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Murray–Darling Basin Water Market Products Scoping Study

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Marsden Jacob Associates are leading economics, public policy, markets and strategy advisors. We can help you shape the future wisely. We are a national practice of talented economists and policy advisors. We specialise in solving practical and real-world problems relating to water, energy, environment, natural resources, agriculture, earth resources, public policy and transport. We work with a wide range of cross-disciplinary partner firms to deliver best project outcomes for our clients.

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Contents

Executive Summary

Across the water markets in the Murray-Darling Basin (MDB) a broad range of water products have developed. These products are transacted across the breadth of the agriculture sector - from small scale farmers trading their annual Allocations to large corporate investors trading Secondary Products, such as Leases, Forward Allocations (Forwards) and Carryover Parking.

MDB water markets are designed to support the movement of water assets to their highest value use. Whether that is a seller seeking to maximise their returns on excess allocation water or a buyer looking to secure water to minimise crop cost inputs and maximise returns.

Water trading in Australia has a long history, initial recognition of water as an economic instrument was slow, however key market development in the 1990's propelled growth and it has continued to evolve ever since.

The purpose of this study was to:

- identify and map the existing and emerging water market products transacted across the MDB, assess their market uptake and coverage; and
- assess options to improve market failures and increase the quantity of information reported in the current water market information systems.

The key findings from the Study are as follows:

Key Finding #1: Spot Allocation and Permanent Entitlements continue to be the most commonly traded products within MDB water markets. However, stakeholders are reporting a substantial increase in the demand for Entitlement Leases, underpinned by high prices for Entitlements and other Allocation products.

Key Finding #2: Secondary water market products such as Forwards are transacted by a small proportion of market participants - typically those with the greatest market knowledge and capacity to pay. It is estimated that 5-10% of irrigators have engaged with Forward markets with the uptake being especially weak in the northern MDB.

Key Finding #3: Secondary water market products suffer from transparency and market access issues. A significant proportion of secondary market products are offered “off-market” - with direct corporate-to-corporate or investor-to-corporate deals common ways of transacting Leases and Forwards. This not only weakens market price transparency, but also limits the availability of these products to the broader group of irrigators (especially to those with smaller water requirements).

Key Finding #4: Aspects of the market are not yet fully developed. The MDB Secondary Product markets are relatively new and immature – with a substantial number of irrigators yet to be introduced to products such as Forwards. However, at the time of writing it is questionable whether sufficient volumes of water would even be available to be supplied through Forwards or Leases, to a broader group seeking to mitigate risk, since these products are predominantly supplied by a small number of market participants.

Key Finding #5: Secondary Products such as Forwards, Leases and Carryover Parking are difficult to specifically identify in the market data as they are not separately recorded within Basin State Water Registers – which generally report water market products as either Entitlement or Allocation Trades. Other key reporting shortfalls identified include:

- Price Outliers – "zero dollar" and Commonwealth water recovery projects
- Trade Timing Executions – time variation between Entitlements and Allocations
- Missing Information and/or Lack of Detail – IIO trades, 'Wet' and 'Dry' Entitlement information

Key Finding #6: There are feasible system and policy solutions to market issues within immediate and short-term (1-2 years) timeframes. These solutions, such as changes to transfer forms to capture more nuance data, should be considered as soon as possible.

Key Finding #7: Solutions to market issues within the medium-term (2-5 years) would require improvements to current Water Registers to capture and transparently report the Secondary Product trade. These developments will require financial resourcing so that changes can be implemented. However, the analysis has identified that low-cost solutions may exist, and third parties from the private sector could expedite the progress in data reporting.

Key Finding #8: Efficiency of water market information is a key challenge. Water market information in Australia suffers at the same time from there being too much (on some issues) and too little information available (on others), making it confusing for market participants. The intuitive long-term solution (over 5-10 years) is to provide a singular point of access to trade data and information.

Key Finding #9: Due to limited transparency, it is difficult to ascertain the volume traded for secondary water market products, leading to reduced market awareness and confidence.

We estimate the indicative trading volumes of Secondary Products available on the southern MDB market to be as follows:

- Entitlement Lease is approximately 290-450GL
- Carryover Parking is approximately 50-200GL
- Forwards is approximately 130-200GL

1. Introduction

1.1 Project scope and background

1.1.1 A short background to the Scoping Study

The Murray-Darling Basin Authority (MDBA) has a broad audit function with significant information gathering, inspection and investigation powers provided under the Commonwealth *Water Act 2007* and the *Murray–Darling Basin Plan 2012* (Basin Plan). Auditing and assurance reviews are the key tools used by the MDBA to monitor and incentivise compliance with the Basin Plan.

As part of its 2018–19 audit work program, in May 2019 the MDBA published a two-part audit of water trade price reporting (Price Reporting Audit).

The first part of the audit assessed the effectiveness of the processes and procedures of each Basin State[1] to collect, validate, record and report accurate water trade pricing information for Water Year 2017-18.

The second part of the audit assessed water traders' compliance with their requirement to report accurate price information to their relevant approval authority in accordance with s12.48 of the Basin Plan.

The management responsibilities associated with actioning Recommendations from the Price Reporting Audit falls across two levels of government and between multiple Basin States.

The MDBA has considered all the recommendations from the Price Reporting Audit and considers that they fit into four broad themes which will be actioned in sequential order:

1. Engagement and Education
2. Water Trade Applications and Front-End System Management
3. Monitoring, Validation and Compliance
4. Water Trade Information and Reporting

We understand that this Scoping Study is the MDBA's first step to delivering on the recommendations from the Price Reporting Audit; and that the findings from the Scoping Study will be used to inform other reviews and inquiries currently underway, including the ACCC Inquiry into Murray–Darling Basin Water Markets.

1.1.2 Project scope

The purpose of this Study was to map and document the existing and emerging water market products transacted across the MDB, and assess the market uptake and coverage of those products.

This report identifies and explores different types of state-based and 'off market' trading methods in the MDB and provides an overview of the possible solutions a range of market issues resulted to

[1] Australian Capital Territory, New South Wales, Queensland, South Australia and Victoria.

both primary and Secondary Products. Table 1 below outlines the water market products discussed in this report, noting which are in and out-of-scope.

Table 1: Scope of water market products being discussed

Product Segment	Water market product	In scope	Out of scope
Primary	***Spot Allocation Trades***	✓	
	Permanent Entitlements Trades	✓	
Secondary	***Entitlement Lease***	✓	
	Forward Allocation trade	✓	
	Carryover Parking	✓	
	Insurance and financial products		✗
	Deferred delivery		✗
	Call options		✗
Related market products	***IIO specific products such as delivery rights***		✗
	Annual use limits		✗
	Site use approval trades		✗

Another key objective of this project was to identify market information and reporting failures in the current water market information systems; and to develop options to improve the quality and availability of transaction information provided to the water market.

1.2 Summary methodology

Below we have summarised the methodology that underpins this study.

1.2.1 Consultation process

To inform the development of the report, both desktop analysis and semi-structured interviews with Basin State Governments, industry associations and market participants and stakeholders were undertaken.

This study interviewed key stakeholders, ranging from water market intermediaries[2] to institutional investors and Commonwealth and Basin State regulators and authorities. We have also drawn upon information available from previous engagements with water market intermediaries and market participants.

1.2.2 Market data analysis

In addition to stakeholder interviews, this project has relied on publicly available data and information.

The key sources of data for this project include

[2] For the purpose of this study we use the term intermediary to refer to all market brokers, trading facilitators, market exchanges and real estate agents that trade water.

