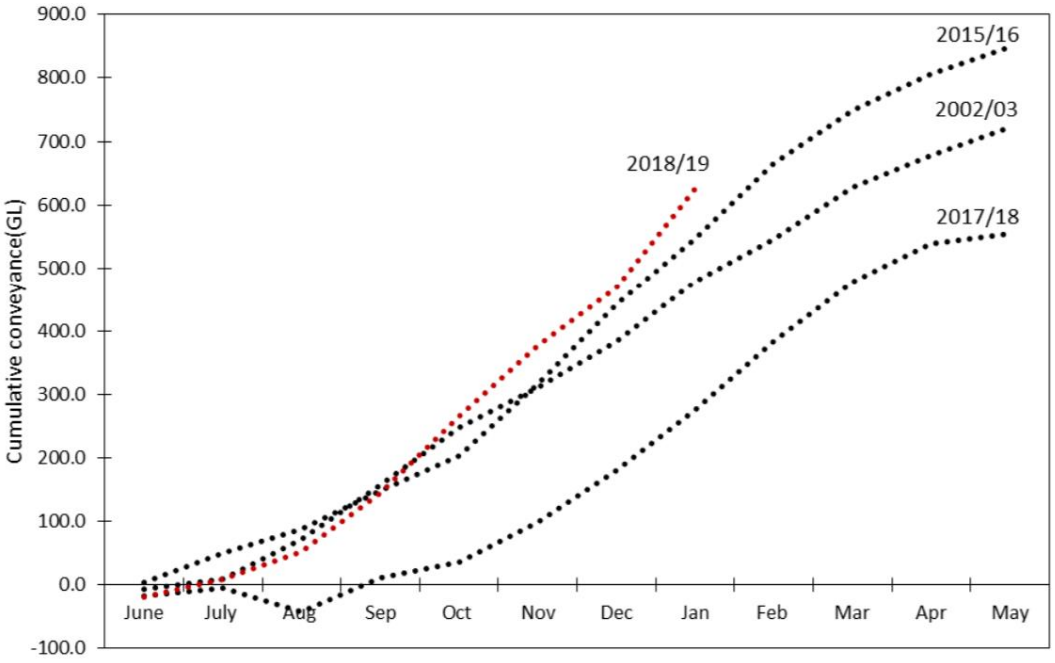
26 Murray Darling Basin Authority 2019, The Barmah Choke, https://www.mdba.gov.au/managing-water/water-markets-trade/barmah-choke

27 Murray Darling Basin Authority 2020, River Murray System Annual Operating Outlook 2020-21.

28 Independent River Operations Review Group, September 2019, Review of River Operations 2018-19

29 Overbank transfers occur when water is delivered downstream at a flow rate which exceeds the channel capacity of a river reach, resulting in water flowing over the banks of the river."

Figure 18: Estimated cumulative losses for 2018–19 water year to January compared to years where fully regulated and overbank transfers to Lake Victoria took place



Source: Murray Darling Basin Authority, 2019, Losses in the River Murray System 2018–19, pg. 14.

As noted by the Independent River Operations Review Group, the MDBA consulted with Basin State governments on the trade-off between increased conveyance losses and risk of storage spills or elevated water delivery shortfall risks during this period.[30] Basin State governments indicated they were willing to incur additional conveyance losses over the increased risk of water delivery shortfalls. It was considered that mitigating delivery shortfall risks was paramount, and of benefit to all water users.

Similar conditions have been experienced in recent years, in particular in 2014-15 when channel capacity was at its maximum, which led to the Independent River Operations Review Group to initiate recommendations on managing this risk.[31]

The Murray Darling Basin Authority is responsible for managing river operation of the Murray. The central document guiding decision making where there are trade-offs is the *Objectives and Outcomes for River Operations in the River Murray System*[32]. Under 2a - General Objectives and Outcomes, the main specified objective of water storage, delivery and accounting is to:

> *"Operate the River Murray system efficiently and effectively in order to deliver state water entitlements"*

The outcomes of this objective should be to ensure:

30 Independent River Operations Review Group, September 2019, Review of River Operations 2018-19

31 Independent River Operations Review Group, September 2015, Review of River Operations 2014-15

32 https://www.mdba.gov.au/sites/default/files/pubs/Objectives-and-outcomes-for-river-operations-in-the-RMS-2019.pdf

"(i) The conservation of water and minimisation of losses…

(iii) The delivery to the Southern Basin States of their authorised water orders (including water traded under Schedule D of the Agreement), unless physical constraints of the River Murray System prevent this from occurring."

Accordingly, river operations focus on meeting demands, and minimising losses on the Murray system. As discussed previously, these objectives are occasionally in conflict and the MDBA is often required to make trade-offs between water conveyance losses and storage spills and minimising the risk of shortfall.

Objective 5a, which is to contribute to the protection and, where possible, restoration of priority environmental assets and ecosystem functions within the River Murray system, can also be a competing factor when considering the environmental impact of meeting demand for downstream users (for example overbank flows in the Barmah-Millewa Forest).

The decision to prioritise meeting water demand at the risk of increased conveyance loss risk has distributional consequences. The benefits of this prioritisation are realised by the users downstream who face reduced shortfall risk. However, the costs associated with increased conveyance and storage spill risk are socialised across all entitlement holders. NSW irrigators have documented their concerns regarding the resource availability costs associated with increased conveyance losses.

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.

The 2018-19 river operations summary highlighted that mitigating delivery shortfall risks was considered paramount. The Murray Darling Basin Authority 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 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.[33]

The Independent River Operations Review Group states that the management of shortfall risks of 2018-19 were supported by the Basin States:

"They [Basin States] have also praised the significant operational efforts made by the MDBA in putting into place the currently available mitigations and carefully managing the system to avoid shortfalls, including reaching agreement on access to the Mulwala Canal and the "fire drill" exercise led by the MDBA in February 2019"[34]

The Murray Darling Basin Authority's actions to reduce and manage future shortfall risk, such as the agreements to provide access to the Mulwala Canal (to manage channel capacity constraints), follow recommendations made by the Independent River Operations Review Group in 2015.[35]

33 Murray Darling Basin Authority, 2019, River Murray System summary of river operations 2018-19

34 Independent River Operations Review Group, September 2019, Review of River Operations 2018-19, pg. 54

35 Independent River Operations Review Group, September 2015, Review of River Operations 2014-15

These recommendations and measures focussed on how river operations are conducted and how potential shortfalls can be managed between Basin States in the future.[36]

These actions, however, do little to manage the underlying problem, namely increased demand downstream of the Barmah Choke, which remains the fundamental driver of these risks and outcomes. With demand (primarily from maturing crops in horticultural developments) increasing in the mid-Murray, these dynamics will continue to challenge river operations, with future trade-offs between shortfall and efficiency losses likely.

The above discussion has identified costs that are being incurred in order to meet downstream demands (and these demands have increased over time with net trade to zones 7 and 11). These costs include:

- Arrangements for use of infrastructure alternatives to bypass the Barmah Choke, such as arrangements with Murray Irrigation Limited for use of the Mulwala Canal. For example, in 2018-19 "the access agreement between MDBA and MIL required the MDBA to order at least 100 GL through the Mulwala Canal and incur a 10% 'loss' tariff for the use of the escape infrastructure".[37]
- Increased expected losses in system — from the uncertainty and risk associated with positioning water resources across the scMDB in order to meet increasing demands in lower Murray locations.

The decision to prioritise meeting demand over conveyance losses and hence incur these costs has distributional consequences. The benefits of meeting demand downstream are realised by the users downstream, however this comes with increased costs (including risk for higher losses) which are socialised across all entitlement holders.

4.3 Options for reform

4.3.1 Different treatment of different trade mechanisms

The BPWTR currently requires tagged delivery to be restricted when water allocation trade is restricted: "If a restriction has effect on the trade of water allocations between 2 places, each of which is in a regulated system; and a tagged water access entitlement exists in relation to those 2 places, then an order for water under the tagged water access entitlement is subject to the same restriction". Prior to December 2019, the large amount of tagged trade that occurs from the Victorian Goulburn system to the Victorian Murray system was no subject to the same restrictions as allocation trade. [38]

However, the two trade mechanisms for reallocating water between zones for use (water allocation trade and tagging) have some different consequences and effects. In particular, in

[36] Independent Panel for Capacity Project Review, December 2019, Report prepared for the Murray Darling Basin Ministerial Council https://www.mdba.gov.au/sites/default/files/pubs/ipcpr-minco-final-report-2019.pdf

[37] MDBA 2019, Annual Report 2018-19, www.mdba.gov.au/sites/default/files/pubs/mdba-annual-report-2018-19.pdf, p.64.

[38] DELWP 2019, Changes to tagged trade and operational regime for the Goulburn system, https://waterregister.vic.gov.au/about/news/286-changes-to-tagged-trade-and-operational-regime-for-the-goulburn-system

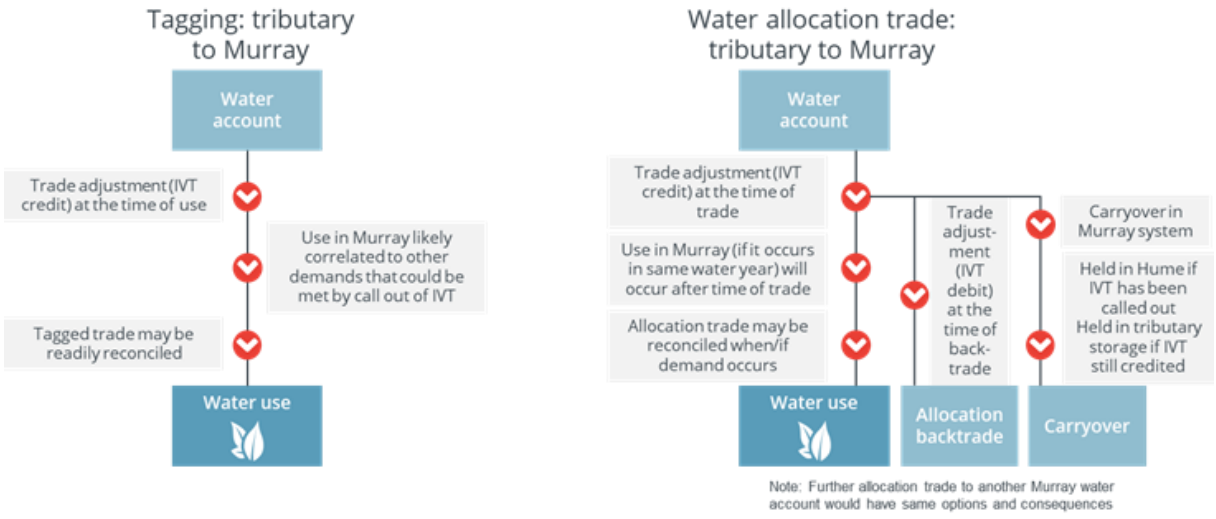
addition to changing the zone of water use, water allocation trade also changes the zone for any further allocation trade and/or carryover.

Figure 19 sets out the additional uncertainty faced by river operations when water allocation trade between zones occurs, because of the range of timing and opportunities that water allocation trade allows for when the water is actually used.

The simplest case is tagging. When tagged delivery and use occurs, the IVT is credited at the time of use. Given that the use is occurring at that time, this suggests that there are demands in the Murray that could be met by IVT callout. River operators may instead *choose* to meet these demands using Murray resources and use the IVT volumes for broader system operation.

In the case of water allocation trade, the IVT is credited at the time of trade. If this trade was to support a crop water demand then the river operator may choose to call out the volumes in the expected pattern of demand (for the remaining part of the water year). The traded volume may instead not be used at that time but instead may be carried over. However the river operator has little information on which to base their expectation of what demands will eventuate. (Discussions with river operators suggested that they were keen to have more information about water users' intent to carryover.) Clearly, if water allocation trade occurs towards the end of the year, then it is more likely that the volumes will be for carryover rather than immediate use. As there is no significant demand for IVT callout during these latter months, rather than call out the IVT, the IVT balance will need to be carried over to the following year.

Figure 19: Tagging and water allocation trade: consequences for river operations



Source: Frontier Economics.

An incremental reform option would involve revision of BTWTR 12.23 to allow tagged delivery when water allocation trade is restricted, if the tagged delivery does not significantly contribute to the stated reason of the restriction. The effect of this would be to recognise that where allocation trade is constrained to protect against IVT spill risk, tagged delivery provides a means for beneficial movement of water downstream that does not contribute to spill risk (since aligned to circumstances for call out of IVT).

Communication and legislation could also be improved for the language to be more closely aligned with how tagging is implemented. For example, BTWTR 12.23 only refers to 'tagged water access entitlement' and does not refer to tagged water allocation trade. This would involve revisions to cover all tagged delivery (delivery from tagged water allocation trade and tagged water access entitlement trade) given that these are implemented equivalently in NSW and Victoria via tagged water accounts.

A more far-reaching reform option would be to rely on tagging as the primary (or only) mechanism of 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 support interstate tagging are not sufficiently developed. The ACCC interim report (p. 467) found that such a change 'would likely face significant administrative complexity to implement'.

Recommendation

Revise BPWTR 12.23 to allow tagged delivery to occur when water allocation trade is restricted, where appropriate.

Ensure communication and legislation covers all tagged delivery (delivery from tagged water allocation trade and tagged water access entitlement trade.

4.3.2 Clarify basis for trade rules based on trade adjustments (IVTs)

As discussed above, water allocation trade and tagged delivery both credit the IVT of the exporting tributary. This credit on the IVT is then called out to debit the IVT as required by river operations.

The consequences of these IVT actions associated with water allocation trade and tagged delivery include:

- Similarities — Both allocation trade and tagged trade lead to interregional changes in location of use, therefore both mechanisms have similar conveyance and peak demand consequences for the interregional delivery of volumes for use.
- Differences — Tagged delivery is correlated to demand that could be met by IVT callout, whereas allocation trade is independent of demand timing (and may be carried over). In the case where water allocation trade credits to the IVT are not called out, they add to IVT spill risk.

Given that an IVT limit does not set an upper limit on the total volume of water that changes location (because IVT call outs debit the account and create opportunities for further trades), using an IVT limit to seek to manage conveyance losses is not directly managing the concern. This is because conveyance losses will be incurred on the total volume of water that changes location. Rather, a limit on the total volume that changes location in a given year may more closely address the concern — although it should be noted that this may still be a poor proxy given that conveyance losses depend on seasonal conditions and other factors.

Reform options

If IVT limits are maintained (noting some reforms considered elsewhere in the report may amend how or if IVT limits apply), a potential reform option is improving the clarity about the purpose of IVT limits (such as for conveyance losses and spill risk).

Consequent to this, the effect of IVT limits on trade and other outcomes could be assessed as being aligned with the intended concern and potentially fit-for-purpose. Alternatively, if the effect of IVT limits do not closely address the stated issue, there is the potential for the appropriate mechanism to address these concerns to be revised — such that the trade issue is addressed through an alternative mechanism rather than through an IVT limit.

Recommendations

IVT limits be clearly linked to their underlying purpose (such as limiting conveyance losses and spill risk) so that the effect of IVT limits on trade be aligned with the stated purpose. If the IVT limit does not directly address the underlying concern, it should be revised to more closely address the underlying concern or an alternative approach be used to manage the concern.

4.3.3 Adjusting for conveyance losses resulting from trade

An adjustment for conveyance losses resulting from trade would help incentivise trading decisions so that any consequential losses are taken into account by the trader.

Determining the appropriate adjustment for conveyance losses resulting from trade would be extremely challenging since losses depend on *when* traded water is delivered, and on the *aggregate* volumes delivered at the time the traded water is delivered (i.e. losses are conditional on the actions of the trader, but also other parties' actions), and this information is not available at the time of trade. Carryover opportunities may increase the time between when a trade occurs and when the traded volume is ultimately delivered.

Nevertheless, some examples of 'conveyance loss factors' being applied at the time of trade do exist in in other jurisdictions — an example is the Queensland Border Rivers water supply schemes where a conversion factor is applied to take into account estimated differences in conveyance losses between zones.