- BoM Water Information Dashboard: http://www.bom.gov.au/water/dashboards/#/water-markets/mdb/at
- New South Wales Water Register: https://waterregister.waternsw.com.au/water-register-frame
- Victorian Water Register: http://waterregister.vic.gov.au/water-trading/water-share-trading#watersharevolumeandpricestats
- South Australia WaterConnect: https://www.waterconnect.sa.gov.au/Systems/WTR/Pages/default.aspx
- Water market intermediary bulletin boards and exchanges.
- Marsden Jacob: Waterflow™ information platform.

2. What are the Current Water Market products?

2.1 Definitions of market products

Products in the Australian water market can be broadly grouped into three categories:

1. **Primary Products** – basic trade mechanism for allocation and entitlement transfers
2. **Secondary Products** – products that have been derived from the characteristics of allocations and entitlements, and/or are executed using the basic trade mechanism to achieve a specific outcome
3. **Related Products** – products that are not derived or related to the characteristics of allocations and entitlements but can be used in conjunction with them.

Primary and Secondary Products are available for both surface and groundwater trading, whereas related products typically only exist within defined districts or areas.

All product types are defined in the following sections.

2.1.1 Primary Products

Allocation Trade

Also known as Spot Allocation trade or temporary trade. The transfer of water allocation between one party and another specifically for the duration of the ongoing irrigation season.

Entitlement Trade

Also known as permanent trade. Similar to the sale of a house, this trade involves the transfer of ownership of an entitlement between two parties.

2.1.2 Secondary Products

Except for Entitlement Leases (where a separate Term Transfer instrument can be used to bring Leases into effect), call options or insurance products (which may not result in actual 'delivery' of water), all other Secondary Products are exclusively delivered through the allocation trade mechanism.

Forward Allocation Trade (Forwards)

Forwards are contracts for an allocation trade at a set price with a delivery at a future date (either intra or inter-season). Forwards enable irrigators to mitigate risk and secure water within set budget, as opposed to riding the wave of fluctuations that can sometimes occur on the temporary market.

Entitlement Leases

An Entitlement Lease passes the characteristics (benefits and responsibilities) associated with holding a water entitlement from the lessor (seller) to the lessee (buyer) for an agreed period (for multiple years, often up to five). At the end of that period, the access to the entitlement characteristics returns to the lessor.

Carryover Parking

Unused water can be 'carried over' to the next year based on a range of parameters set out by the water authority under which the entitlement is held. A parking product has also been created around carryover; this product the placer (buyer) is renting holder's (seller) carryover capacity to 'park' excess water allocation, effectively carrying that water over to the next water year using the holder's entitlement. The parked allocation is then returned in the new water year. In Victoria a 5% evaporation loss applies to all water that is carried over.

Call Options

Call Options give a buyer the right, but not the obligation to buy a known volume of allocation at a known price (strike price) at a specific date in the future. The seller charges a non-refundable fee to the purchaser for each option, known as the option premium.

Just like a Forward, a Call Option gives the buyer secure access to an allocation at a known price in the future. However, unlike a Forward, the buyer has the choice whether they exercise the option or let it lapse based on the prevailing market price.

Insurance and Financial Products

Insurance products work by underwriting[3] against a low seasonal allocation. That is, if an announced allocation doesn't reach a certain percentage, then the water allocation will be topped up by the underwriter. The 'buyer' pays an insurance premium to have this option available. If the water is delivered, then the buyer pays both the insurance premium and market price.

In terms of financial credit, the underwriter gives a line of credit to be used for water purchases (Spot, Forward, Permanent) by the buyer. The credit is secured against future crop and repaid after harvest.

Deferred Delivery

For this product the buyer locks in a price and volume today for delivery and payment at an agreed date later in the same season. This allows irrigators to secure their future critical water needs within the constraints of their expected cashflow. A 20% deposit is typically required at transaction date, with the balance due prior to date of delivery.

The difference between Deferred Delivery and an intra-season Forward trade is that with deferred delivery the seller gets the money and delivers the water to an intermediary's holding account straight away, not upon full payment from the buyer.

[3] An underwriter is any party that evaluates and assumes another party's risk for a fee. The fee is often a commission, premium, spread, or interest.

2.1.3 Related Products

Delivery Right Trades

An Irrigation Infrastructure Operator (IIO) is an entity that operates water service infrastructure for the purposes of delivering water for the primary purpose of it being used for irrigation.

Within IIO's individual irrigators may have a Delivery Right or entitlement which is a right to have water delivered to a landholding, or an Irrigation Right which is the rights to receive water from an IIO and/or share in the irrigation system. Delivery Rights are traded within IIOs to provide right holders with greater flexibility and an alternative to termination and the payment of termination fees. These rights can be permanently (and in some instances temporarily) traded within the irrigation district.

Annual Use Limit Transfer (Victoria only)

The Annual Use Limit is the maximum volume of water in an irrigation season that may be used on the land described in a water-use licence or water-use registration. In areas of Victoria impacted by salinity there is demand for Annual Use Limit and water users can transfer water between water-use licences. Transfer of Annual Use Limit can only occur between water-use licences within the same salinity impact zone, or from water-use licences in a higher salinity impact zone to water-use licences in a lower salinity impact zone.

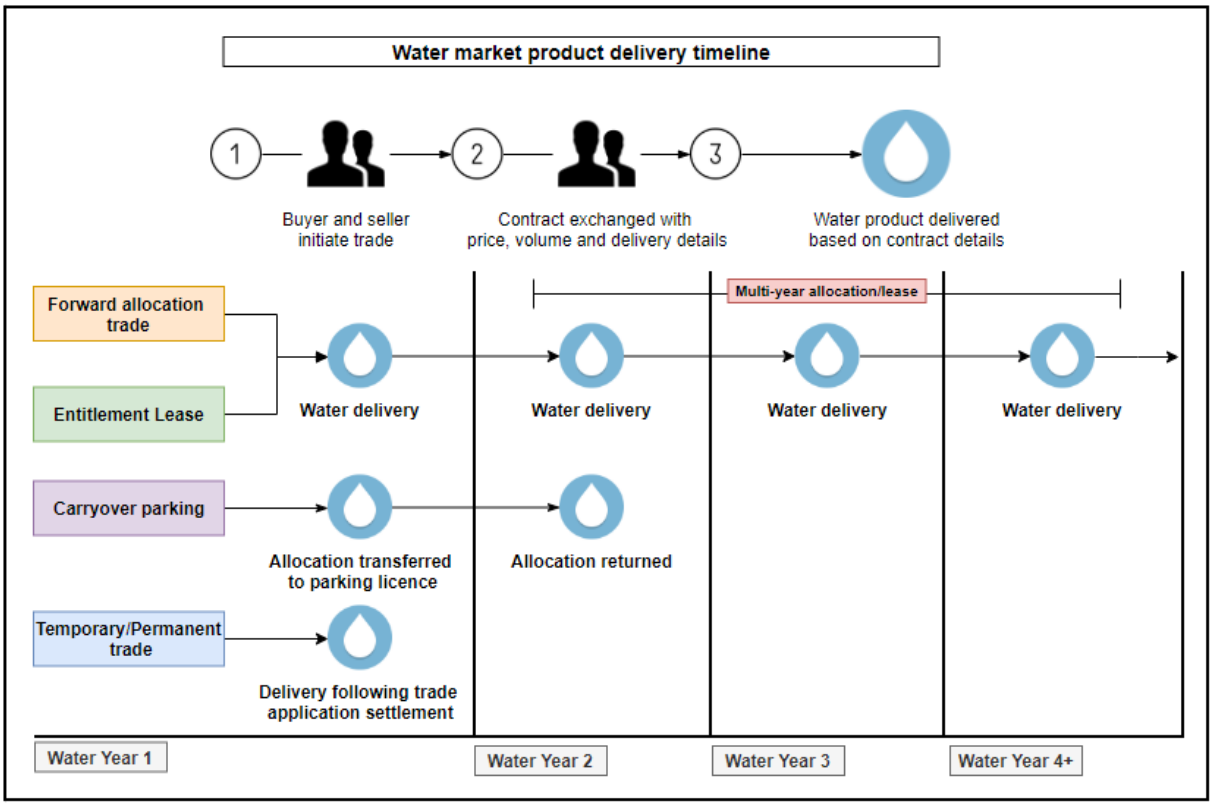
Site Use Approval Transfers (South Australia only)

A Site Use Approval is a permission to use water at a particular site and in a particular manner. You need Site Use Approval to carry out any type of irrigation or other water use along the South Australian River Murray. This Site Use Approval may be traded to other water licence holders under certain conditions.

2.2 Detailed discussion of each in-scope water market product

Each in-scope product is discussed in the following tables. In general, compared to owning permanent entitlements, all other products offer opportunities to access water without capital expenses. For sellers, all products are used to maximise financial return on their water assets. Figure 1 illustrates how the delivery of products differs.

Figure 1: Indicative water market product delivery timeline



2.2.1 Allocation Trade

Table 2: Allocation Trade characteristics

Allocation Trade	
History	Allocation trading in some form has been around since the inception of water markets. In many areas temporary seasonal allocation trading was allowed before permanent entitlements could be bought and sold. For example, temporary transfers of water rights have been permitted in New South Wales and Victoria as far back as during the droughts of 1966–1967, not long before its more general introduction in 1986–1987. During this period there was a greater acceptance of temporary allocation trading rather than permanent trading of entitlements as most of the trading was done in Irrigation districts and exiting the district was difficult.
Geographical Coverage	Allocation trading is the most wide-spread market product across the MDB (and beyond it), both in surface and groundwater systems. The most liquid markets are in the southern MDB.
Product contracted features	
Price and Volume	Agreed trade volume and unit price paid by the purchaser.
Buyer Deposit	This varies between intermediaries, but a deposit (e.g. 10% of the trade value) may be required at transaction date, with the balance due upon trade completion.

Allocation Trade	
Use Purpose and Economic Appeal	Water allocation trading is the primarily mechanism that assists water users to respond to seasonal conditions and other short-term events by reallocating water between users within a particular year. Simply put, sellers are looking to maximise returns on their excess allocation water whereas buyers' objective is to secure water to maximise crop in-season opportunities and/or minimise input cost. Allocation Trade does not involve capital cost or exposure to asset depreciation. The full spectrum of market participants use allocation markets (from mom and dad irrigators to corporate farmers and institutional investors) both as buyers and sellers, and it is currently the most common water risk management method. Even though the price risk may be significant due to market volatility, temporary water has always been available on the market, and in most years this has been a sufficient strategy cost-wise.
Current Trend (2019/20)	 Engaging with the spot market at the time when participants need the water is still the most common method to use the water market. Stakeholders have noted that lower water availability across the MDB has resulted in historically high allocation water prices in many catchments. Regardless, demand for temporary water is ongoing as it is the most widely utilised market product and has the simplest and most liquid market.

2.2.2 Entitlement Trade

Table 3: Entitlement Trade characteristics

Entitlement Trade	
History	Water trade of permanent products in the MDB has grown since the early 1980s. South Australia was the first State in Australia to offer provisions for formal water trading of both water access entitlements and allocations in 1983. In New South Wales, the first water access Entitlement Trades were registered in 1989 between individual right holders, although there were provision for trade under the Water Act 1912 this was rarely exercised. The first Victorian water access entitlement transfers were not formally registered until January 1992 following approval of regulations setting out trading rules in late 1991. Initially, it was limited to defined locations, types of users and types of trades. In particular there was greater willingness to allow trading within irrigation districts than between districts. From the 1980 to the early 2000s, Basin States have been progressively converting water licences which were bundled to land into new entitlements that are clearly defined, secure and tradable.
Geographical Coverage	Entitlement Trading is available across the MDB (and beyond it), both in surface and groundwater systems. The most liquid markets are in the southern MDB.
Product Contracted Features	
Price and Volume	Agreed trade volume and unit price paid by the purchaser.

Entitlement Trade	
Buyer Deposit	A deposit from the buyer is typically required at the time of contracting trade (e.g. 10% of the trade value), with the remainder paid upon transfer settlement.
'Wet' or 'Dry'	The entitlement can be sold with this year's full allocation (wet) or with the future allocation from the date of contract onwards only (dry). Wet entitlements have the price of the allocation water embedded to the unit price, thus typically being more expensive than dry entitlements.
Use Purpose and Economic Appeal	Broadly speaking, permanent water buyers are looking to secure water to maximise long-term crop opportunities and mitigate allocation risk, or buy water as a long-term investment. Entitlements can result in capital gains (or asset depreciation) and be used as security for lending. Sellers' motives can be related to capitalising on the entitlement's value appreciation, or have less capital tied into permanent entitlements (and use other products to satisfy water requirements). Permanent markets serve market participants of all sizes; however, typically corporate players have a higher capacity to pay for water. Many interviewees noted that a change of market dynamics has occurred; even though it is still rare to find a permanent crop grower who wouldn't have at least a proportion of their water requirements covered by holding permanent entitlements, in general there are a lot more people in the market who don't own permanent entitlements at all.
Current Trend (2019/20)	 Entitlement values across the southern MDB have reached record high values over the last 24 months. For those who are still looking to buy permanent water (such as high value crop growers), the last two seasons appear to have underpinned their willingness to buy more high security/reliability permanent water ('never want to spend a million dollars on temporary water again'). Thus, the increased relative value of holding a high security entitlement during the drought has impacted the demand (and prices) of certain products, such as New South Wales Murray and Murrumbidgee high security entitlements. Demand for lower allocation-yielding entitlements has softened. High entitlement prices have also had an impact on the interest coming from pure water investors – for example, if the investors have a 6% return target with water Leases, would the annual per ML lease price for high security entitlement worth $9,500 per ML be $570 per ML, which is perceived as being too expensive for annual crop growers and some permanent crop growers, and well above the historical average spot market price on most years. Additional institutional level investment in water only is becoming scarce as investors see better opportunities in farmland and water packages.

2.2.3 Forward Allocation Trade

Table 4: Forward Allocation Trade characteristics

Forward Allocation Trade	
History	The use of Forwards in water markets is a relatively new concept[4]. In March 2014, the Commonwealth Government announced amendments to financial regulations to allow for the common-sense treatment of the trade of water rights, so water rights are regulated in the same manner as agricultural commodities. In effect, these regulations 'carved out' tradeable water rights from the definition of a 'financial product' in the derivatives section of the *Corporations Act 2001*, bringing greater clarity about the legal status of trading water rights. This made Intermediaries more comfortable about openly marketing such opportunities and as the market demands such products. However, forward contracts were written a long time before this amendment (anecdotally since 2004).
Geographical Coverage	Theoretically Forwards are available as a market product across the MDB, both for surface and groundwater entitlements. However, they are more popular in the southern MDB surface water trading regions.
Delivery Mechanism	Allocation Trade
Product Contracted Features	
Price and Volume	Agreed trade volume and unit price paid by the purchaser.
Delivery Date	Agreed delivery date, which can be intra- or inter-season. The buyer guarantees that they will take the water over from seller's zone, despite trade limits.
Duration (if multi-year)	Most Forwards are written for next water year or are delivered later during the current season. Multi-year Forwards were popular 2-3 years ago, but the demand for them has significantly dampened. According to intermediaries, this is because buyers are observing that the price premium is too high. Sellers are not willing to commit to multi-year contracts either unless analysis on resource availability can be done for a longer time period. Leases are currently preferred longer-term solutions as they are a simple financial equation and are easy to understand to both sides.
Buyer Deposit	Often includes a commission (typically higher than for Spot Allocation Trades) and a transfer fee associated with authority charges. In addition, usually 20% deposit (may vary between intermediaries) from a buyer is required, but no security is held from a seller. Full payment occurs when water is delivered.
Use Purpose and Economic Appeal	Forwards give buyers certainty of the volume of water they will have available upon transfer and the price they will pay (effectively locking in their profit, all other input costs being equal), providing an efficient risk management tool against allocation risk. The main benefit of Forwards compared to Leases is that with Forwards, the contracted volume is secure, i.e. Forwards are not subject to allocation risk. For the sellers the economic appeal is similar – they can lock in their future returns as well.