Reform options

A potential reform option is to apply loss factors to water volumes traded between regions. There are a several ways in which this could be done.

If a single loss factor was applied under all conditions (such as an average value), then this would effectively set an exchange rate between water allocations between zones. In any particular year, when the actual losses were higher or lower than this value, the exchange rate could distort trade decisions to reallocate water between zones in response to prevailing conditions. This would reduce resource use efficiency of water across the scMDB. Further, any 'excess' losses that are not accommodated by the loss factor would be socialised and would therefore undermine entitlement reliability. It is important to note, however, that the 'excess losses' from the current 1:1 exchange rate would be greater than any 'excess losses' above an average loss value.

While a dynamic loss factor could instead be applied based on annual or monthly estimates, the complexity of doing so may lead to uncertainty to water users, and the administrative costs of arriving at these estimates may be prohibitive.

An alternative approach is to consider a set of high-low estimates of loss factors. These could be implemented as a low-high spread such that trade downstream is based on the high (upper

bound) estimate while trade upstream is based on the low (lower bound estimate).[39] This avoids the lockstep of exchange rate conditions that would result from applying a single loss factor, and the potential negative third-party impacts of applying a loss factor that is lower than the resultant physical losses. However, the incentive for trade between regions would be somewhat muted by using these conservative loss estimates. Such an upper- and lower-bound approach would also result in actual losses being less than those being recovered through the loss factor. A significant question would be how to treat the surplus volumes that are retained. For example, these could be held and returned to entitlement holders in the source valley.

Recommendations

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.

We expect that, given the current Murrumbidgee IVT limit is partially motivated by conveyance loss concerns, that this would be a suitable valley to consider in the first instance. If trade limits are more clearly linked to their purpose (as recommended in above in section 4.3.2) then opportunities exist to replace the IVT limit, as a management tool for conveyance losses, with adjustment that are more directly aligned with conveyance losses.

[39] This is similar to charging for Mallee salinity impacts where salinity fees are levied for moving water use into higher salinity impacts zones, but are not returned for actions that move water use into lower salinity impacts zones.

5 Delivery shortfalls

5.1 The overall trend in delivery patterns

As discussed in the previous section, interregional trade has generally been moving water use downstream and into the Barmah to SA Border section of the Murray River (zones 7 and 11). This has occurred in the context of water recovery that has reallocated water from consumptive uses to the environment across the scMDB (and the whole MDB more generally).

The Barmah to SA Border section of the Murray River has significant consumptive demands. Water also moves into and through this section of the river from the Goulburn and Murrumbidgee, to enter SA for environmental and consumptive purposes (including SA entitlement flows).

Analysis by HARC (2020)[40] of the period 1992-93 to 2018-19 shows that the overall trend in consumptive use in the Barmah to SA Border has been relatively static both annually and over the peak consumptive use period between January and April. The consumptive use of Murray resources in this section of the river has decreased and consumptive use has been increasingly met by IVT deliveries (from the Goulburn and Murrumbidgee).

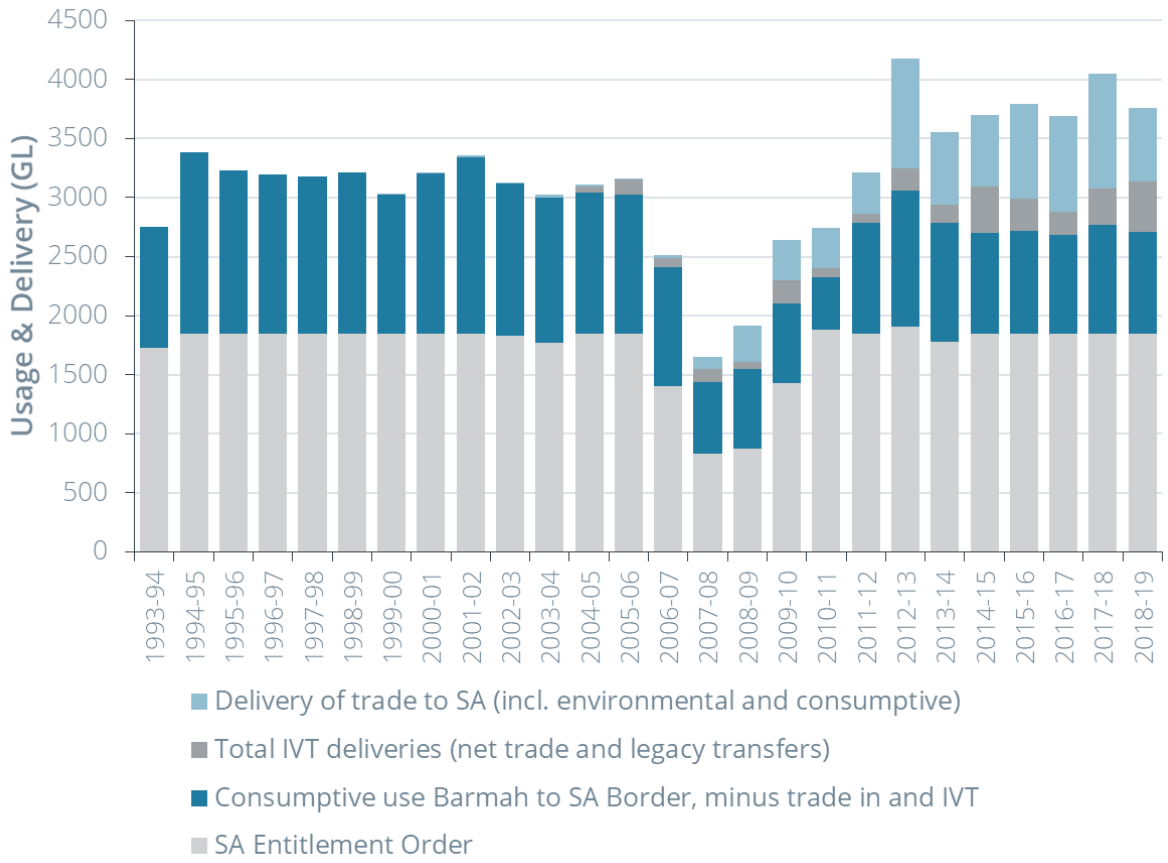
However, HARC also showed that trade and environmental water recoveries have been used to deliver significant volumes of environmental flows to SA. Water can be supplied from environmental water entitlements held in the Murray (above or below Barmah), Murrumbidgee or Goulburn systems.

At an annual level, there has been a significant increase in the total volumes of water entering Barmah to SA Border for use in the region or to pass through to SA. **Figure 20** combines HARC (2020) data for:

- SA Entitlement order — volumes to meet SA entitlement flows
- Consumptive use from entitlements issued within the Barmah to SA Border region — Barmah to SA Border use net of imports from SA and IVTs
- Total IVT deliveries — from the Goulburn and Murrumbidgee, to deliver net trade and legacy transfers
- Environmental water delivery and consumptive trade to SA.

[40] HARC (Hydrology and Risk Consulting) 2020, *Review of historical use of water: Barmah to the SA Border*, https://www.mdba.gov.au/sites/default/files/pubs/review%20of%20historical%20use%20of%20water%20barmah%20to%20south%20australia.pdf

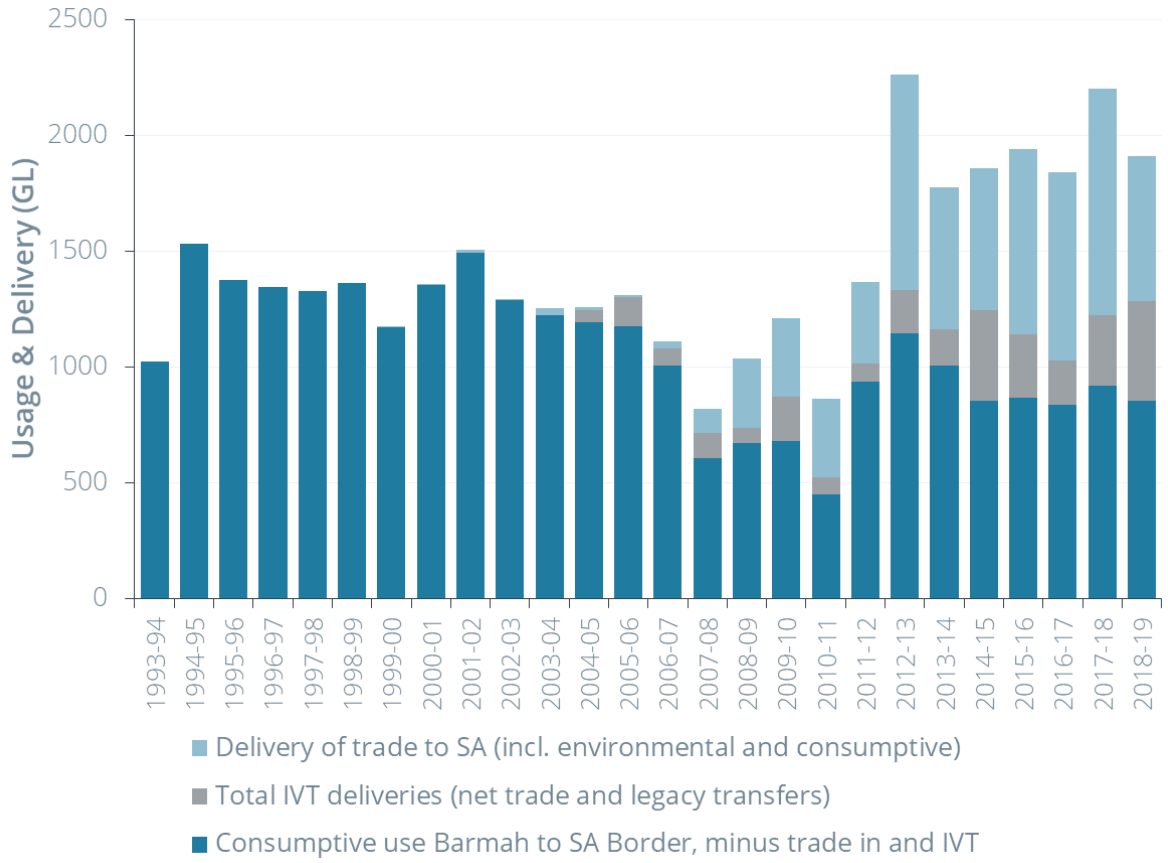
Figure 20: Flows into and through Barmah to SA Border — Annual totals



Source: Frontier Economics analysis of data provided to the ACCC by the MDBA, from HARC (2020).

The increase in flows into and through Barmah to SA Border is more pronounced once the SA entitlement flows are removed from the annual total — **Figure 21** shows that although consumptive use (met from both regional resources and imports) has remained relatively static, the addition of environmental water and consumptive trade to SA suggests that total usage and delivery has increased significantly.

Figure 21: Flows into and through Barmah to SA Border — Annual totals (net entitlement flows)



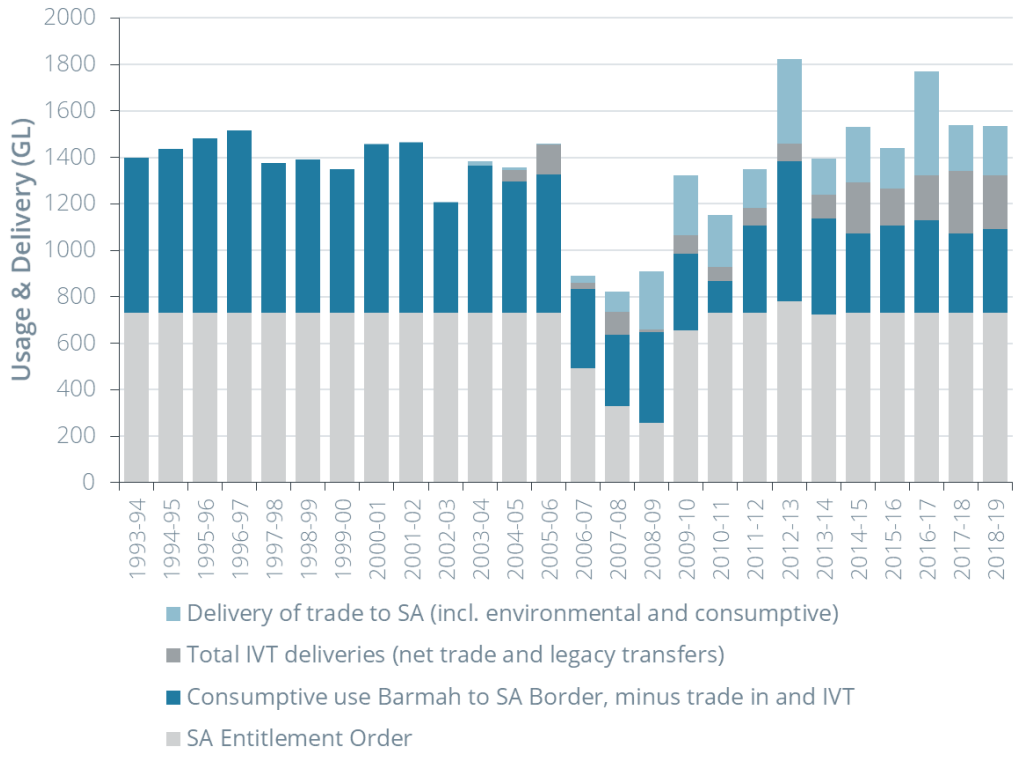
Source: Frontier Economics analysis of data provided to the ACCC by the MDBA, from HARC (2020).

This observation is also applicable to the peak January–April period (**Figure 22** and **Figure 23**).

The January–April increase is of a lesser magnitude given that the pattern of environmental deliveries to SA tend to occur largely in winter-spring, and do not coincide with peak consumptive use (HARC 2020). However, the volumes in January to April for environmental water and consumptive trade are not negligible — and were approximately 450GL in 2016–17.

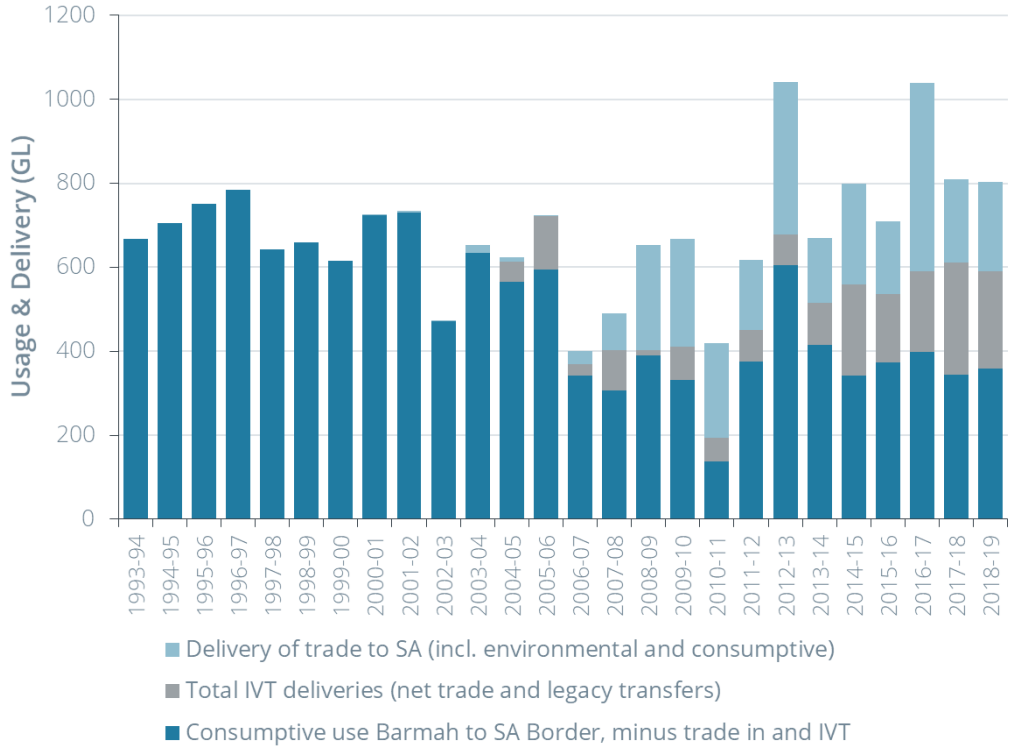
The remainder of this chapter considers the challenges of managing delivery within delivery constraints and the possibility of delivery shortfalls.