[4] For comparison, in financial markets these products are commonly referred to as futures contracts and have been in operation since the 17th century.

Forward Allocation Trade	
	Intermediaries are observing that since 2014, Forward markets have provided good results for Forward water buyers in all but 2016-17, meaning the price contracted during the previous year ended up below the eventual spot market price at the time of delivery. Broadly, the main suppliers of Forward contracts are water investors and other participants with large holdings. On the demand side corporate level operators with permanent crops often have higher annual water requirements, hence products such as Forwards are more accessible to them compared to family farms because the sellers of those products typically offer them in bigger lots (even though there would be demand for smaller parcels). Subsequently, the bulk of forward trades are typically done on a direct corporate to corporate or an investor to corporate basis, resulting in limited market transparency. Annual growers also utilise Forwards if prices make financial sense to them. However, Forward product is not suitable for all crops – e.g. in the Murrumbidgee growers can forward sell cotton, but in the Murray growers can't forward sell rice, so consequently more Forwards have historically been written in the Murrumbidgee.
Current Trend (2019/20)	 Since their broader inception, Forwards have been in high demand amongst the grower groups that have sought water security to avoid mid-season spot market price peaks and secure for their crop programs in advance. Due to high allocation water prices and unknown water availability in the coming season, both sellers (cannot be certain how much water they have available in the future) and buyers (hesitant to lock in a very high price for the next season since conditions can change) of Forwards are now on a holding pattern, and the demand for Forwards has decreased, especially compared to Leases.

2.2.4 Leases

Table 5: Entitlement Lease characteristics

Entitlement Lease	
History	Leasing of water entitlements has been available as a market product across all Basin States for a long time. For instance, in South Australia and Victoria the ability to lease an entitlement has been part of the State water legislation since 2004 and 2006, respectively, i.e. even before water entitlements were unbundled from land. In New South Wales Leases as a separate instrument were introduced in the *Water Management Act 2000* in July 2004 (at the same time when first entitlements were unbundled from land). In Queensland, Leases as a separate registrable instrument were first available in 2003.
Geographical Coverage	Entitlement Leases are utilised as a market product across the MDB, both for surface and groundwater entitlements. However, they are more popular in the southern MDB surface water trading regions.

Entitlement Lease	
Delivery Mechanism	Allocation Trade or Term Transfer
Product Contracted Features	
Duration	Typically, Leases are written for a longer time period (three years or more). The desired duration for the lessor and lessee varies depending on the price levels for other market products. For example, when allocation prices are high, lessors may want to maximise the lease term to benefit from higher returns, whereas lessees are incentivised to seek for shorter durations.
Price	Price per ML paid for the entitlement; normally the lessee pays for the full volume under lease regardless of the announced allocation the entitlement will yield during the lease term. For Lease products the rule of thumb has been that lessors are looking to achieve a minimum of 6% return on investment for Leases (based on the current market value of the leased entitlement).
How allocation is transferred (Term Transfer vs. separate Allocation Trades)	Basin States offer 'official' instruments to execute Leases. For instance, New South Wales provides for Leases through a Term Transfer whilst in Victoria they are formalised through a Limited Term Transfer. Despite the existing of State-based mechanisms, in recent years direct (private) contractual arrangements for Leases have become more popular than State Term Transfer arrangements. Under contractual arrangements Leases are executed through one or more Allocation Trades between the lessor and the lessee throughout the water year. The reason for increasing popularity of Leases via Allocation Trades stems from the flexibility they give the lessor compared to Term Transfers: a) In Term Transfers allocation for the entitlement is transferred automatically to the lessee whenever it is announced, regardless if they've made their lease payments or not. Leases via Allocation Trades give the lessors more control. b) Term Transfers in New South Wales and Victoria can only be done for the full entitlement volume – thus, if the lessor would only like to lease out a part of the entitlement, they would need to subdivide it first. c) Term Transfers are encumbrances in water titles – thus, if the lessor is looking to use encumbered entitlements as security for lending, the financial institutions may not accept them.
Who pays ongoing fees?	Typically, lessee pays all ongoing fees associated with holding and using the entitlement under lease.
Downside risk capped or not ('hybrid lease')	During recent seasons 'hybrid' Leases have been offered to the market. In hybrid Leases downside risk is capped – for instance if allocation yielded by the leased entitlement does not get to X%, lessor will top it up by an agreed volume. This can be used to make lower allocation yielding entitlements such as New South Wales general security more attractive for lessees.

Entitlement Lease	
Price adjusted or not (e.g. via an index)	In Lease contracts the annual price may be tied to an index (e.g. Consumer Price Index) or to an agreed percentage increase rate per annum.
Use Purpose and Economic Appeal	Entitlement Leases offer a long-term solution for both parties – longer-term water security (albeit typically comes with an allocation risk to the lessee) without capital expenses to the lessee, and a longer-term financial return for the lessor. Leases are also a cheaper way for irrigators to diversify and mitigate allocation risk (not only compared to permanent entitlement purchases, but often compared to allocation products as well). Low or non-allocation yielding entitlements such as Victoria low reliability entitlements are leased for the sole purpose of increasing the lessee's carryover capacity. The main suppliers of the Lease product are typically the same parties that provide Forward contracts, i.e. water investors and agricultural fund managers. Lessees are growers of all sizes and various crop types. However, this depends on the lease price and whether it makes financial sense for the individual grower and his margins – hence, most of the new Leases have been reportedly written for permanent crop growers. Lessors typically offer Leases in bigger parcels, so Leases for smaller volumes (below 100ML) may be hard to find.
Current Trend (2019/20)	 Intermediaries interviewed for this project commented on a substantial increase in the demand for Entitlement Leases – for instance, one intermediary stated that the annual number of Leases they've contracted has increased by 900% in the last 12 months. The resurgence in popularity originates from a few factors: 1. According to interviewees, 'for the longest time' Leases were not attractive for the lessee compared to Forwards because of the higher $/ML cost – now the situation has changed and there's an abundance of interest for the Lease product. 2. High entitlement prices have outpriced some growers from the entitlement market, and growers view Leases as the next best option. 3. As allocation water prices have significantly increased, financial institutions are reportedly critically looking at their lending customers that are exposed to the allocation market risk, asking for better visibility to their strategies to cope with the price risk and remain financially viable. Thus, growers are looking for Leases for this purpose as well. Despite strong demand, some intermediaries also noted that there are questions regarding the sufficiency of supply to satisfy demand. For instance, it was observed that many of the big water investors may not have a large amount of their portfolio available for new Leases at the moment[5]. Some also questioned the depth of the

[5] This observation is in line with Duxton Water, one of the major water investors, having 63% of its water portfolio under lease at the end of February 2020, and Duxton's long-term goal of having 70-80% of the portfolio under lease. Source: https://www.asx.com.au/asxpdf/20200316/pdf/44g2zxzrglk7my.pdf

Entitlement Lease	
	lessee side demand due to uncertainty around future water availability – 'if I'm only looking to get 30% allocation for a high reliability entitlement and paying $430/ML for it, what am I actually leasing/paying for?' (e.g. $430/ML with a 30% allocation corresponds with $1,433/ML spot price).