Figure 22: Flows into and through Barmah to SA Border — January–April



Source: Frontier Economics analysis of data provided to the ACCC by the MDBA, from HARC (2020).

Figure 23: Flows into and through Barmah to SA Border — January–April (net entitlement flows)



Source: Frontier Economics analysis of data provided to the ACCC by the MDBA, from HARC (2020).

5.2 Problems with current arrangements

5.2.1 Changes in the location and timing of water use due to trade can increase the risk of shortfalls

As noted in Chapter 2 issues can arise for third parties when a large number of water users draw on the volumes in their allocation accounts at a particular time and location. It is possible that localised peaks in use may mean demand cannot be fully met without compromising minimum environmental flows. This is referred to as a shortfall event (see Box 3 below). System shortfalls are not necessarily related to water availability in main storages, but rather they can reflect:

- localised system capacity and delivery constraints, and
- the actions of river operators in pre-empting localised peaks in making their release decisions — given it can take weeks to deliver water from the main storages to the end of the system the river operator has to make pre-emptive releases to meet expected peak demands.

The *likelihood* of a shortfall is largely driven by climatic conditions (i.e. unexpected hot weather causing a demand spike which was not anticipated by the river operator). The *consequences* of a shortfall will depend on the time when it occurs and the nature of the water use or irrigation operations affected. For the most part, system shortfalls can be expected to occur during peaks in irrigation demand. Production losses as a consequence of a delivery shortfall could be significant particularly for certain water users. For example, a short-term restriction in supply for table grape producers at certain times in the irrigation season could significantly affect the quality of their produce, making it unsuitable for sale.

Box 3: System shortfalls and short-term shortfalls

When water cannot be delivered to users when and where it is needed it is called a delivery shortfall.

'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 arise because of a long period of unexpected dry weather combining with physical and operational system constraints. It could also arise 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.

Under the MDBA definition '**short-term 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 SA border.

Source: Frontier Economics interpretation of MDBA definition (from RMOC June 2016)

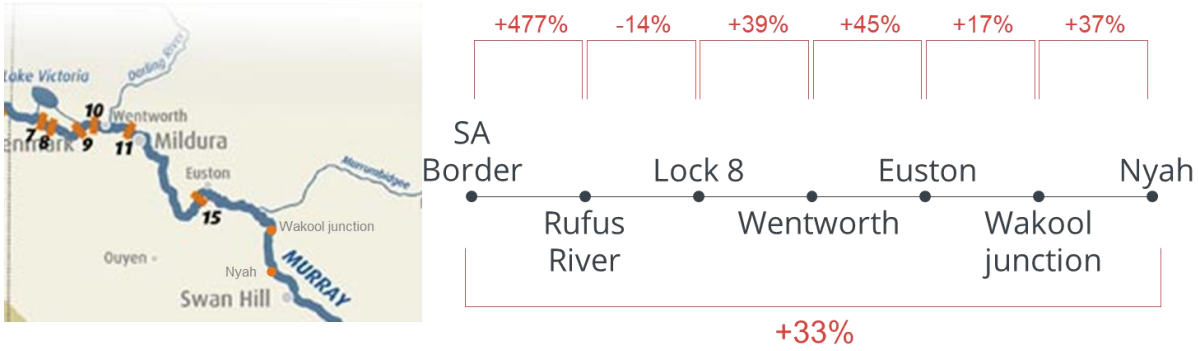
While the risk of delivery shortfall exists in the scMDB regardless of trade, to date this risk been low. For example, the MDBA describes the risk of water delivery shortfalls as 'rare'[41] and that 'shortfall risks have been managed well enough to avoid restrictions since March 2002'.[42]

However, changes in irrigation in the scMDB have concentrated the location and timing of water demand further downstream. This is likely to have exacerbated the risk of delivery shortfall by creating the potential for higher localised peaks in demand.

Interregional trade (and also carryover), while not the cause of delivery shortfalls has led to changes in the timing and location of water use. In Victoria, changes in the location of use can be identified by looking at how extraction shares have changed over the last decade.[43] To be able to extract water in Victoria an extraction share is required and in the lower Murray a significant number of additional extraction shares have been issued. **Figure 24** shows that, in the river stretch between Nyah and the SA border, extraction shares have grown by 33% in the last decade. The most significant area of growth has occurred close to the SA border.

The consequences of these changes in use is that access to water allocations will ultimately be diluted should a system shortfall occur. Put another way, delivery reliability has been reduced[44]. However, the significance of the future risk of shortfall is currently not well understood.

Figure 24: Change in Victorian extraction share from 2010-11 to 2020-21



Source: Frontier Economics, based on information provided to ACCC by DELWP.

5.2.2 Current arrangements are not addressing the increased shortfall risk

Under current arrangements the right to have water delivered to an on-river extraction point is bundled with the right to access that water. It is assumed, for the most part, that a water allocation can be extracted or accessed at any time without affecting third parties. However, as discussed above this is increasingly likely to not be the case.

41 MDBA 2020, River Murray water delivery shortfall risks, https://www.mdba.gov.au/publications/mdba-reports/river-murray-water-delivery-shortfall-risks

42 MDBA 2018, Understanding River Murray water delivery shortfall risks, https://www.mdba.gov.au/sites/default/files/pubs/river-murray-water-delivery-shortfall-%20risks.pdf

43 Extraction shares are not defined in other jurisdictions of the scMDB.

44 Existing water users will have formed expectations regarding deliverability based on historical experiences. Therefore, changes in use patterns facilitated by traded will therefore be where concerns around the deliverability might arise.

Under current arrangements the reliability with which water can be delivered[45] throughout the scMDB is incompletely defined. While the Water Act 2007 (Cwth) 'unbundled' water rights in irrigation districts and created delivery shares which govern access to irrigation delivery infrastructure (see section 2.3)., this unbundling of rights did not extend to define capped and tradeable rights to delivery for river diversions. Instead river diverters in regulated systems (that held water entitlements) may have extraction rights, such as in Victoria, that are specified in licences (water access licences or works licences). The extraction component or extraction share in the licence specifies 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 the extraction component/share in managing and sharing access to available river flows during a shortfall event is not specified. Extraction shares for segments or stretches of river are not capped even if the physical capability of the system to deliver these shares might actually be limited. Nor are these extraction shares defined in a way that would enable them to be readily used for rationing or sharing if a shortfall occurred. It would also be difficult to readily enforce their use for this purpose. Our understanding is that water corporations cannot issue financial penalties for breaches of an extraction share, rather it would be a legal matter under the Victorian Water Act (1989).[46] Water users also face no price signal which relates to delivery capacity.

Essentially 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[47] or third parties.

Instead, trade rules — such as those related to the Barmah Choke — are used to protect third party delivery reliability and to mitigate the growing risk of system shortfalls. These rules are focused on managing congestion issues arising from trade that could compromise deliverability. This arrangement implicitly grandfathers priority delivery rights to entitlement holders in segments of the system rather than users relying on traded allocation rights.

These trade rules would also not be effective in managing short-term shortfalls (as may occur with a series of extreme hot days during peak summer irrigation season). In these circumstances it is a peak in demand from existing downstream users (already holding allocations within the system) that would be driving the shortfall. Therefore, turning off the tap on trade will not address the short-term constraint.

So the question becomes whether and to what extent trade rules should continue to play a role in managing the risk of shortfall or whether alternative approaches would better manage this risk.

45 The reliability of a water share is not the same as the reliability with which water can be delivered. By way of example, the volume held in a water account may not necessarily be available for use at the desired time if deliverability through the system is constrained.

46 This is similar to the treatment of overuse. Prior to 2017-18, Goulburn-Murray Water implemented an overuse fee of $2000/ML, whereas now have implemented a 'make good' approach to overuse — such that water needs to be traded into the account to bring the balance back to a positive or zero.

47 Existing mechanisms only allow environmental water managers to purchase additional water for the environment.

5.3 Options for reform

The following discussion considers five alternative options for reform which can be loosely classified as:

- Clarifying and better communicating existing delivery and shortfall arrangements.
- Creating in-river delivery rights
- Introducing peak delivery charges
- Improving trading rules
- Introducing use controls.

5.3.1 Clarify and better communicate existing delivery and shortfall arrangements

As discussed above under current arrangements there are no formalised arrangements in place or transparency around how available localised supply would be rationed to manage delivery shortfall events. While works licences contain some of a water user's rights and obligations in extracting water (including an extraction share) they are not defined in a way that would enable them to be used for rationing or sharing if a shortfall occurred.

On this basis, an incremental solution that would go part of the way to addressing the increasing shortfall risk would involve:

- Formalising how extraction will be managed or controlled during a delivery shortfall, including the role extraction shares will play in this. To formalise this, it will be necessary to investigate what triggers could be applied where and to whom. This planning process will help identify the extent to which water users' delivery rights are defined in works licences and whether it would be possible to introduce more far-reaching reforms such as in-river delivery shares and delivery charges.
- Communicating how shortfall events will be managed — This will give additional certainty to irrigators around their delivery reliability. This will enable irrigators to better determine whether they should do more on-farm to reduce shortfall risks given the nature of their operations, or conversely whether they could rationalise on-farm infrastructure.
- Investigating further the significance of the risk of system shortfall across the scMDB — This would include identifying where in the system the risk maybe relatively high as a result of:
    - physical constraints in river delivery capacity;
    - the nature of use/irrigation operations (i.e. what is being produced).

    Having a better understanding of the risks of system shortfalls would help clarify whether (and where) further reforms to clarify delivery property rights might be valuable and whether there might be merit in investing to in the system to relieve capacity constraints.

This would be a no regrets, incremental reform as it would be a necessary first step to developing some of the more far-reaching reform options (namely in-river delivery rights and peak delivery charges) considered in the sections that follow.

5.3.2 In-river delivery rights

Creating explicit in-river delivery rights or shares could be considered an extension to clarifying and communicating the delivery shortfall management arrangements (see section 5.3.1).

These rights could be used to ration available delivery capacity during delivery shortfalls. In theory these rights could be defined as a share of key system delivery infrastructure (in terms of a proportion of a fixed flow or volume). This would enable the right to remain stable even if the size of the available capacity/flow varies over time as a result of changes in minimum flows, new infrastructure investments or natural changes in the river. By way of example, the River Murray System Annual Operating Plan 2017-2018 identifies the Barmah Choke channel capacity as 10,000 ML/day, however, in the most recent River Murray System Annual Operating Outlook 2020-21 suggests the capacity is now 9,000–9,500 ML/day.

5.3.1 The benefits of a system of in-river delivery rights are uncertain

In-river delivery rights (unbundled from any water holdings) would make it clear to users that the delivery of their water order is subject to the limits of the delivery system. It would also provide a mechanism to ensure they are required to manage the impacts on the delivery reliability of other users when purchasing more water.

With an alternate means of rationing capacity some trading rules (intended to manage shortfall risks) could be removed, most notably those applying to trades downstream of the Barmah Choke and in the mid Murray. The removal of these rules would help enable available water resources to move to the most economically efficient use and location.

It is possible that the removal of these trade rules could reduce complexities in the water trade approval process. However, this is not clear. On the one hand the removal of trade rules would reduce transaction costs. But on the other hand, some irrigators purchasing water allocations may need to source more in-river delivery rights in order to have certainty around having this delivered during times of shortfall. This could add complexity to the trading process for some irrigators and reduce it for others.

5.3.2 There are significant challenges in creating in-river delivery rights

The creation of in-river delivery rights would create some benefits but this solution would also be challenging and costly to implement and administer. The key challenges are considered below.

Defining in-river delivery rights would not be straightforward

For in-river delivery rights to be effective they should be clearly specified and reflect underlying hydrological conditions. This would enable holders of these rights (and potential holders) to understand exactly what benefits and obligations the right brings. It is here where the first challenge emerges.

In an interconnected river network, delivery reliability at any point in the system will be a function of water ordering decisions of all users and the actions of the river operator in pre-empting demand. It will not necessarily be related to the amount of water stored in a single weir pool or the flow in a river adjacent to an extraction point. This means 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.

Under current arrangements the river operator manages the system to avoid shortfalls. For example, river operators routinely pre-empt periods of high demand and so choose to run the Barmah Choke at capacity earlier in the season and store this water in downstream in-line storages. In effect, the river operator is managing the delivery reliability risk on behalf of all water users.

Let's assume in-river delivery rights were defined for a share of the capacity of the Barmah Choke. To reduce their individual shortfall risk during peak periods, downstream water extractors would either need additional delivery rights to downstream storages (so they could move water through early) and/or they would need to develop on-farm storages. In-river delivery rights would essentially place the risk of shortfall management on individual users. They would be required to manage the timing of their water ordering and their approach to delivering it through the network.

It is not clear that individual water extractors are best placed to do this. Rather, these decisions this is likely to be better managed and optimised by the river operator. To this end, the MDBA releases an annual operating outlook that explains how the MDBA may operate the River Murray system across a range of possible climatic and rainfall scenarios. Outlooks and plans are prepared working with the Australian Government and the New South Wales, South Australian and Victorian state governments. They are regularly updated to reflect new information, seasonal conditions, and changes to the system conditions and assumptions.

Given the risk of delivery shortfalls is uncertain, it is unlikely to be valuable to define in-river delivery rights for the entire network and for every period of the season. Ideally the focus would be on locations and times when delivery constraints bind. However, as described above doing this in a simple and practical way is challenging.

In addition, there would only be value in defining in-river delivery rights in areas subject to shortfall risk. Without further investigating the significance of the risk of system shortfall across the scMDB it is difficult to identify where specifically in-river delivery rights could be valuable.

There may be segments of the river network where it would be possible to define in-river delivery rights. For example, this may be feasible where all downstream users in a region share a single, common supply point or specific in-steam storages or weirs. However, as discussed in section 5.3.1 further investigation of what triggers could be applied where and to whom needs to be undertaken.

It is worth highlighting that although delivery shares/rights have been created within irrigation districts this experience does not give weight to the argument that creating in-river delivery rights will be easy or practically achievable.

This is because delivery shares in irrigation districts do not necessarily reflect the physical realities of the irrigation delivery network. The creation of these rights was not driven by the need to manage shortfall events or delivery constraints (see Box 4). Instead they were intended to:

- enable an irrigation infrastructure operator (IIO) to continue to charge for its network costs and
- to provide clarity around an irrigator's ongoing access to the IIO's delivery network.

The development of delivery shares had the side-effect of creating a system of rights to ration capacity, but this was not the main driver for the creation of delivery shares within irrigation districts.

Box 4: The driver of unbundling and the creation of delivery rights in irrigation districts

Historically, water rights within an irrigation district were bundled together with the right to have this delivered through an irrigation infrastructure operator's (IIOs) network. Charges for the use of an IIO's delivery network were on the basis of an irrigator's water holdings. This meant that when an irrigator ceased to hold or use water they also ceased to pay for the delivery network servicing their property. Where water was traded into or within a district this was not a problem, however, when water entitlements were sold out of a district this was creating a revenue shortfall for IIOs. To address this issue IIOs created numerous substantive restrictions on trade out of their districts.

Compounding this, an IIO's obligations in terms of maintaining the water delivery network servicing the properties of landholders who no longer held entitlements was also unclear.

Delivery rights emerged as a response to this problem. They were defined primarily on the basis of the water entitlement holdings of irrigators rather than on the basis of the capacity of the network servicing the property. They acted as a quasi-contract which defined the rights and obligations of landholders and the IIO in respect to on-going delivery which were unbundled or separated from the water rights themselves.

Source: Frontier Economics

How would in-river delivery rights be initially allocated?

Assuming it is possible to define in-river delivery rights, a decision would need to be taken about how to initially allocate these rights to users in the scMDB. This initial allocation of rights could be proportional to:

- existing extraction shares
- existing entitlement holding, or
- recent history of extractions.

As an alternative, the rights could be auctioned. None of these approaches is without challenges and there will be significant distributional impacts depending on the approach adopted.

Consideration would also need to be given to whether as part of issuing these delivery rights certain extractors or uses should be given priority.

Should in-river delivery rights be tradeable or is another mechanism needed for enabling new access?

The unbundling of in-river delivery rights would mean users can sell allocations or entitlements without giving up the right to have water delivered via river operations in the future. However, the creation of in-river delivery rights has the potential to make it more challenging for users seeking a new extraction point or looking to improve their delivery reliability from doing so.

In areas with scare delivery capacity (i.e. where rights are capped) this would suggest these rights should be tradeable in order to manage changes in use over time. This would mean in-river delivery rights would need to be transferable, divisible and defined in a consistent manner so that the right can be traded in whole or in part to others. This would require the creation of a register of titles.

It is worth noting that the ability to trade in-river delivery rights will not help users manage rare or short-term shortfalls, such as a series of extreme hot days during peak summer irrigation demands (see Box 3). This is because the transaction costs of using delivery rights to manage this would be high, as the market would be unlikely to balance buyers and sellers of rights within the short time available. Whereas water allocation trade is used to balance water use across a water year, trading prior to a shortfall event would need to occur in weeks or days (although opportunities would exist to trade prior to the event being expected).

The other option for reallocating in-river rights over the longer term is to make these rights subject to a 'use it or lose it' clause, whereby the government can claw back and then reissue these rights via some means. However, this arrangement would undermine the property right itself.

Could in-river delivery rights be enforced?

For in-river delivery rights to be effective it must also be possible to determine when a right has been infringed —by other users not complying with required rationing/delivery curtailment — and to have legal mechanisms for preventing or redressing this. Otherwise, users will potentially ignore their obligations under the right.

Legislative changes would be required to meaningfully enforce in-river delivery rights as no meaningful penalties could currently be applied to a breach of these rights. By way of example in Victoria it may be prohibitively costly to prevent or penalise a person for extracting water beyond their extraction share if they have water in their water account. This is understood to be the case in other States also.

5.3.3 Peak delivery charge

An alternate way of ensuring that users consider the full cost of their water delivery decisions is to introduce a peak delivery charge or levy for transporting water to certain locations at certain times. In theory this could limit extraction at the time of peak demand. This is most likely to be suitable to transportation through particularly congested sections of the network, for example through the Barmah choke. This could be complementary to more general network transportation charges which might be designed to account for conveyance losses.

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.

The revenue generated from peak delivery charges could be used to fund future infrastructure works that expand the delivery capacity of the network. Alternatively, it could be used to discount future period delivery/extraction charges across the board.

This option would result in more efficient outcomes when compared to the status quo which relies on existing restrictive trade rules and limits. This is because extractors would be required to internalise the impact of their ordering decisions on third-parties and as a consequence make ordering and use decisions better aligned with the interests of society. A delivery charging mechanism would allow highly beneficial trades to proceed rather than restricting all trades at a period of time irrespective of their value to society.

We anticipate that substantive legislative changes would be required to implement this option as it would require revision to the charging arrangements currently in place across the states.

5.3.4 Alternative trading mechanism

Another alternative would be to replace blunt, restrictive trading rules and limits, which prevent certain trades from taking place, with an alternative mechanism that incentivises (or disincentivises) certain trades. For example, interregional allocation trades from above to below the Barmah Choke could be subject to an exchange-rate adjustment, which reduces the volume of the water to account for the expected negative impact on water resources (i.e. losses). Alternatively, these trades could be subject to a levy which acts in much the same way.

This approach would ideally be applied symmetrically. For example trades from below the choke to above the choke could be subject to an exchange rate adjustment that increased the volume of water. Ideally the exchange rate or levy would vary by season and time of the year in responses to changes in trading patterns.

Similar to a delivery charging mechanism, this option would result in more efficient outcomes when compared to the status quo. This is because market participants would internalise the wider impact of their trading decisions on third-parties and as a consequence make decisions more aligned with the interests of society. A pricing or exchange rate mechanism would therefore allow highly beneficial trades to proceed rather than restricting all trades at a period of time irrespective of their value to society.

Under this option it would be challenging to set the level of the exchange rate or levy in order to balance peak demand and available delivery capacity. As described in relation to a peak delivery charge the exchange rate or levy level might need to vary substantially. Further, it would be challenging to set a mechanism for the exchange rate to respond to prevailing seasonal conditions.

Finally it is worth noting that this option would not incentivise users more generally to consider the impact of their ordering decisions of third parties. Instead, it would maintain the implicit existing access that water entitlement holders have in terms of delivery.

5.3.5 Use controls

Given it is changes in the location and timing of water use that increase the risk of delivery shortfalls, an alternative option to manage this risk would be to impose limits on certain types of agricultural activity within areas of the Basin.

For example, at present, it appears that an increase in almond production in the lower Murray is driving much of the changes in the location and timing of water use in the Basin. Instead of attempting to make users account for the wider impacts of their ordering and use decisions, limits could be directly imposed on almond production. This could take the form of a restrictions on the area within the Basin that can be used for almond production.

This would be an exceedingly blunt instrument for managing third party impacts. It has the potential to prevent water being allocated to the most efficient uses and so could impose high economic costs. It also makes no allowance for the possibility that some users may be able to more easily adjust their ordering decisions to manage risks within the scMDB such that such a blunt instrument would be unnecessary.

In addition, these limits would be very difficult to adapt over time in response to wider changes to production in the Basin which may ultimately result in these limits becoming obsolete or damaging. They would most likely need to be implemented through State Planning Legislation which would add to implementation (and adaption) challenges.

5.3.6 Summary of assessment

Of the solutions discussed above for managing shortfall risk there would be merit in adopting an incremental approach to reform. This would include:

- Formalising and communicating how extraction will be managed or controlled during a shortfall event, including the role extraction shares will play in this
- Investigating further the significance of the risk of system shortfall across the scMDB by identifying where in the system the risk relatively maybe high as a result of physical delivery constraints and the nature of water use.
- Exploring the use of exchange rates and trade levies/charges for manage delivery shortfalls instead of the more blunt and restrictive trade rules currently applied.

This is a no regrets solution that would help clarify:

- whether (and where in the network) further far reaching reforms such as defining in-river delivery rights or introducing peak delivery charges would be valuable; and
- whether there might be value in investing in elements of the system to relieve capacity constraints.

On balance there is unlikely to be sufficient benefit in acting immediately to creating in-river delivery rights or introduce peak delivery charges. Both options would enable some trading rules to be removed which would create efficiencies. However, they would be complex to define and implement and could create significant administration costs in an attempt to address third party impacts that are poorly understood and hard to define *ex ante.*

We do not consider that use controls would be an effective mechanism to manage impacts on third parties' delivery reliability. These are blunt instrument that once implemented would be difficult to adapt should circumstance change in the scMDB in the future. Measure of this nature could be considered a backwards step.

6 Storage/carryover

6.1 Current arrangements

Rights to inflows and storage are both conferred through a water access entitlement. Water access entitlements have been adapted to include carryover provisions, including rules to provide access to other available airspace.

Carryover arrangements can have negative third-party impacts if individual carryover decisions impose higher storage losses or costs on others, or if storing the carryover volume leads to lost opportunities for others to harvest resource inflows.

In general, State carryover rules seek to manage the impact of carryover on third parties by applying the principle that unused water can be stored in the available airspace of a storage, but it cannot displace additional storage inflows. This can involve several elements:

- A carryover limit — a limit on the unused water during a year that may be carried over to the following year
- The 100% limit — volumes carried over into a year plus allocation determinations within the year, up to 100% of the associated water access entitlement, are available for use (or trade) within that year.
- Rules for the treatment of volumes greater than 100% — if the carryover plus allocations exceed 100%, then the volumes in excess of 100% are managed by additional rules.

The individual decision to carryover may be expected to contribute to a share of total evaporation losses in storage, and so carryover arrangements can also include loss factors and fees to avoid free-riding.

Carryover management approaches and opportunities differ between states and systems (see **Table 4**).

Table 4: Differences in state carryover arrangements

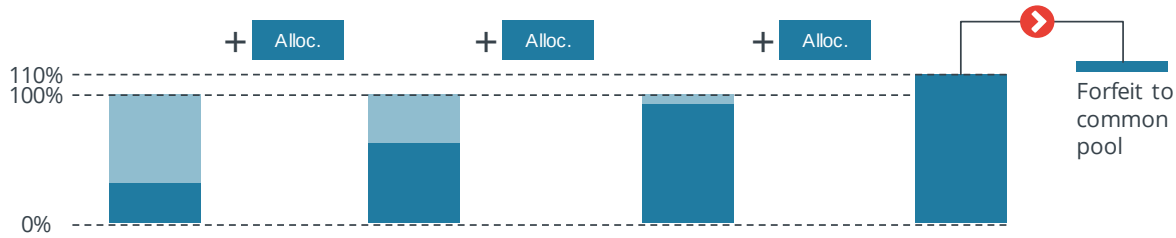
State	Carryover arrangements
NSW	In the NSW Murray, carryover is available to General Security (GS) entitlement holders, who can carryover over up to 50% of their GS entitlement volume. Forfeiture of additional volumes will occur when the volume of allocation in the account (carryover plus seasonal determinations) exceeds 110% of the GS entitlement. In the NSW Murrumbidgee, GS entitlement holders can carry over up to 30% of their GS entitlement volume. Carryover is constrained by the 100% rule, which prevents an entitlement owner accessing more than 100% of their entitlement volume (carryover plus seasonal determinations) in a single year. This means that any additional seasonal determinations against a Murrumbidgee GS entitlement is forfeited once carryover plus seasonal determinations reach 100%.

State	Carryover arrangements
Victoria[48]	Carryover is available to all water shareholders in the Murray, Goulburn and Campaspe systems, who can carryover up to 100% of the entitlement volume. However, 5% of the carried over volume is deducted to cover evaporative losses from the storages, and the remaining volume is available in accounts on 1 July. Any volume of water (from carryover and seasonal determinations) in the water account exceeding 100% of the water share volume is quarantined in the Spillable Water Account (SWA). The water account holder is unable to access volumes in the SWA until a Low Risk of Spill declaration is made by the Northern Victoria Resource Manager (NVRM). A declaration means the probability of a storage spilling for the remainder of the year is below 10%. Additional fees are levied on water stored above the entitlement volume. The cost difference is small: $3.85/ML in Goulburn compared to $4.19/ML in Murray (but is significantly larger in Campaspe at $16.04/ML).[49]
SA[50]	Carryover is only available to SA Class 3 entitlement holders, and only when minimum opening allocations are less than 50% (forecast provided mid-April with first formal announcement mid-June). The maximum carryover is 20% of the entitlement volume. An evaporative loss of 5% will be deducted at a bulk level (not against individual entitlement holders). The total volume of allocation and carryover available to entitlement holders is capped at 100%.

Source: Frontier Economics

Figure 25 is a diagrammatic representation of carryover in the NSW Murray — if carryover volumes plus allocation improvements exceed 110% the excess volumes are forfeited.

Figure 25: Carryover in the NSW Murray



Source: Frontier Economics

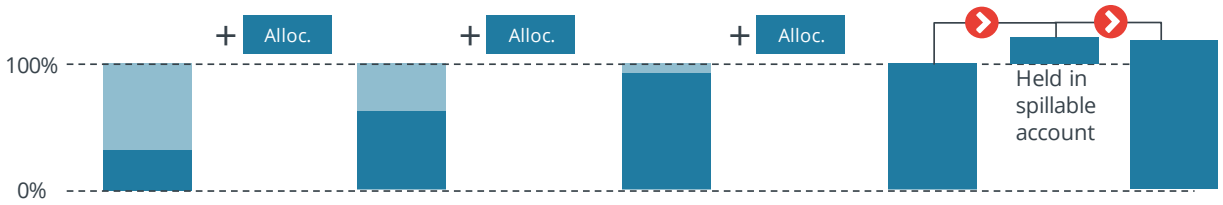
48 https://waterregister.vic.gov.au/images/documents/Trade-offs%20in%20carryover%20decisions.pdf

49 www.g-mwater.com.au/downloads/gmw/Pricing_List/201920_price_list.pdf

50 https://www.environment.sa.gov.au/files/sharedassets/sa_murray-darling_basin/water/allocation_plans/river_murray/2019_river_murray/feb_2019/2019-rm-wap-private-carryover-fact.pdf

Figure 26 is a representation of carryover in Victoria — if carryover volumes plus allocation improvements exceed 100% the excess volumes are placed in a spillable water account. The volumes in this spillable account may be made available later in the water year.

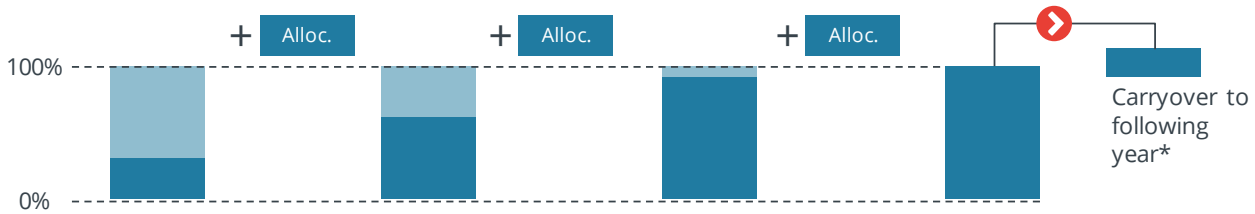
Figure 26: Carryover in the Victorian Murray and Goulburn



Source: Frontier Economics

Figure 27 is a representation of carryover in South Australia — if carryover volumes plus allocation improvements exceed 100% the excess volumes are carried over to the following year (if carryover is made available).

Figure 27: Carryover in the SA Murray



Source: Frontier Economics

These arrangements mean that there are selected systems where the sum of carryover and allocations can exceed 100% of entitlement in a given water year — namely, NSW Murray (which is limited to 110%) and Victorian systems where spillable accounts are available. In South Australia, volumes beyond 100% may be available in the following year.

The use of carryover is extensive in the scMDB — from water account data in Victorian systems, the use of carryover is significantly more prevalent than trade. **Table 5** and **Table 6**.

Table 5: Zone 1A (Victorian Goulburn) carryover and trade behaviour

Year	Accounts using carryover	Accounts trading in	Accounts using carryover + trade in	Accounts using spill account	Accounts using spill account + trade in
2011-12	77%	11%	8%	68%	6%
2012-13	74%	17%	13%	63%	9%
2013-14	72%	16%	13%	45%	4%
2014-15	69%	16%	12%	42%	4%
2015-16	63%	15%	11%	15%	1%
2016-17	61%	15%	12%	9%	0%
2017-18	57%	14%	10%	20%	2%
2018-19	54%	13%	9%	16%	1%
2019-20*	52%	6%	4%	-	-
Overall	64%	13%	10%	29%	3%

Note: The higher proportion of accounts using spill account early in the series is a result of wet conditions and different carryover rules (changes to carryover arrangements came into effect in 2013-14). **Dataset only extends to November 2019.*

Source: Frontier Economics, using data from the ACCC.

https://waterregister.vic.gov.au/images/documents/When%20the%20changes%20from%20the%20carryover%20review%20come%20into%20effect.pdf

Table 6: Zone 7 (Victorian Murray Barmah - SA) carryover and trade behaviour

Year	Accounts using carryover	Accounts trading in	Accounts using carryover + trade in	Accounts using spill account	Accounts using spill account + trade in
2011-12	81%	11%	7%	56%	3%
2012-13	82%	15%	11%	74%	9%
2013-14	78%	17%	13%	68%	9%
2014-15	77%	18%	13%	63%	8%
2015-16	71%	18%	13%	31%	2%
2016-17	68%	17%	12%	55%	8%
2017-18	61%	16%	12%	50%	8%
2018-19	58%	16%	12%	30%	3%
2019-20*	81%	10%	7%	-	-
Overall	69%	15%	11%	46%	5%

*Note: The higher proportion of accounts using spill account early in the series is a result of wet conditions and different carryover rules (changes to carryover arrangements came into effect in 2013-14 and 2014-15). * Dataset only extends to November 2019.*
Source: Frontier Economics, using data from the ACCC.
https://waterregister.vic.gov.au/images/documents/When%20the%20changes%20from%20the%20carryover%20review%20come%20into%20effect.pdf

6.2 Problems with current arrangements

6.2.1 Current arrangements do not manage all third-party impacts

All the carryover arrangements observed in the scMDB manage the potential impact of carryover displacing additional storage inflows (a negative impact on third parties) by implementing a form of the 100% limit.