2.2.5 Carryover Parking

Table 6: Carryover Parking characteristics

Carryover Parking	
History	Carryover rights have been in place in many New South Wales and Queensland irrigation systems for since the 1990s. Since 2000, there have been significant changes to carryover rules in the southern MDB States. During the millennium drought, temporary carryover arrangements were introduced for the first time in South Australia and Victoria, while carryover limits in some New South Wales regions were temporarily increased. Since then, both South Australia and Victoria have introduced permanent carryover arrangements, all with varying levels. Carryover Parking allows one party to carryover an allocation from one season by utilising the entitlement and carryover capacity of another party. Whilst parking in some form has existed since carryover capacity was introduced, as a commercial standalone market product it has only existed for the last decade or so.
Geographical Coverage	Theoretically parking is available across the MDB for all surface and groundwater regions where entitlements have carryover capacity. However, certain entitlements are more suitable for parking because of their carryover characteristics and lower risk of water 'spilling' as a result of parking. Victorian low reliability entitlements are broadly the most secure entitlements[6] to park water onto as they rarely receive any announced allocation. During low allocation years Victorian high reliability entitlements are also used for parking, as are certain New South Wales general security entitlements.
Delivery Mechanism	Allocation Trade
Product Contracted Features	
Price and Volume	There is often a $/ML fee associated with this (payable to the seller/holder of the water), in addition to intermediary's commission and processing fee associated with the water authority.
Who pays storage fees? (Victoria only)	Typically, the buyer (placer) pays the storage fees associated carrying water over.
Who bears spill risk?	This refers to a situation where water is spilt as a result of parking water (either due to breaching carryover/holding limits, or in Victoria due to authorities announcing a

[6] Technically NSW general security entitlements offer 10% parking space that will never spill, whereas Victorian LR entitlements can theoretically be subject to a spill.

Carryover Parking	
	storage spill[7]). Depending on the risk bearer stipulated in the contract (holder/placer), one party could end up covering other party's losses, i.e. having to transfer allocation back. Typically, prices are higher for parking contracts where the holder bears the spill risk.
Use Purpose and Economic Appeal	Carryover Parking is a well-established and widely used instrument. It is a relatively easy product to adopt as the benefits are clear and tangible for a single purpose (placer: protect carryover water / holder: generate returns on unused carryover capacity of the entitlement). Also, the cost of the parking mechanism is often low, around $15-50/ML. A broad spectrum of market participants report using Carryover Parking , ranging from irrigators to corporate farmers and environmental water managers. Some intermediaries noted that big volumes (above 1GL) of parking space are harder to find.
Current Trend (2019/20)	 Carryover Parking product is utilised most typically during the last quarter of the irrigation season – intermediaries report current low levels of interest, stating that given the low water availability there will be a lot of parking space available but a limited amount of water to be parked. Some reported that New South Wales high security licence holders want to protect next year's water, and some interest may also come from South Australian Murray.

2.3 Are products standardised or do they vary across service providers?

Products offered on the market are relatively homogenous across suppliers. Permanent and Spot Allocation trades are the most standardised products, with only minor variance regarding which party pays the State and water authority application fees and charges. One intermediary also noted that the definition of a 'wet' and a 'dry' entitlement can vary between intermediaries.

Options have only been recently introduced to the market, so it is hard to assess if they will differ across providers. Interviewee consensus was that they are likely to be similar across the board due to Australian Financial Services Licence (AFSL) considerations. In order to offer 'pure' derivative products such as options, intermediaries would need to have an AFSL licence. Therefore, to offer option-like products without them falling under AFSL regulation, these products would need to be of specific format (e.g. the intermediaries not being a party to a transaction).

Other products are more variable in their form:

- Leases – can be structured in many ways, hence vary quite a lot (e.g. whether it's an 'official' Term Transfer vs. taking effect via Allocation Trades, if the price is tied to an index, payment times, who pays ongoing fees etc.). However, the basic product is fairly standardised, i.e. lessee bears the allocation risk (unless it's a hybrid lease) and pays all ongoing fees

[7] In the Victorian Murray, Goulburn and Campaspe systems, entitlement holders are able to carryover a volume up to 100% of their high and low-reliability water shares. This may mean that when allocation are greater than 0%, entitlement holders may have more than their total high and low reliability water share volume in a given season. If this happens, then the volume above the high and low reliability water share volume is quarantined in a spillable water account and may be lost if the storage in those systems fills and spills.

- Forwards – usually 20% deposit from a buyer, no security held from a seller. The buyer guarantees that they will take the water over from seller's zone, despite trade limits. Basic product is relatively standard (percentage deposit may vary, as may the time of final payment).
- Carryover Parking – holder/placer risk is optional, different price points depending on the spill risk bearer. There is some variance regarding who pays storage fees.

Intermediaries noted that despite similarities, there's still enough variance between the products across suppliers to make like with like price comparison difficult (even if there was a greater market price transparency for these products).

A key issue identified by interviewees is that a significant proportion of market instruments are offered off-the-market, with direct corporate-to-corporate or investor-to-corporate deals being very common with Leases and Forwards. This not only weakens market transparency, but also limits the availability of these products to a broader group of irrigators.

Interviewees also commented that there are no market products that provide a get-out clause for the seller or the buyer. The main reason is that a contract could potentially be in the derivative space, and currently water transfers need to be physically settled to avoid the AFSL requirements for the product suppliers. One of the intermediaries reported anecdotal evidence of a Forward Contract having a clause in relation to an inter-valley trade (IVT) limit being open, and if the limit would've been closed the contract would've been deemed null and void.

On-selling an instrument is generally not possible, however some Lease contracts are known to have an 'assignment to another party' clause.

3. Water Market Product Reporting – Issues and Solutions

In this section we examine market data requirements and how data is currently reported in water information systems. Following this, we investigate the types of information shortfalls within existing systems, and finally consider solutions to the identified issues.

The analysis finds that reporting for primary products is generally working well (with some notable exceptions), whereas the majority of reporting issues in relation to Secondary Products stem from the fact that since they are predominantly delivered through Allocation Trade mechanisms, different products cannot be currently differentiated from Spot Allocation Trades in State Registers.

3.1 Current market data requirements

Water markets vary between States and Territories due to the differing approaches to water planning and management and differing administrative and institutional arrangements. Each jurisdiction records and manages trade transactions on its own registry system, with the broad processes for entitlement and allocation trading being generally the same across the Basin States. In addition to State and Commonwealth Registers and dashboards, private exchanges and bulletin boards offer a variety of product information.

3.1.1 National Water Initiative

The Intergovernmental Agreement on a National Water Initiative (NWI) built on the 1994 Council of Australian Governments (COAG) strategic framework for the efficient and sustainable reform of the Australian water industry. As part of the NWI, parties agreed to established in each State and Territory, compatible, publicly accessible and reliable Water Registers of all water access entitlements and trades (both permanent and temporary) on a whole of Basin or catchment basis, consistent with the principles set out in NWI. Specific to water market data, parties agree that Water Registers established in each State and Territory will:

- provide data on all entitlements including price, trades location and identity of holder
- manage time lags between date of lodgement for registration and actual registration of dealings
- be administered pursuant to certain procedures and protocols, based on land title office manuals and guidelines that exist in various States and Territories that seek to minimise transaction costs for market participants

3.1.2 Water Act 2007

Under Part 7 of the Water Act, the BoM is required to collect, hold, manage, interpret and disseminate Australia's water information. The Act places an obligation on persons specified in the Regulations to give certain water information to the BoM including:

- issuing national water information standards
- collecting and publishing water information
- conducting regular national water resources assessments
- publishing an annual National Water Account
- providing regular water availability forecasts
- giving advice on matters relating to water information
- enhancing understanding of Australia's water resources

In relation to the above, under *Water Regulations 2008*, 13 of the larger IIOs and one rural water utility is required to report internal trades (trades or leases of Australian water access entitlements, irrigation rights and water allocations) to the BoM on a weekly basis. In contrast, some of the smaller IIOs have no obligation to report or publish their internal trade data.