The carryover arrangements in Victoria and South Australia also take into account the sharing of storage evaporation losses:

- In Victoria, a 5% deduction is made to individual carryover volumes.
- In South Australia 5% of the volume carried over is deducted at a bulk level to reflect evaporation, rather than at an individual level. The River Murray Advisory Committee

discussion on South Australian carryover arrangements[51] justified the change from 5% individual losses to the socialised loss approach as: "A change is proposed to account for evaporative losses from the total volume stored for private carryover rather than the volume that is made available to individuals. This will enable 100 per cent of the volume eligible for carryover to be delivered in years when the volume in storage for carryover is greater than the bulk volume eligible for carryover". Earlier communication on the issue flagged the 'application of fixed net loss in storage' as being 'administratively easy to apply'.[52]

NSW implements "Carryover Evaporation Reduction" in regions such as the Lower Darling and Macquarie Valley, but we are not aware of their application in the Murrumbidgee or Murray.

Victorian arrangements go further to manage the impact of individual carryover on other water entitlement holders by charging a fee on spillable accounts (i.e. storage access beyond that associated with the entitlement) that contributes to the cost recovery of managing bulk water assets. To our knowledge, NSW and South Australian carryover arrangements do not impose charges on users for accessing carryover arrangements. However, NSW variable infrastructure charges and water planning and management charges still apply when using water allocations that have been carried over.

6.2.2 Current arrangements are susceptible to change and may introduce new risks

During our consultations we have heard anecdotal reports that traders consider that there are risks to carrying water over in South Australia and NSW, and they therefore prefer carryover in Victoria.

In South Australia a recent reform has introduced rule changes to carryover arrangements applying from 1 July 2020. Also, because carryover is only made available when the projected minimum opening allocation of water for the year is 50 percent or less, there is uncertainty in whether carryover will be available in subsequent years (and thus if volumes of carryover and allocation in exceed of 100% of entitlement will be available or forfeited). This means that if the decision to carry over water is made, and allocations do reach high levels, it is uncertain whether volumes exceeding the 100% limit will be available to the entitlement holder in the following year or forfeited. This binary outcome is somewhat different to Victorian arrangements where water from spillable water accounts are available when the risk of spill is low and any forfeiture is linked to physical spills in the system.

In NSW it has been decided to quarantine carryover in dry conditions. Although this does not apply in the scMDB, it has occurred in nearby jurisdictions (such as the Lachlan in 2019-20 when only 57% of carryover volume was available for delivery). This suggests that there is a risk that NSW Murray or Murrumbidgee carryover may be similarly treated by NSW water managers in the future.

51 River Murray Advisory Committee 2018, Update on the review of private carryover, www.naturalresources.sa.gov.au/files/sharedassets/sa_murray-darling_basin/water/allocation_plans/river_murray/2019_river_murray/rmac-carryover-update-april-2018-fact.pdf, p.5.

52 SAMDB NRMB 2014, Amending the Water Allocation Plan for the River Murray Prescribed WatercoursePrivate carryover policy, www.naturalresources.sa.gov.au/files/sharedassets/sa_murray-darling_basin/water/allocation_plans/rm-wap-11-private-carryover.pdf, p.10.

6.2.3 Current arrangements do not allow storage risks to be directly managed

As a result of access to storage for carryover being made available via the water access entitlement, individual storage decisions are subject to carryover rules and the associated risks of forfeiture. These risks cannot be directly managed because a separate storage right does not exist. Under current arrangements, however, water allocations can be traded to other entitlement holders to be held as their carryover. This is referred to as 'carryover parking' in the ACCC interim report.

An alternative model for storage management is capacity sharing (see Box 5).

Box 5: Capacity sharing

As set out by Hughes and Goesch (2009a):

"Capacity sharing is a system of allocating property rights to water from shared storages proposed by Dudley (Dudley and Musgrave 1988). Capacity sharing involves redefining water entitlements into separate storage space rights and water/inflow rights. Each entitlement holder in an irrigation system is allocated a share of the total system storage capacity, as well as a share of total inflows (and losses). Users are able to manage these capacity shares independently: determining how much water to use (or sell) and how much to leave in their share of storage."

Such storage managements systems are in place in St George and MacIntyre Brook irrigation schemes in southern Queensland.

Source: Hughes, N., Goesch, T., 2009a. Management of Irrigation Water Storages: Carryover Rights and Capacity Sharing, Canberra; Hughes, N., Goesch, T., 2009b. Capacity Sharing in the St George and Macintyre Brook Irrigation Schemes in Southern Queensland, Canberra.

However, it should be noted that current arrangements for carryover do facilitate individual access to storage airspace that is otherwise unused airspace (i.e. the rules for volumes in excess of the 100% limit). This access is provided in a very low transaction cost manner — with it happening automatically to additional volumes when the '100% limit' is exceed.

Our understanding is that capacity sharing arrangements would require transactions between parties to take place in order for such 'unused' airspace to be accessed, or else volumes that exceed an individual's storage right are forfeited (called an internal spill). For example, Truonga and Drynanb (2013) explain that internal spillage does occur in St. George irrigation system that implements capacity sharing due to non-zero transaction costs.

6.3 Options for reform

An incremental reform would be to fine-tune existing carryover arrangements such as:

- Individual evaporation loss deductions from carryover in NSW and SA. If incremental storage losses are minimal then this may not change the efficiency of storage decisions (but may increase the equity of sharing storage losses). If the South Australian arrangements of socialised losses are preferred in that jurisdiction, for reasons other than administrative ease, then this should be taken into account (for example, South Australian carryover is made

possible by State entitlement volumes being held to the following year under clause 91 and Schedule G of the MDB Agreement).

- Clearer communication of how carryover volumes will be treated — including policies for quarantining carryover in NSW system under dry conditions. We note that NSW does have Incident Response Guides which articulate when and how restrictions would occur[53,54], however were unable to identify clear information on how and by how much access to carryover is restricted.

A fa- reaching reform would be to implement capacity sharing arrangements in the scMDB. However, there would be significant challenges to implementation, including:

- There are multi-storage systems in the scMDB. For example, the NSW Murrumbidgee has two major storages (Blowering and Burrinjuck dams) and a connection to the Snowy Mountains hydroelectric scheme. This would make a capacity sharing arrangement very complicated and has the potential to adversely affect optimal management of the inter-connected system.
- There are systems where some resource improvements do not enter storages in the scMDB (such as mid system unregulated flows). For example, in the Victorian Murray flows out of the Ovens and other Victorian tributaries might go into Lake Victoria but they can also meet Victorian diversion and flow to South Australia requirements.

Recommendations

In our view, there are unlikely to be sufficient benefits to justify implementing capacity sharing arrangements in the scMDB , given that current carryover arrangements already provide access to airspace beyond entitlements in a low-cost way that is not expected to have negative third-party impacts. Any benefits would have to outweigh the potentially significant costs of addressing the complex implementation challenges.

Rather, we recommend that any reform to carryover arrangements focus on fine-tuning arrangements in South Australia and NSW and improve communication of carryover risks.

53 DPIE 2019, NSW Murray and Lower Darling Surface Water Resource Plan Incident Response Guide, www.mdba.gov.au/sites/default/files/pubs/nsw-schedule-g-incident-response-guide-nsw-murray-lower-darling-water-resource-plan.pdf

54 DPIE 2019, Draft Incident Response Guide For the Murrumbidgee Surface Water Resource Plan Area, www.industry.nsw.gov.au/__data/assets/pdf_file/0014/230315/schedule-g-murrumbidgee-sw-incident-response-guide.pdf

7 Governance

This chapter focuses on market governance issues relating to the market architecture which may undermine the operations, transparency, competitiveness or efficiency of scMDB water markets.

Governance may be contributing to market architecture issues identified in this report and may impede implementation of solutions. Therefore, the scope of the governance analysis in this report does not consider market governance as a whole, but is limited to governance issues arising out of the market architecture issues considered within this report.

Based on this scope, we have identified three key aspects of governance that are impeding efficient operation of the water markets. These relate to:

- **Market rules:** The complexity of the current market governance means that the market rules are defined across a multitude of instruments and the processes for rule making are too slow, lack transparency and may not support optimal market outcomes.
- **The coordination of river and market operation:** With potential to impact on storage and delivery, more transparent and systematic approaches are needed to manage objectives of river and market operation. These objectives may not always be aligned — such as when flexibility is required to manage the river in response to variable seasonal conditions, while clear property rights are required to support market outcomes.
- **Poor market information provision:** There are still fundamental gaps in the provision of necessary information to market participants and in the capabilities of the systems and infrastructure needed for the systematic provision of information to the market. We understand that this issue is being addressed in detail by the ACCC as part of its work program under the water markets inquiry. Hence, this paper does not address this issue. However, as part of their analysis, it is recommended that the ACCC consider the lack of information on use and carryover intentions provided to the system operators which is undermining optimal river operation and management resulting in unwanted or unnecessary water movements, environmental impacts, and third party impacts.

7.1 What are the market governance arrangements?

The governance arrangements in the water market relate to:

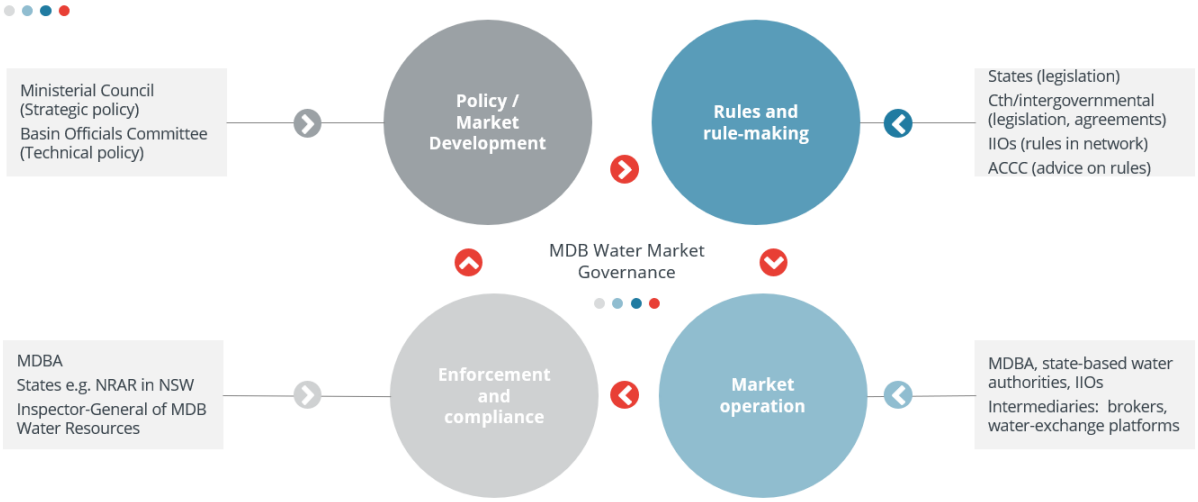
- **Institutions**: That operate, oversee and facilitate the market
- **Roles & responsibilities**: Allocation of roles and responsibilities (i.e. the powers and function of each institution including in relation to policies/market development, rules and rule-making, market operation, and enforcement and compliance).
- **Decision-making and coordination**: The parties with decision-making rights in the scMDB water markets including the Basin States, Commonwealth, MDBA, infrastructure operators, etc. Coordinated decision making is needed to support the operation of the water markets.

- **Rule-making**: In the context of markets, governance is also fundamentally concerned with establishing and enforcing sets of rules that facilitate exchange between market participants (including buyers and sellers).

The governance of the water markets is a subset of the broader governance arrangements that manage the Murray-Darling Basin. As such there are important intersections between the river system governance and the water market governance.

An overview of the governance arrangements for the water market in the scMDB is shown in **Figure 28**. This shows the governance arrangements for each key market function including policy and market development, rule-making, market operation and enforcement and compliance.

Figure 28: Southern connected MDB water market governance



Source: Frontier Economics

The figure highlights that the market governance arrangements are complex, with multiple jurisdictions and parties undertaking common roles (e.g. rule-making and market operation) and that a high degree of cooperation is involved.

In broad terms, the water markets are governed by rules set out in Commonwealth, State and irrigator network instruments. These are mostly legislative instruments, but also include rules (e.g. the Irrigation Infrastructure Operators network rules), regulations and plans (e.g. the State water resource plans) and guidelines.

Multiple parties make and enforce these rules, including the MDBA, the Basin States and the Irrigation Infrastructure Operators (or IIOs).

The market operation involves many entities including:

- Water delivery and management by the MDBA, State-based bulk water authorities and the IIOs
- Trade facilitation is undertaken by a number of water market intermediaries including brokers and water exchanges.

- Compliance with trade rules, and the agreed management framework for the Basin is undertaken by the MDBA, Basin States and the Inspector-General of the Murray Darling Basin Water Resources.

The Commonwealth Minister for Resources, Water and Northern Australia has announced plans to improve arrangements for compliance governance in the Murray Darling Basin[55]. This would separate the operational and compliance responsibilities of the MDBA. Under the proposed arrangements, the responsibilities of the Inspector-General of the Murray Darling Basin Water Resources and the MDBA's Office of Compliance would be merged to create a separate statutory body - the Inspector General of Water Compliance. We understand that the detail of these arrangements is still being developed.

7.2 Principles of good governance

When considering both potential deficiencies with the current arrangements and potential solutions to improve the water market governance arrangements we have had regard to four principles for effective institutional arrangements and good governance set out by the Productivity Commission in its Murray–Darling Basin Plan five-yearly assessment and referenced in the ACCC's Interim Report:[56]

- **Clear roles and responsibilities:** including clear powers and functions for each institution and clear decision-making responsibilities
- **Conflicting objectives and functions are effectively managed:** which is concerned with separating regulatory, service delivery, and policy-making functions into separate institutions
- **Effective mechanisms for accountability:** institutions have a responsibility to fulfil their duties, and open and transparent processes enable stakeholders to understand the reasons behind decisions
- **Effective processes for collaboration:** coordination among government institutions helps streamline decision making and avoids overlaps and duplication.

We have also had regard to lessons in sound market governance from other water markets and gas and electricity markets, which like the water market are by necessity highly managed markets. We recognise that these lessons need to be tailored to the circumstances of the scMDB water markets.

7.3 Rule-making in the scMDB water market

Having clear market rules and transparent processes for changing and adapting rules over time is fundamental to well-functioning markets. Reflecting the complexity of the governance arrangements in the scMDB more generally, the market rules are defined across a multitude of (mostly legislative) instruments. This makes accessing and understanding the market rules more complex and onerous. Also, experience shows that the rule-making process is not well designed and may not deliver efficient market outcomes.

55 https://minister.awe.gov.au/pitt/media-release/new-chapter-mdbp, , viewed 14 September 2020.

56 Productivity Commission, 2018, *Murray-Darling Basin Plan: Five-year assessment, Final Report*, p. 347 and ACCC, 2020, *Murray–Darling Basin water markets inquiry—interim report*, p. 484.

These concerns and how they may be addressed are considered in this section of the report.