3.1.3 Basin Plan 2012

In 2012, there was widespread agreement across Basin Governments that a plan was needed to manage our water carefully and protect the Basin for future generations. The Basin Plan was developed to manage the Basin as a whole connected system.

Section 12.48 of the Basin Plan

The water trading rules set out in Chapter 12 of the Basin Plan are intended to provide greater clarity and consistency for the water market across the whole of the Basin.

Section 12.48 sets out requirements for water trade price reporting:

1. If the trade of a water access right requires the approval of an approval authority, the person disposing of the water access right must notify the approval authority in writing of the price agreed for the trade
2. If the trade of a water access right does not require the approval of an approval authority but does require registration, the person disposing of the water access right must notify the registration authority of the price agreed for the trade
3. The notice must be given either at, or before, the time the approval or registration is sought

One of the main sources of noise within water market data are trades being recorded as zero value. The issue is with the current way trades are reported for both permanent and temporary water as there is no way to differentiate between different types of trades. This is because most Secondary Products are delivered through Allocation Trades, and appear accordingly in State Registers amongst normal Spot Allocation Trades. There are also legitimate trades such as gifts and moving water between other licenses in a water portfolio that don't necessary require a price to be reported.

When the various types of trades are able to be differentiated, the level of trades which are being incorrectly reported as zero value when in fact they should have a higher, market-based price can be determined.

MDBA's responsibilities

The MDBA facilitates fair, consistent and transparent water trade across the Murray-Darling Basin. To support this the MDBA provides information on water trading and works with Basin States to ensure the State rules comply with the Murray–Darling Basin Plan's trading rules.

Where price reporting is concerned the MDBA's specific responsibilities regarding the Basin Plan include:

- The compliance activity undertaken to meet water trade price reporting requirements per s12.48 of the Basin Plan
- Identifying risks that threaten the compliance with s12.48 of the Basin Plan identified above being met
- Identifying, designing and implementing controls to support and monitor compliance with the requirements of s12.48 of the Basin Plan

In relation to the above, the MDBA has developed guidelines[8] to help market participants understand trade rules in the Basin and give them much better access to market information, regardless of which State they operate in.

3.2 How is water market data reported in water information systems?

In this section we have summarised how different market products are reported in the current water market information systems such as the State Water Registers and the BoM water information dashboard.

3.2.1 An overview of the current water market information systems and what data is available

Water markets vary between Basin States due to the differing approaches to water planning and management and differing administrative and institutional arrangements. Each jurisdiction records and manages trade transactions on its own registry system, with the broad processes for entitlement and allocation trading being generally the same across the Basin States. In addition to Basin State and Commonwealth Registers and dashboards, private exchanges and bulletin boards offer a variety of product information. Table 7 and Table 8 summarise the features of the most well-known and comprehensive current water market information systems.

[8] https://www.mdba.gov.au/publications/policies-guidelines/guidelines-water-trading-rules

Table 7: Overview of current public water market systems

System Type	Location/Provider	Products Included	Data Available
State Register	NSW	Allocation Entitlement	Itemised trade data for all groundwater and surface water sources Breakdown between environmental and non-environmental Allocation Trades
	Vic	Allocation Entitlement Annual use limit	Itemised trade data for all groundwater and surface water sources Breakdown between environmental and non-environmental Allocation Trades
	SA	Allocation Entitlement Leases	Itemised trade data for all groundwater and surface water sources Breakdown between environmental and non-environmental allocation and Entitlement Trades
	Qld	Entitlement	Only aggregated summary information available for most surface water and some groundwater sources
Commonwealth Dashboard	BoM	Temporary Entitlement Leases (SA and Vic)	Itemised trade data for all groundwater and surface water sources. Covers all States and Territories and some IIOs.

Table 8: Overview of current private water market systems (grouped by system type, in alphabetical order)

System Type	Location/Provider	Products Included	Data Available
Private Exchange	H2OX	Temporary Entitlement Forward Leases Carryover Parking	Live buy/sell listings and last contracted trades for most MDB regulated surface water sources and some groundwater areas. Requires a user account to view the full temporary market data. Registration is free. Other data accessible without a user account.

System Type	Location/Provider	Products Included	Data Available
Private Exchange	Murray Irrigation	Temporary Entitlement Delivery shares	Live buy/sell listings for internal Murray Irrigation trades only. Data accessible without a user account.
Private Exchange	Ruralco Water	Temporary Entitlement Forward Leases Carryover Parking	Live buy/sell listings and last contracted trades for MDB regulated surface water sources and most liquid groundwater trading areas. Data accessible without a user account.
Private Exchange	Waterfind	Temporary Entitlement Forward Leases Carryover Parking	Live buy/sell listings and last contracted trades for MDB regulated surface water sources and most liquid groundwater trading areas. Requires a user account to view the full data. Registration is free. Leases and Carryover Parking listings are accessible without a user account.
Private Exchange	Waterpool	Temporary Entitlement Delivery shares	Live buy/sell listings and last contracted trades for northern Victoria regulated surface water and some groundwater sources. Data accessible without a user account.
Bulletin Board	Elders	Temporary Entitlement Forward	Buy/sell listings and last contracted trades for most MDB regulated surface water sources and groundwater sources in the Murrumbidgee and NSW Murray. Data accessible without a user account.
Bulletin Board	Key Water	Temporary Entitlement Forward Leases Carryover Parking Delivery shares	Buy/sell listings for most MDB regulated surface water sources and most liquid groundwater trading areas. Data accessible without a user account.
Bulletin Board	National Water Brokers	Temporary Entitlement Forward Leases	Buy/sell listings for most southern MDB regulated surface water sources and most liquid groundwater trading areas. Data accessible without a user account.

System Type	Location/Provider	Products Included	Data Available
		Carryover Parking	
Bulletin Board	Wilks Water	Temporary Entitlement Forward Leases Deferred delivery Delivery shares	Buy/sell listings and last contracted trades for groundwater and surface water sources in the Murrumbidgee, Murray, Lachlan & Goulburn. Data accessible without a user account.
Information Aggregation Platform (not a trading platform)	Waterflow	Temporary Entitlement Forward	Aggregates buy/sell listings and contracted trades from various intermediaries. Also, historical trade data from State Registers and the BoM. Requires a user account to view the data. Registration is free.

3.3 Overview of data and information shortfalls and failures within existing market systems

There is a lot of variation between the products available on State Registers and that of private exchanges, bulletin boards and information aggregation platforms. State Registers generally report water market products as either Entitlement or Allocation Trades except for Leases on the South Australian Register. This leaves many water market products hidden due to lack of lack of information capture or miss reporting. We describe the main shortfalls in the water market information below.

3.3.1 Combined Allocation and Entitlement market reporting shortfalls

Outlier pricing: One of the most reported and known issues in the water market is the large number of outliers in the price reporting of trades, such as zero-dollar (zero value) trades. At present there is no available method to report 'non-market' trades such as gifts, related-party or administrative transfers, which means that sellers have no option but to report these trades with zero price amongst normal Spot Allocation Trades.