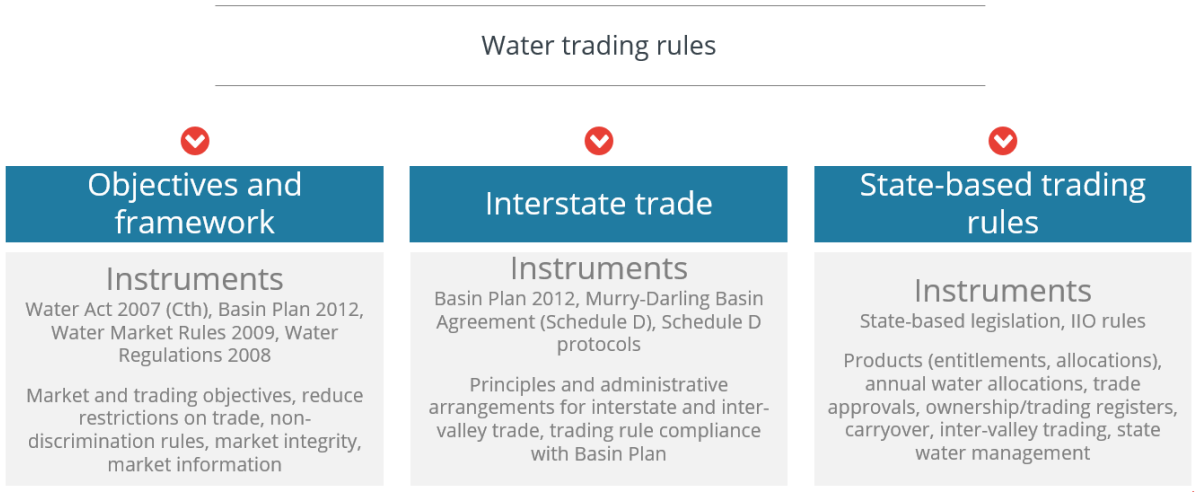
7.3.1 A range of instruments define the current rules for the scMDB water markets

The market rules cover all of the arrangements that enable water trading between market participants. This includes the water products, how they are traded, delivery, measurement, carryover, oversight and enforcement.

The market rules are defined across a wide variety of instruments as shown in **Figure 29**. The market rules are largely defined in State-based legislation, but are also contained in the Commonwealth legislation, the intergovernmental agreements (also defined in legislation) and State legislation relating to the Murray-Darling Basin and its water trading arrangements.

Irrigation infrastructure operators or IIOs develop the rules within their networks.

Figure 29: Southern connected MDB water market rules



Source: Frontier Economics

The key objectives and frameworks for the trading rules are set out in a number of national legislative instruments, namely **the *Water Act 2007***, the **Basin Plan 2012 (Chapter 12)**, the ***Water Market Rules 2009* (specific Irrigation Infrastructure Operator (IIO) arrangements only)** and the **Murray-Darling Basin Agreement (Schedule D)**.

Schedule 3 of the *Water Act 2007* sets out the water market and trading objectives which include facilitating the operation of efficient and effective water markets, minimising transaction costs and protecting both third party interests and the needs of the environment (see section 3.1).

Chapter 12 of the Basin Plan contains the Basin Plan Water Trading Rules which provide a consistent framework for water trading across the states. The Basin Plan Water Trading Rules address three broad aspects of market operation, namely:

- Reducing restrictions on trade, by defining the types of trade restrictions that are permissible (e.g. due to physical constraints, lack of connectivity or environmental constraints)
- Improving transparency and access to information

- Maintaining market integrity and confidence.[57]

The Basin Plan Water Trading Rules apply to the Commonwealth (including the MDBA), Basin States, irrigation infrastructure operators, and individuals participating in water markets.

Irrigation infrastructure operators establish the rules regarding water trading in their networks. Under the *Water Markets Rules 2009*, irrigation infrastructure operators must not unreasonably restrict the trade of water delivery rights. These rules ensure irrigators can permanently transform their irrigation right into a statutory water access entitlement which they can trade or hold in their own name, free of any trade restrictions imposed by the irrigation infrastructure operator. The rules set out by the irrigation infrastructure operators must be consistent with the Basin Plan and in particular:

- Specify water delivery rights and give this information to the holders of these rights
- Specify irrigation rights and give this information to the holders of these rights
- Document their trading rules and make them available.[58]

Schedule D of the Murray-Darling Basin Agreement and the Schedule D protocols[59] provide the structures and mechanisms for interstate and inter-valley trade in the scMDB. While the *Water Act 2007* and the Basin Plan Water Trading Rules set out high-level principles and requirements to promote water trading in the MDB, Schedule D and the Schedule D protocols address necessary administrative and accounting arrangements to support inter-valley and interstate trade, while minimising third party impacts.

Basin States create the majority of rules governing water trade in the Basin, though these rules must be consistent with the Basin Plan[60]. The State legislation creates many of the building blocks for water trading including establishing the water products (i.e. the water licences/entitlements). Basin States are responsible for approving trades and for compliance with and enforcement of State-based water management frameworks. Basin States also administer their own water registers that record ownership and trading activities. Finally, State legislation also defines many inter-valley trade/transfer rules and carryover rules.

The water markets operate within the broader rules and governance of the Basin that also fundamentally impact on trade. The Basin rules and governance are set out in the same legislative instruments and intergovernmental agreements above, but also include a range of subsidiary instruments including:

- State and Territory-based Water Resource Plans: these determine the availability of water for trade. The MDBA assesses and recommends the Water Resource Plans for accreditation by the Commonwealth Minister responsible for water. Not all Water Resource Plans are complete as yet. Interim bilateral agreements have been put in place to implement key elements of plans, where accredited plans were not in place.

57 Murray-Darling Basin Authority, *Guidelines for Water Trading Rules*, viewed 14 September 2020, https://www.mdba.gov.au/sites/default/files/pubs/01_WTG-REFERENCE_final.pdf.

58 https://www.mdba.gov.au/managing-water/water-markets-trade/basin-plan-water-trading-rules, viewed 14 September 2020.

59 The text of the Murray–Darling Basin Agreement appears at Schedule 1 of the Water Act.

60 Links to the Basin State trading rules are provided here: https://www.mdba.gov.au/managing-water/water-markets-trade/basin-state-water-trading-rules, viewed 14 September 2020.

- River operation: the MDBA directs river operations in the River Murray System in accordance with objectives and outcomes set by the Basin Officials Committee[61]. The objectives and outcomes in no particular order of priority relate to: Water storage, delivery and accounting; River Murray Operations (RMO) assets; People and communities; Environment; and Communication and information management. There are also specific objectives and outcomes which are more prescriptive and relate to a designated reach of the River Murray System, a designated river operation activity, and/or a river operations asset (such as a dam or weir).
- Water infrastructure charges and water planning and management charges: Water charging rules are made under Section 92 of the *Water Act 2007*. The water charging rules have been consolidated into the Water Charge Rules 2010 (Water Charge Rules) which commenced on 1 July 2020. These determine the arrangements for setting and publishing water infrastructure charges, including charges for water delivery, water storage and termination fees, and arrangements for publishing water planning and management charges. [62]

Most rules are made and changed by States and IIOs subject to MDBA oversight

Rule-making is devolved in the MDB water trading markets. In general, it is the Basin States and irrigation infrastructure operators that make and change the water trading rules. However, as noted above, trading rules also defined in the key intergovernmental agreements relating to the MDB.

The rules are required to be consistent with the water trading objectives and frameworks in the instruments outlined above, including the Basin Plan Water Trading Rules in the Basin Plan. To ensure that this is the case, the MDBA has an enforcement role to check the consistency of Basin State and irrigation infrastructure operator trading rules with the Basin Plan. The MDBA can seek advice from the ACCC on amendments to water trading rules to assist in undertaking this role.

There are also processes for consideration of emerging issues that may require rule changes so that these can be considered and assessed in advance, including those relating to inter-state and inter-valley trade. This includes the Ministerial Council, the Basin Officials Committee and its technical working groups on trade, the Trade Working Group and Trade Rules Working Group.

A significant proportion of trading rules are contained in legislation

Many trading rules are contained in legislation rather than in subsidiary regulations, rules or guidelines. While this has advantages in terms of being well defined and enforceable, as described below, it does mean that trading rules are more inflexible to change.

7.3.2 The rule making process varies

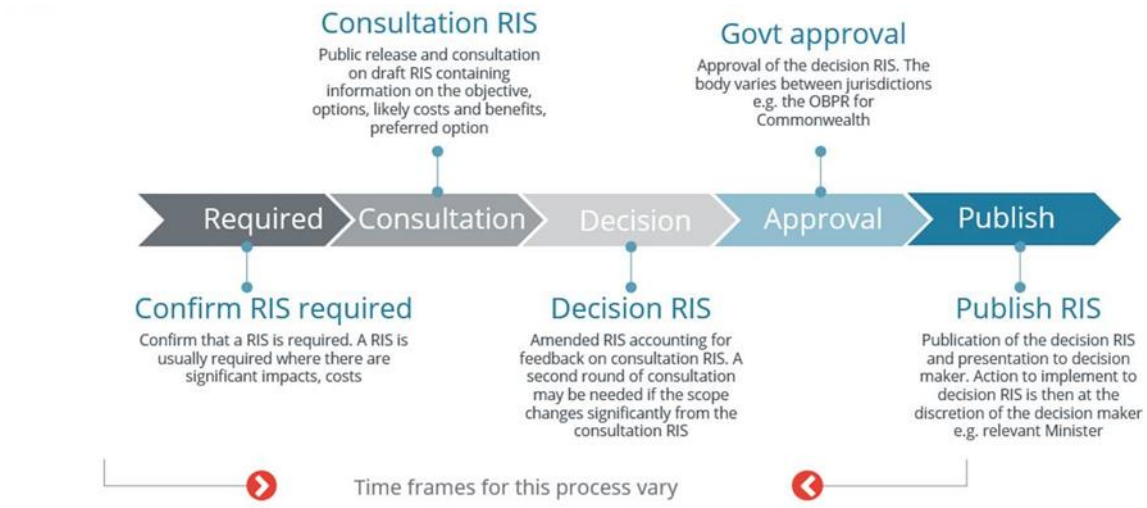
The current processes for making market rules follow a range of processes depending on the party that is making the rule and whether there is a relevant process defined that must be adhered to (e.g. a Regulatory Impact Statement process). An overview of the key rule making processes used currently is shown below.

[61] Murray-Darling Basin Officials Committee 2019, *Objectives and outcomes for river operations in the River Murray System*, Effective 1 June.

[62] https://www.accc.gov.au/regulated-infrastructure/water/water-charge-rules viewed 14 September 2020.

- A State-based Regulatory Impact Statement process may be applied for making trade rules contained in Commonwealth and State-based legislation. As shown in **Figure 30** this would typically involve consultation on a regulatory impact analysis report. State-based RIS processes limit their impact analysis and consultation processes to within the relevant State, rather than basin-wide. This may mean that analysis and consultation on basin-wide or third-party impacts is not undertaken, or is not sufficient.

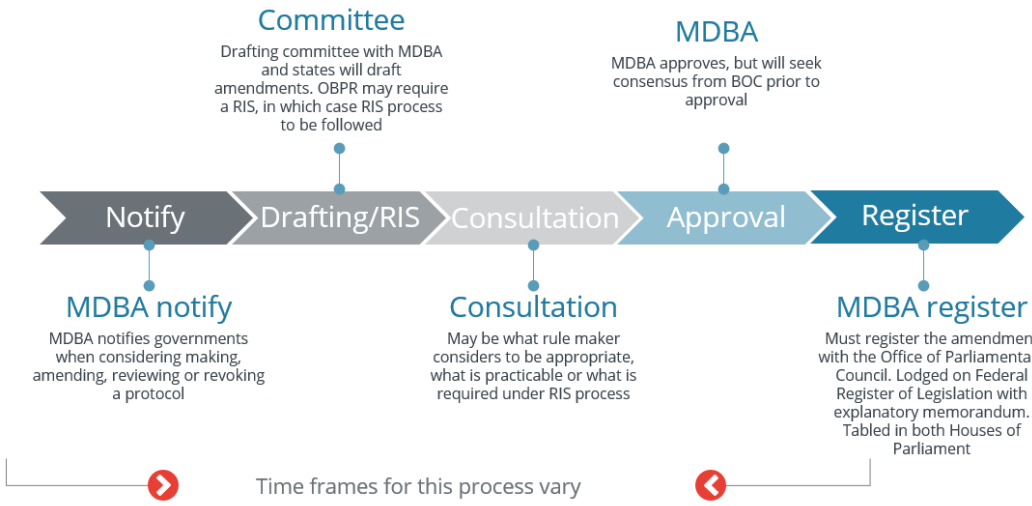
Figure 30: Regulatory Impact Statement processes



Source: Frontier Economics

- The Murray-Darling Basin Agreement Schedule D protocol amendment process (outlined in Clause 6(2) of Schedule D) and summarised in **Figure 31** involves the MDBA and Basin States jointly drafting the protocol amendments. The transparency of the process and the degree of consultation undertaken can vary depending on whether the Commonwealth Office of Best Practice Regulation (OBPR) determines that a Regulatory Impact Statement (RIS) is required. If a RIS process is not required, this process could largely be undertaken behind closed doors by MDBA and Basin State officials with limited consultation. A RIS process would typically involve more formal requirements for consultation. The protocol amendment process can be lengthy.

Figure 31: Schedule D protocol amendment process

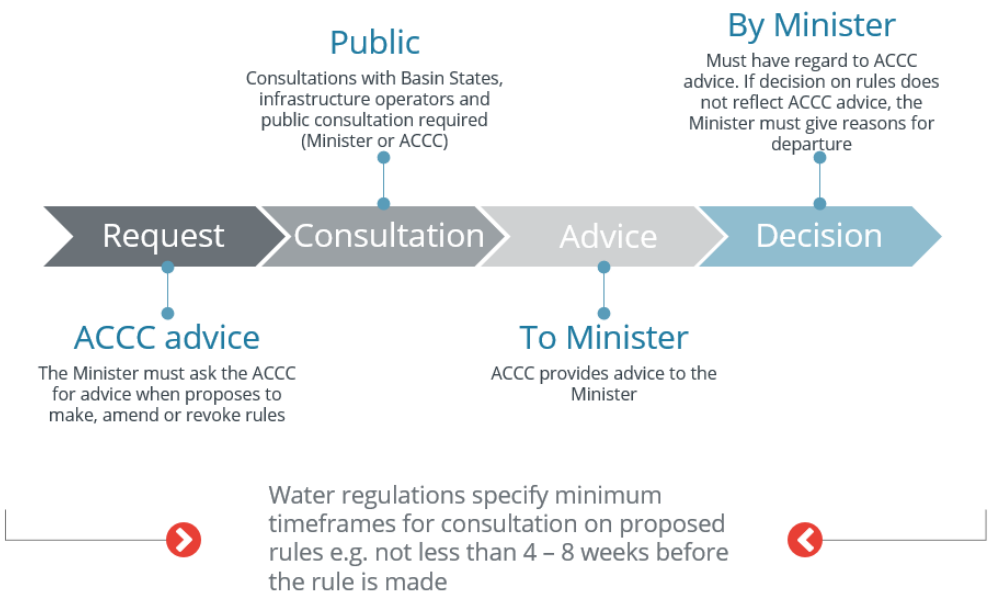


Source: Frontier Economics

- Section 98 of the *Water Act 2007* defines the process for making water market rules. While this might sound like it is a process for making all water market rules, it only applies to the making of the rules for irrigation infrastructure operator networks, to ensure irrigators can permanently transform their irrigation rights in these networks into a statutory water access entitlement which they can trade or hold in their own name, free of any trade restrictions.

  This rule making process provides for consultations with the Basin States, infrastructure operators and public consultations. This process has some desirable features. For example, the Minister must seek advice from the ACCC, which will ensure that sound analysis of impacts and issues is undertaken. The Minister must indicate if the rule that is made differs from the advice given by the ACCC and give reasons for any departures from the ACCC advice. The process defines minimum timeframes for consultation.

Figure 32: s98 process for making water market rules



Source: Frontier Economics

7.4 Problems with the current arrangements

We have identified a number or issue with the current governance arrangements.

7.4.1 Current market rule making does not align with principles of good governance

Assessed against the principles for good governance outlined above, we consider that a number of aspects of rule-making for the scMDB water market are not consistent with best practice.

Clear roles and responsibilities for rule-making

This involves institutions having clear powers and functions, and clear decision making responsibilities, in relation to rule making. Under the legislation, the rule making powers and functions are quite clearly defined (as described above).

It is where there is a need for collaboration and agreement among governments on water trade issues, or to deal with issues at the intersection of water resource management and water trade management where the current collaborative processes have not had sufficient clarity of responsibilities and roles, or sufficient clarity of the process.

This has led to delays in necessary decision making. It has also forced the introduction of rules by Basin States. A recent example of this related to the increasingly adverse impacts of trade (via IVT delivery) on the Goulburn River in Victoria. After two years of very high deliveries from the

Goulburn IVT account to the Murray system, the Victorian Government announced an interim operational regime to limit summer flows.[63]

Conflicting functions and objectives

This principle is concerned with separating regulatory, service delivery, and policy-making functions into separate institutions. Here we are concerned with rule-making powers.

The key concern is that the MDBA is involved in making water trading rules, but also has responsibilities for reviewing and approving rules (based on their compliance with the Basin Plan).

We note the announcement by the Minister for Water on 4 September 2020[64], to separate the operational and compliance responsibilities of the MDBA. Under the proposed arrangements, the responsibilities of the Inspector-General of the Murray-Darling and the MDBA's Office of Compliance will be merged to create a separate statutory office to the MDBA — the Inspector General of Water Compliance.

This separation of functions will be useful under any modified models for water trade rule-making in the MDB.

At present, the trading rules are not systematically reviewed for compliance with the Basin Plan. Given its risk-based regulatory approach and practical resourcing constraints, the MDBA instead prioritises its assessment of market rules. The MDBA's prioritisation approach is outlined in its document *Strategic Priorities – Basin Plan Water Trading Rules*. This is a living document[65] that the MDBA endeavours to review bi-annually. The criteria used to prioritise the assessment of the rules is shown in **Table 7** below.

Based on these criteria, the current document identifies two high priority areas in relation to water trading rules which have the potential to significantly compromise the objectives of the water market. These are trade restrictions and disclosure of water announcements. While this does not mean other rules are not assessed, this significantly limits the range of rules that are assessed for compliance with the Basin Plan and market objectives.

A more consistent approach is needed that would address all trading rules and amendments to those rules. As we discuss below, this would occur as part of an improved rule making process.

63 The Victorian Government is now consulting on the changes to the Goulburn to Murray trade rule. See https://s3.ap-southeast-2.amazonaws.com/hdp.au.prod.app.vic-engage.files/5915/8388/7812/Goulburn_to_Murray_trade_rule_review_consultation_paper.pdf The Victorian Government is preparing a Regulatory Impact Statement (RIS) based on the feasible options and a preferred option for the trade rule. A RIS process is not an appropriate/ideal rule change process if a change will have significant impacts in other jurisdictions (given that the analysis is limited to impacts within the State , rather than basin-wide).

64 https://minister.awe.gov.au/pitt/media-release/new-chapter-mdbp, , viewed 14 September 2020.

65 https://www.mdba.gov.au/publications/policies-guidelines/strategic-priorities-basin-plan-water-trading-rules, , viewed 14 September 2020.

Table 7: Criteria for setting strategic priorities

High Priority	Moderate Priority	Low Priority
Occurs across entire State or between States Occurs in or between 'significant' market areas Prevents or discourages trading High likelihood of third party impacts	Occurs in more limited area (e.g. catchment, water resource plan area, irrigation network) Trade not limited, but decisions not optimal Moderate likelihood of third party impacts	Limited likely impacts (e.g. on markets, individuals, limited circumstances) Limited likelihood of third party impacts

Source: Adapted from https://www.mdba.gov.au/sites/default/files/pubs/Strategic-priorities-water-trading-rules.pdf

Transparency and accountability

This principle is concerned with ensuring that institutions have a responsibility to fulfil their duties in relation to water trade rule making and importantly, that there are open and transparent processes that enable stakeholders to understand the reasons behind decisions, including the making of market rules.

The current rule making process does not reflect best practice rule-making. Specifically, there is no one clear process, rule-making is often not timely, rule-making often lacks transparency, consultation does not occur consistently allowing for the involvement of all market participants and there is not consistent analysis and consideration of market-wide as well as more localised impacts of any proposed rule change.

Given that many trade rules are made in legislation, Regulatory Impact Statement processes are used by Basin States to assess and undertake consultation on proposed rule changes. However, this process does not allow for or require market-wide consultation or assessment of market-wide impacts.

Under the current rule making processes, trading rules may be developed that do not:

- Have a close connection to the river system's physical characteristics or properly consider all river impacts (including operational and environmental impacts)
- Properly consider all third-party impacts or impacts on deliverability or
- Meet desired objectives and outcomes for water trading.

Effective coordination

This is concerned with ensuring coordination among government institutions, and to avoid overlaps and duplication.

Under the current arrangements different rules may be developed for the same function in different jurisdictions resulting in unnecessary complexity and duplication. For example, the ACCC has highlighted the lack of standardisation of trade approval processes across states and trading zones, particularly in the Southern Connected Basin.

In addition, there is no systematic process for considering whether there are gaps in the trading rules and how to address these.

Flexibility and adaptability

An additional criterion that is important in the context of the market rules is the need for flexibility to change and adapt the rules over time. As noted above, many of the trading rules are contained in legislation, which creates inflexibility.

7.5 Potential solutions

7.5.1 Designing improved market rule making processes for the scMDB

It is recommended that the rule making process be redesigned to address the significant shortcomings of the current arrangements. The key features of the redesigned rule change processes should be as follows:

- *Clearly defined*: The process should be documented and clear to all stakeholders and market participants. The process should be published alongside the consolidated market rules.
- *Clear roles and responsibilities*: The relative roles, responsibilities and obligations must be clear. Changes may be needed to roles and responsibilities for rule making, under some options for improved rule making processes discussed below.
- *Highly transparent*: The rule change process should be transparent. This would require the publication of consultation papers explaining the rule change and its likely impacts (including whole of market and third-party impacts in the case of the water markets), and consultation processes open to all market participants and stakeholders.
- *Require presentation of evidence:* A sufficient level of evidence should be presented so that stakeholders understand the impacts of the proposed rule change. In many instances this may require close cooperation of relevant stakeholders including state water resource managers and the MDBA (including those with expertise in modelling the operation of the river systems), irrigation infrastructure operators, independent evidence, etc. There should always be a requirement to consider basin-wide and third-party impacts. There may be a need for powers to require the provision of evidence.
- *Timely:* The process should have clearly defined timeframes to ensure that matters are dealt with in a timely manner.

The recommended improvements to the rule change process could free up the matters coming before these bodies, and allow them to focus on emerging, strategic market issues as intended.

7.5.2 Examples from other markets: National energy market

As part of the assessment of improvement to rule making for the MDB water markets, we have considered the rule making process in the national energy markets (i.e. the national electricity and gas markets).

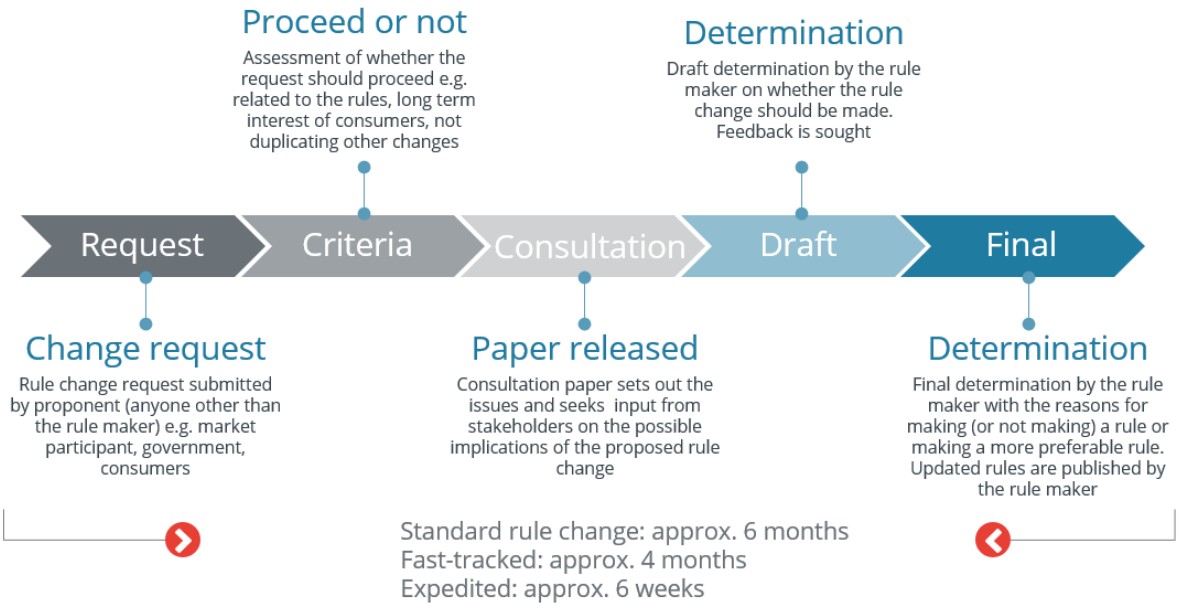
The rule making and rule change process was agreed between the jurisdictions and the Commonwealth and is defined in the market legislation i.e. the National Electricity Law (NEL), the National Gas Law (NGL) and the National Energy Retail Law (NERL).[66]

For the national energy markets, there is a single rule maker, the Australian Energy Market Commission (AEMC). The AEMC is an independent statutory body. As well as being the rule maker, the AEMC provides market development advice to governments. The AEMC make and amend the National Electricity Rules, National Gas Rules and the National Energy Retail Rules.

The rule change process for the national energy markets is clearly defined and open and transparent. It involves significant public consultation. As shown in **Figure 33**, the rule making process has clearly defined stages.

The process starts with a request for a rule change. Any party other than the AEMC may request a rule change including governments, market participants, consumer groups, energy market regulatory bodies, the market operator, public advocacy groups, major energy user groups, business groups or individuals.

Figure 33: National energy market rule change process



Source: Frontier Economics. Adapted from Australian Energy Market Commission 2017, *The rule change process, A guide for stakeholders*, 20 June.

The AEMC determines whether to proceed with the rule change by assessing it against criteria including whether it is likely to be in the long-term interest of consumers, checking it is not

66 This legislation is cooperative legislation across the energy market jurisdictions to operate with harmonised laws and regulations. Under the cooperative legislative scheme, one jurisdiction (South Australia) is the lead legislator. The other jurisdiction signed on to a Legislation Agreement, where each participating jurisdiction agreed to adopt legislation identical to that of the lead legislature (i.e. South Australia) and not to change or repeal the cooperative legislation without unanimous consent.

misconceived or lacking in substance, whether it is within the scope of the AEMC's powers to make a rule and that the matter has not already been dealt with.

If the rule change proceeds, the standard process provides two opportunities for stakeholders to make written submissions – first on an initial consultation paper that sets out the key issues raised in the rule change request, and then in response to the draft determination published by the AEMC.

The AEMC will also often engage with stakeholders in other ways during the rule change process, for example, in informal one-on-one discussions, workshops, forums and technical working groups. It will also seek to gather and present evidence and may commission expert reports.

Ultimately the AEMC makes a determination on the rules, based on the evidence provided, and setting out their reasoning.

A standard rule change process typically takes six months to allow for two rounds of consultation. In practice, some complex rule change processes have taken far longer. There is also provision for fast-tracked or expedited rule changes where the matter is urgent or straight-forward, which can be as short as six weeks.

The rule making process can be fast tracked where there has been adequate previous public consultation on proposed rule changes by an energy regulatory body such as the Australian Energy Regulator or the Australian Energy Market Operator or if the request arises from an AEMC review. Under the fast-track process there is an opportunity for written submissions only after publication of the draft rule determination.

The AEMC may expedite the rule making process even further if the request is for a non-controversial or urgent rule (these terms are defined in the relevant legislation, i.e. the NEL, NGL and NERL)[67]. Under the expedited process there is only one round of written consultation on the rule change and no draft determination is made.

The national energy market rule change processes have many useful features, particularly the full assessment of impacts and significant, open consultation with market participants. However, we are aware that there are important differences between the energy markets and the scMDB water market that need to be considered when seeking to apply aspects of this model. The differences and the implications for recommendations for the rule change process in the MDB are considered below.

7.5.3 At a minimum there should be a consistent rule making process defined for the water market

We consider that changes should be made to the rule making approach for the scMDB Basin water markets. At a minimum, we consider that these changes could be made while retaining the existing roles and functions, and with only minor changes to the regulatory framework to place an obligation on rule makers to follow that rule making process.

The remainder of this section explains the elements of what is proposed in terms of the rule making process.

[67] For example, under the NEL, a non-controversial Rule means a Rule that is unlikely to have a significant effect on the national electricity market. An urgent Rule means a Rule relating to any matter or thing that, if not made as a matter of urgency, will result in that matter or thing imminently prejudicing or threatening— (a) the effective operation or administration of the wholesale exchange operated and administered by AEMO; or (b) the safety, security or reliability of the national electricity system.

Continue to always publish the rules in a central location

To ensure that all market participants can more easily access and understand the market rules, it is crucial that all trading rules continue to be published together in a single location.

While we consider the possibility of consolidating the water trading rules into a smaller number of instruments or a single instrument in Section 7.5.6 below, the minimum requirement should be that the market rules should always be published together in one location and in a consolidated manner.

The MDBA web site already does this.[68] This seems to have a few gaps that could be addressed (e.g. systematically outlining relevant elements of the Water Act 2007, including Schedule 1 of the Murray-Darling Basin Agreement). However, we note that there are also links to some useful guidelines on this page that provide an overview of the water trading rules.

Having this consolidated information improves rule making as it assists to more readily demonstrate inconsistencies, duplication and gaps in the trading rules.

While multiple rule makers can remain, a single rule making/rule change process should be followed

As explained above, for the national electricity and gas markets there is only one, central rule-maker – the Australian Energy Market Commission. We discuss the option of moving to a single rule maker for the MDB water markets in Section 7.5.7. Another option is to retain multiple rule makers, but to establish a requirement to follow a standardised rule change process. This is recommended as a minimum step.

7.5.4 Features of the standardised rule making process

The desired features of the standardised process were outlined in Section 7.5.1 (i.e. that the process should be clearly defined, allocate clear roles and responsibilities, be highly transparent and consistently include sufficient consultation, require presentation of evidence and be timely).

These features are explored below.

The process should be modelled on that in the national energy markets

We consider that the rule change process in the national energy markets provides a good model, but is one that needs some adaption before being applied in the scMDB water markets.

However, the fundamental features of this process that we strongly recommend for adoption is that there is always gathering and publication of evidence on the issues and likely impact of the proposed rule and that there is an opportunities for all stakeholders and market participants to be consulted and to present their views and additional evidence to the rule maker.

Given that many of the water market rules are legislatively-based, the standardised rule change process would need to meet minimum requirements associated with Regulatory Impact Statement processes. However, the standardised process should be an enhancement to this process in that it should always involve assessment of market-wide impacts and involve consultation with all market participants and stakeholders.

[68] On this page: https://www.mdba.gov.au/managing-water/water-markets-trade/basin-plan-water-trading-rules (accessed 14 September 2020).

Careful consideration is also needed to the role of relevant Minister. The Schedule D protocol amendment process allows the MDBA to register the new protocol with the Office of Parliamentary Council and the new protocol is lodged on the Federal Register of Legislation. This process does not have Ministerial involvement. However, a process like the s98 process for making water market rules where the Minister makes the rule may be needed for rules that are made in primary legislative instruments.

The decision on the proposed rule would be made by the relevant rule maker but with transparent evidence and reasoning

As noted above, in the national energy markets, the rule maker ultimately decides on the nature of the final proposed rule change. In the MDB water market, the multiple rule makers would also ultimately decide on the final rule. However, it is recommended that under the new process (as in the energy markets) the rule makers be required to provide a final report and proposed rule that:

- Describes the implications and impacts based on sound evidence and modelling as required
- Summarises comments received in consultation and how these have been addressed
- Demonstrates how the proposed rule complies with the Basin Plan
- Outlines the process and timetable to implement the rule change.