There are also other types of outlier prices[9]. Regarding Entitlement Trades, e.g. trades associated with Basin Plan water recovery (e.g. through efficiency programs) are often reported in Registers with outlier prices, without the ability to explicitly distinguish the trade purpose.

The outlier pricing issue is universal and occurs across all market products and is the primary source of market uncertainty and 'noise' in the data.

[9] Outlier pricing issues in relation to Secondary Products are discussed separately in section 3.3.3.

Time lag registered/contracted trades: Trades in all State Water Registers are reported when they are registered. South Australian and Victorian Registers also include the date for receipt of trade application.

For Allocation Trades the lag is not necessarily significant as trade processing is quicker. However, for Entitlement Trades it can take weeks and even months for a trade to progress from contract to settlement and registration. This means that all Entitlement Trade prices have some lag when they are reported - but there is no transparency around the extent of the lag associated with specific trades. This lag can vary significantly between trades in the same resource, depending e.g. on whether the entitlements traded have encumbrances on them.

Because the Registers only report settled data, it isn't possible to directly compare allocation prices with entitlement prices as the timeline is not the same for both trade types. The implication of this is when you consider the recorded prices on any given date, the temporary trades may have been contracted 1-7 days earlier, but Entitlement Trades might have been contracted up to 3 months earlier. Because of this it would be helpful to start collecting the date of contract information in trade application forms. This information could make it easier for market participants to interpret whether an allocation trade was a Spot/Forward Allocation trade.

Trading Zone Information missing for groundwater trades: In many groundwater sources there are more than one trading zone. As groundwater usually cannot be traded freely from one zone to another, it is important to have zone specific entitlement and allocation trade data to have an accurate understanding of their market values. In the BoM dataset or State Registers, zone level data can be only found for very few groundwater sources.

Queensland trades: There is no public Water Register in Queensland where itemised Entitlement Trade data could be found. The Queensland Government website provides aggregated Entitlement Trade reporting but is lacking individual trade level detail. Itemised Entitlement Trade data is included in the BoM dataset, but does not include information on trading zones.

The BoM allocation dataset does not report prices for temporary trades that originate in Queensland, and there's no other public source for allocation trade data. We understand that the lack of price data is because the Queensland Government only recently added a requirement for water supply scheme operators to start collecting prices for seasonal assignment (temporary) trades.

Trades within some IIOs: There's limited transparency over the Entitlement and Allocation trades happening within IIOs. While specific analysis of this issue was outside the scope of this study, it is nonetheless noted as the vast majority of interviewed stakeholders identified this as an important information gap that materially affects water market transparency. This is principally because internal IIO trades in many cases constitute a significant proportion of trades in a region (e.g. within the New South Wales Murray and Murrumbidgee markets), but do not appear on State Registers.

3.3.2 Allocation or Entitlement market reporting shortfalls

Allocation market reporting shortfalls

Tagged trading: At present there is limited ability to identify Allocation Trades that are linked to a tagged entitlement and subsequently used in a different location (only NSW Water Register has the

ability to search tagged licences). Having such detail could explain unexpectedly high prices e.g. for 1A Goulburn Allocation Trades when it's actually used in Zone 7 Murray.

Entitlement market reporting shortfalls

Distinction between wet/dry trades: The current entitlement market data does not differentiate between 'wet' and 'dry' trades, i.e. permanent water sold with or without the current year's announced allocation. Wet parcels are naturally more expensive as the value of allocation water is built into the unit price (which may be up to $1,000/ML of the price). Thus, getting the pure value of the underlying entitlement is difficult if it isn't known whether any single trade was *wet* or *dry*.

Further, if the entitlement is sold wet, there will be an associated allocation trade from the seller to the buyer. Typically, this trade is reported at zero value since its value is already embedded to the unit price of the Entitlement Trade.

Water and Land Transfers: When entitlements are transferred on a 'whole of licence' basis, the Registers do not separately identify parcels transferred in conjunction with land (i.e. property sales with water). In these cases, the water transaction may be recorded at a price that does not reflect the true market value (there may be tax related benefits), making it difficult to know the fair market values from this trade data.

3.3.3 Forwards, Leases & Carryover Parking

Products misrepresented as Spot Allocation Trades: As markets have matured and new products have emerged in the Allocation Market, it is difficult to accurately and effectively differentiate between different allocation trade types on the State Water Registers as Forwards, Leases & Carryover Parking are all delivered through the allocation trade mechanism:

- Forward trades are typically contracted during the current season and processed the next year, appearing on State Water Registers close to agreed delivery dates.
- Trades in relation to Entitlement Leases are often lodged early on during the new water year, or gradually throughout the season, appearing on State Water Registers accordingly (if they are not executed as Term Transfers).
- Carryover Parking product includes two Allocation Trades, one for placing the water and another one when delivered. Transactions for placing and returning water are recorded in Public Water Registers on both sides of the water year.

None of these trade types are differentiated on the State Registers or the BoM data, but they appear there as regular Allocation Trades, often with prices that seem like outliers compared to the prevailing Spot Allocation market price. This impedes the market transparency as it is difficult to interpret raw trade data without sufficient context or nuanced details.

This subsequently means that many market participants do not realise how the Forward market has performed when compared to the Spot Allocation market or Entitlement Leases. It also means that in thinly traded areas the participants have no ways to ascertain which ones are 'real' Spot Allocation Trades – in the worst case Forward trades hitting the Register will artificially inflate the spot market prices if they are interpreted as spot trades and price signal is taken from them.

NSW/Qld Term Transfer Information: For Entitlement Leases delivered through the Term Transfer instrument, information regarding prices is only available for South Australian and Victorian entitlements. There is no available data on Term Transfers in New South Wales and Queensland.

Table 9 summarises how different water market products appear in the State Water Register and/or in the BoM data, compared to what data is captured by intermediaries offering these products.

Table 9: Summary of trade appearance in BoM data/State Water Register by product type vs. data captured by industry

Segment	Product	Intermediaries	State Registers/BoM
Primary	**Spot Allocation Trade**	Price - $ per megalitre	Price - $ per megalitre[10]
		Water Catchment/Zone	Water Catchment/Zone
		Date of contract execution	Date of approval
		Purpose (commercial vs. administrative)	Purpose (environmental vs. non-environmental)[11]
			Date trade application received[12]
	Permanent Entitlement	Price - $ per megalitre	Price - $ per megalitre
		Water Catchment/Zone/Reliability	Water Catchment/Zone/Reliability[13]
		Date of contract execution	Date of approval
		'Wet'/'Dry'	**N/A – if 'wet', associated Spot Allocation trade is reported as zero value trade**
			Date trade application received[14]
Secondary	**Entitlement Lease (Term Transfer)**	Price - $ per megalitre, annual increases	Price - $ per megalitre[13]
		Water Catchment/Zone/Reliability	Water Catchment/Zone/Reliability[15]
		Lease arrangement start date	Lease arrangement start date[13]
		Duration of lease arrangement	Duration of lease arrangement[13]
	Entitlement Lease (Allocation Trade)	Price - $ per megalitre, annual increases	**N/A - Displayed as per Spot Allocation trade, may be reported as zero value trade**
		Water Catchment/Zone/Reliability	

[10] This excludes Qld, where price information for Allocation Trades is currently not collected or reported in any public Register.
[11] This information is not available for Qld in public Registers.
[12] SA and Vic are the only Basin States that publish this information in their Water Registers.
[13] Zone level information is currently not available for Qld in public Registers.
[14] SA and Vic are the only Basin States that publish this information in their Water Registers.
[15] Information on Term Transfers is only available for SA and Vic Leases in public Registers.