In all cases we consider that it would be important for the ACCC to have input to the rule change process, providing expert input and advice on the proposed rule change.

This process would substantially assist the MDBA (or the new Inspector General of Water Compliance once formed) in its compliance role in relation to rule changes, by providing necessary evidence and information around compliance with the Basin Plan. It is not proposed that this process would remove the MDBA's compliance role. This is likely to still be required in the event that a non-compliant rule was made in the above process, although this is far less likely.

Allow for rapid as well as 'standard' rule changes

This feature of the energy market rule change process is a useful one that is also recommended for the water markets rule change process. As in the energy legislation, it would be important to place limits on when the more expedited rule changes processes could replace the standard rule change process. The expedited processes are used for circumstances where the new rule is less complex, likely to have less impact or has been extensively examined or debated as part of an alternative formal process.

Could other proponents propose a rule change?

Under the national energy market rule making process, any proponent may request a rule change. This could include governments, market participants, customer advocates, etc.

The water markets already have a number of parties that make (and hence initiate) rule changes including the Commonwealth, Basin States and irrigation infrastructure operators. The question is whether the ability to request a rule change should be extended to other stakeholders, particularly those who own water entitlements and allocations, engage in trade and market intermediaries (brokers and water exchanges).

We consider that other parties should be allowed to request a rule change, particularly those engaged more broadly in the MDB water markets (e.g. catchment management authorities, agricultural boards, irrigator groups, environmental groups, etc).

To allow this, a process would be needed to accept and assess whether the rule change process should proceed (as in the energy market process). Then responsibility for the rule change could be allocated to an appropriate party (e.g. a Basin State). We consider that this function should be undertaken by the MDBA compliance group (as they already consider the compliance of rules with the Basin Plan) or the new replacement Inspector General of Water Compliance once established.

All rules should be subject to this process

It is recommended that all rules should be made following the standardised process. While not compulsory, it could also be usefully applied to operational guides and procedures (perhaps in cut down form), particularly given the inter-play between operations that have consequences for trade.

The Basin States and Commonwealth would need to resource their rule change processes

In the case of the energy markets, the rule change process is resourced by the rule maker, the Australian Energy Market Commission. In the case of the MDB water markets, the relevant rule maker could similarly be expected to resource the rule change process.

However, there are some specific requirements to consider in the MDB water markets. In particular, there is a question about whether irrigation infrastructure operators would be in a position to resource rule change processes, including managing a public consultation process. While transparency and open consultation would remain important, a less resource intensive and expedited process may be sufficient to the extent that the rules they make are less complex.

In the event an irrigation infrastructure operator rule change involved more complex issues or wider impacts, the full process could be imposed but with resourcing support provided as required, for example, by governments or by the ACCC. It may also be possible to assist the irrigation infrastructure operator will the development of model rules that could be adapted for their network.

Allow for more long-term reviews as well as rule changes

The Australian Energy Market Commission also undertakes reviews to consider long-term, strategy issues that may ultimately require market rule changes. The Ministerial Council and Basin Officials Committee perform this role in the MDB water markets.

7.5.5 How to enforce the standardised process

Legal advice would be needed on how to ensure that a standardised process could be enforced on the range of rule markers in the MDB, which includes the Commonwealth and State Government and Irrigation Infrastructure Operators. This may require a legislative solution, such as the specification of the rule change process defined in Section 98 of the *Water Act 2007* for making water market rules.

7.5.6 Potential to move trading rules out of legislation to more flexible market rules

A progression from establishing a common rule making process is to consider moving the trading rules for the MDB out of prescriptive, inflexible legislative instruments into market rules as in the national energy markets.

This can have significant benefits in terms of market flexibility and adaptability

With the prescriptive detail in the primary legislation it is difficult to change and adapt the law making it unresponsive to changes in circumstances. Hence, moving to a single, consolidated set of trading rules that are able to be readily adapted over time (in accordance with the agreed rule making process), could have many benefits. This would include more timely and frequent changes to modernise and update the market trading arrangements as needed, scope to standardise the trading rules which currently have unnecessary variation between jurisdictions and scope to better understand the gaps within the trading rules. It would also aid market transparency and understanding of the rules.

Substantial legislative change would be required

While this could be highly desirable going forward, substantive legislative change would be required to:

- Transfer the rules from legislation into an alternative instrument
- Establish the legal nature of the rules and the rule marking framework. For example, the *Subordinate Legislation Act 1978* does not apply to Rules made under the National Electricity Law (NEL). The NEL provides the rule making functions and powers to the AEMC to make rules to regulate the operation of the market.
- Requirement to comply with the market rules, etc.

In the NEM all market operation arrangements are contained in the Rules, including supply, operation, transport access and pricing and retail supply. Hence, the supply system in its entirety is covered by the market rules (noting that the energy market jurisdictions retain some legislative power and responsibilities).

In the MDB this would not be the case. The *Water Act 2007* and the Basin Plan are central to the management of the MDB – balancing economic, social and environmental outcomes and ultimately determining the amount of water that can be taken from the Basin each year. Many of the rules around the operation of the Basin river systems will remain in the Basin Plan and associated Commonwealth and Basin State legislation and plans (including the State's water resource plans).

Hence, there would also be a more complex task to carefully delineate between Basin management and operation versus market operation rules.

7.5.7 Potential to move to a single rule maker

Consideration could be given to moving to a rule making governance model similar to the national energy market, whereby there is a single rule maker. This may make the most sense if there is also a move to remove the market rules from legislation into a consolidated set of market rules.

This would require the agreement of the Basin States, as there would be some transfer of power. However, having a single rule maker would not undermine the fact that the Basin States would

retain constitutional powers over water, could request rules be made and could have strong inputs to any rule making process.

However, if the consistent rule making process above could be made to work, it would be important to understand the incremental benefits of moving to a single set of rules and single rule marker.

We note that in the case of the electricity market, there were strong drivers on the jurisdictions to enter into the national market arrangements rather than retaining state-based electricity supply. This included the increasing cost burden on the states of investing in and servicing new supply capacity, the significant commercial risks of running the energy businesses (particularly generation and retail supply), budgetary constraints and incentives being offered by the Commonwealth Government in the form of competition payments for entering the national market arrangements. The Basin States would need to feel that there were compelling gains to be made by a move to a single rule maker and common set of market rules.

In terms of practical arrangements for a single rule maker, while these have not been considered in detail, possible arrangements could be achieved as follows:

- The arrangement for a single set of rule and single rule maker could be established as part of cooperative arrangements under the Basin Plan
- The rule maker could be a new statutory entity or the ACCC
- By considering any necessary implications for the work of the Ministerial Council and the Basin Officials Committee. The rule maker could have a market development advisory role to the Ministerial Council similar to the AEMC. In undertaking this market development role, the AEMC typically conducts market enquires that involve all of the key stakeholders including governments and industry and form technical working groups to assist them. The BOC and the Ministerial Council could request the rule marker to undertake relevant market reviews in the water markets.

7.6 River operation versus market operation

The MDBA is responsible for managing river operation of the Murray River System on behalf of the states. These objectives and outcomes are specified in BOC's Objectives and outcomes for river operations in the River Murray System document and are given practical effect in the River Murray System Annual Operating Plan.

Two objectives of this plan relate to:

- **Water storage and delivery and accounting** — to operate the River Murray system efficiently and effectively in order to deliver state water entitlements, while conserving water and minimising undesirable losses; and to maximise the water available to the Southern Basin states, after providing for operating commitments in the River Murray system.
- **Protecting the environment** — to contribute to the protection and, where possible, restoration of priority environmental assets and ecosystem functions within the River Murray system.

There are also further objectives and outcomes in the Plan regarding River Murray Operations assets; people and communities; and information and communication.

Accordingly, river operations focus on meeting demands for water and minimising losses on the Murray system. Notably, the protection of environmental assets and ecosystem function in the Goulburn system, Murrumbidgee system, or other tributaries of the Murray River, is not an explicit objective or outcome of the River Murray System Annual Operating Plan. Moreover, the Objectives and Outcomes document does not provide guidance on how to balance/prioritise objectives, where a trade-off may arise.

This raises two issues:

- There are multiple objectives for river operations, and there are competing objectives that require trade-offs to be made (i.e. meeting demands for water and minimising losses). To date, BOC has provided some guidance to inform river operators on acceptable losses to maintain deliverability.
- There are gaps, and no clear identification of who is responsible for managing how river operations affect environmental assets and ecosystem function in the Goulburn system, Murrumbidgee system, or other tributaries of the Murray River. To address this gap in the case of the Goulburn river, Victoria introduced interim measures to limit the IVT call outs during summer months to limit degradation caused by unseasonal high flows.[69]

The first of these may be improved by BOC agreeing on a hierarchy of objectives. As discussed in section 5, an important part of this is identifying and communicating that there is a non-zero risk of shortfalls — meaning that the delivery objective will not be pursued no matter what the impact on losses. There is also the option to represent this via a form of level-of-service statement that guides river operation trade-offs between meeting demands for water and minimising losses. It may also be suitable to develop protocols for how trade-offs will be made under defined circumstances.

The second of these requires a clarification of roles. We do not consider there to be a single solution, because this could be the assignment of responsibility the tributary's State government, the joint programs, or to expand the objective of river operations to explicitly the protection of environmental assets and ecosystem function in the Goulburn system, Murrumbidgee system, or other tributaries of the Murray River.

[69] https://waterregister.vic.gov.au/about/news/286-changes-to-tagged-trade-and-operational-regime-for-the-goulburn-system

8 Future directions and a pathway forward

This report proposes a number of changes or reforms to the current water market architecture and related governance arrangements.

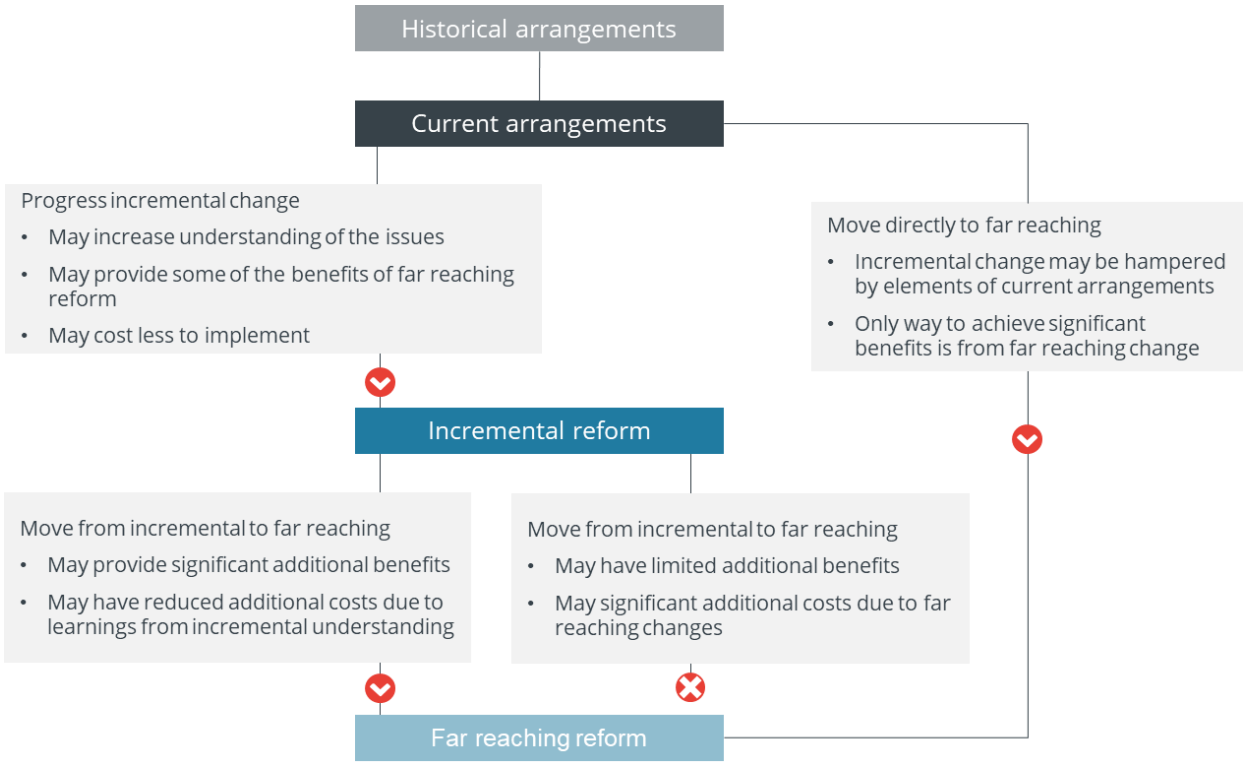
A number of these proposed reforms are interrelated whilst some have prerequisite conditions which would need to be met before they could be implemented.

We also recognise that some changes would take time to develop in detail and implement and there is a need to take action in the meantime in order to address some emerging issues.

In other cases, it makes sense to adopt some readily implementable measure and then ascertain how well they address the underlying problem before considering further measures towards what might be seen as 'first best' solutions.

The potential solutions can therefore be seen as sitting on a spectrum ranging from relatively incremental changes to more far-reaching reforms.

Figure 34: Spectrum of reform



8.1 Water market trading and related rules

8.1.1 Managing delivery shortfalls

While not expected to be a frequent event, a shortfall could occur when demands are unable to be fully met requiring temporary delivery restrictions to maintain minimum river flows.

In principle, a potential solution to this issue would be to fully define and enforce in-river delivery rights.

However, doing so would require a range of complex issues to be addressed and resolved. This means it is not an option which could be implemented in the short term.

One measure which could be more readily adopted is simply to better clarify and communicate how a system shortfall would be managed in advance of an event occurring. Doing so would also provide a lot of information which would be required to develop a property rights approach so could also be seen as a potential step towards such a solution.

Another intermediate option is to consider investing to relieve capacity constraints.

8.1.2 Interregional trade

Simplifying assumptions have been required to facilitate and enable trade across zones. In our view, the restrictions of trade between regions (IVT limits) would benefit from improving clarity regarding the reason for the restriction. This would enable assessment of the effectiveness of these restrictions in managing this reason of concern, and whether alternative approaches exist to better manage the concern.

We also recommend that tagged delivery be allowed when water allocation trade is restricted, if the tagged delivery does not significantly contribute to the stated reason of the restriction. This would require revision of BPWTR 12.23.

A more far-reaching reform option would be to rely on tagging as the primary (or only) mechanism of 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 support interstate tagging are not sufficiently developed. The ACCC interim report (p. 467) found that such a change 'would likely face significant administrative complexity to implement'. In this regard, a major upgrade of IT systems/registers is a prerequisite for this approach.

8.1.3 Carryover

Carryover is the existing mechanisms for rights to air space in storages. Current carryover policy bundles access to storage with entitlements.

However, given there remains a risk of spill of water carried over, this does not provide a fully independent and certain property right. The precise rights and associated risks of spill vary across jurisdictions.

An incremental approach would be to improve communication on risks to SA and NSW carryover.

Defining capacity shares is at the far-reaching end of the spectrum – and could be seen as the theoretically best way of assigning property rights to air space

However, like establishing in-river delivery rights, establishing capacity shares would entail significant complexity in defining and enforcing such property rights – particularly in a multi-storage connected system. It becomes quite difficult to allow entitlement holders to exercise full control of capacity shares in such interconnected system without significantly affecting the operator's ability to optimise physical management of the system.

In our view the incremental benefits of capacity sharing do not outweigh the increase in transaction costs.

8.2 Governance

A key recommendation is to establish a consistent process for water trade rule changes that is timely and considers impacts across the scMDB.

Initially this could be in the form of articulating best practice features of such rule-making processes but not mandating this or enforcing this.

However, if this does not lead to the decision-making processes being followed by the jurisdictions reflecting these features, consideration could be given to making these features a mandatory part of rule-making processes, and/or subjecting rules made under processes which do not reflect these features being subject to closer scrutiny by the MDBA.

Ultimately, if these measures were not leading to clear improvements in decision-making processes, more far-reaching institutional changes (e.g. centralisation of decision-making) could be considered.

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