Segment	Product	Intermediaries	State Registers/BoM
		Lease arrangement start date	
		Duration of lease arrangement	
	Forward Allocation Trade	Price - $ per megalitre	**N/A - Displayed as per Spot Allocation trade**
		Water Catchment/Zone	
		Date of contract execution	
		Date of water delivery	
		Duration if multi-year	
	Carryover Parking	Price - $ per megalitre	**N/A - Displayed as per Spot Allocation trade times two – often 'trade price' reported only once or not at all**
		Water Catchment/Zone/Reliability	
		Date of contract execution	
		Who bears spill risk	

3.4 Solutions to address market issues

As discussed in previous sections, there are currently market issues affecting both primary and secondary water market products (Table 10). In this analysis we have considered whether the issues are related to either:

(i) data not being captured by the industry

(ii) data not being captured by State Registers/BoM

(iii) data not being transferred from the industry to the Registers, or

(iv) data being not correctly reported by the State Registers/BoM (See Appendix A).

Table 10: Summary of market issues

Segment	#	Issue
Primary	1	**Outlier pricing**
	2	**Time lag registered/contracted trades**
	3	**Trading zone information missing for groundwater trades**
	4	**Queensland trades**
	5	**Trades within some IIOs**
	6	**Tagged trading**
	7	**Distinction between wet/dry trades**
	8	**Water and land transfers**
Secondary	9	**NSW/Qld Term Transfer information**
	10	**Products misrepresented as Spot Allocation Trades**

The remainder of this chapter focuses on the solutions to address the above issues. Specifically focusing on:

1. The scope and type of data required to be available to fully inform the market
2. Immediate options that seek to address any data and information shortfall and failures within existing systems – including the misclassification of water products and the misreporting of price information (assuming data is collected and captured as per status quo)
3. Short-term options that seek to address any data and information shortfall and failures within existing systems – including the misclassification of water products and misrepresentation of price information (assuming data collection and capturing is improved)

4. Medium-term options that seek to capture and report the transaction information for emerging products and products misclassified and/or not currently classified within existing systems

5. Longer-term options that seek to optimise water market reporting arrangements.

3.4.1 The scope and type of data required to be collected to fully inform the market

For water markets to operate efficiently and provide equitable opportunity to participate, market participants need access to reliable and transparent information. The scope of data for a fully informed market would provide accurate and complete information for all products, primary and secondary, enabling market participants to make informed decisions with access to all possible available information. The type of data for each of these products will ensure the prices reflect the actual value of the underlying market product.

Table 9 summarised the appearance of trades in BoM data/State Registers by product type versus that captured by intermediaries and industry. As illustrated, there is a wide gap between the level of data collected and displayed in the BoM data/State Registers compared to industry. This is partly due to a lack of data fields available on trade applications, and a disconnect between the BoM data and data shown in State Registers.

In a fully informed market, we could expect to see information in Table 11 and Table 12 disclosed about water market products in water market information systems:

Table 11: Entitlement and Allocation Trade information

Entitlement and Allocation Trade Information
• Date trade contracted
• Date trade application received by the Authority
• Date trade application approved by the Authority
• Water licence number of buyer and seller
• Buyer/seller type (e.g. Water Corporation/IIO, Private, Environmental)
• Entitlement class
• Origin and destination of water (e.g. to/from zones if inter-zone trade possible)
• Trade volume
• Price per megalitre (ML)

• Type of Entitlement Trade
  ○ Administrative (e.g. changing ownership under different company name) and Gift/Donation
  ○ Water traded with land
  ○ Commonwealth water recovery trades
  ○ Other environmental trade (e.g. trade from one environmental water manager to another)
  ○ "Regular", arms-length commercial trade
  ▪ With or without water allocation ('wet' or 'dry', or ML of allocation included)
  ▪ If internal IIO trade, was it traded with or without delivery shares (and if yes, how many)
  ▪ Qld IIO regulated water specific; is the entitlement river or channel water

• Type of Allocation Trade
  ○ Forward trade
  ▪ Inter or intra-season
  ○ Tagged trade
  ○ Carryover parking trade

Entitlement and Allocation Trade Information
○ Option/financial product trade ○ Administrative trade (e.g. between own accounts) and Gift/donation, or allocation trade associated with Entitlement Trade ○ "Regular", arms-length commercial trade ○ Environmental trade ▪ Commercial or administrative ○ Government program trade – e.g. Water for Fodder

Table 12: Lease Trade information

Lease Trade Information
• Date trade contracted
• Date trade application received by the authority
• Date trade application approved by the authority
• Lease arrangement start date
• Duration of arrangement
• Type of trade ○ Term Transfer or Lease via Allocation Trades
• Water licence number of buyer and seller
• Lessee/lessor type (e.g. Water Corporation/IIO, Private, Environmental)
• Entitlement class of buyer/seller licence
• Origin and destination of water (e.g. to/from zones if inter-zone Allocation Trades used to bring lease into effect)
• Trade volume
• Price per ML

We note these represent preferred scopes of data – but not necessarily how they should be structured on Basin State transfer forms. That can be done in many ways, e.g. the way it has been structured above (e.g. all allocation-based Secondary Products are under allocation trade information), or using a different sequencing (e.g. categorising Allocation Trades into Commercial (normal Spot Allocation Trades), Related Party, Contract (would then include sub-categories for Forward, Carryover, Lease etc.) and Environment.

It is important to recognise there are a range of market users whom all require varying degrees of information in order to be classified as fully informed. The data requirements for an irrigator may be very different to those of water industry consultants. However, we believe that the above information could be captured and presented so that it provides benefits to all market participants, regardless of their market understanding.

Based on stakeholder engagement, no insurmountable barriers exist for collecting and publishing information in the above tables via Basin State or Commonwealth water information systems.

Two exceptions may be trade licence numbers in South Australia and Victoria where privacy laws restrict their publishing; and Basin State reporting capabilities which vary between Basin States due to political, social and economic reasons.

3.4.2 Immediate solutions

Table 13 sets out possible options to immediate address any data and information shortfall and failures within existing systems – including the misclassification of water products and the misreporting of price information (assuming data is collected and captured as per status quo). These solutions should be considered as soon as possible.

Table 13: Immediate solutions

Immediate	Issue # addressed[16]
MDBA and the States **to prepare/update guidelines** to inform sellers and buyers of their obligations to disclose the prices at which trade actually occurs. This could entail detailed guidance such as instructing participants and intermediaries what prices to disclose per water market product: <u>Entitlement Trades:</u> • Always report full unit price for commercial arms-length and Commonwealth water recovery trades (regardless of being 'wet'/'dry') • Report all administrative trades such as moving water between own accounts or allocation trade associated with Entitlement Trade at zero value (unless there is a legitimate contracted trade value and money is changing hands when transferring entitlements between related entities) • Report trades associated with land transfers with the water value only, separately for each entitlement that is part of the transaction (typically water assets are valued separately by valuers and information should be available to sellers) <u>Allocation Trades:</u> • Always report full unit price for commercial arms-length Spot Allocation and Forward trades (for each transaction if multi-year forward) • For Carryover Parking trades, only report the first transaction at the full unit price, and the second trade for returning the water should be reported at zero value (to avoid doubling up the trade value) • Report all administrative trades and non-commercial environmental trades at zero value <u>Lease Trades:</u> • Always report full unit price for all lease trades, including the annual increases where possible (regardless of being a Term Transfer or lease via Allocation Trades)	**1** **7-8** **10**
States (NSW, SA and Vic) to prepare instructions for market participants regarding how to find **information about environmental water trades** in their current Registers.	**1**

These immediate actions may not fix the underlying data collecting or reporting issues, however consistency around price disclosure will enable market participants to better identify products that are misrepresented as Spot Allocation Trades from the raw data.

[16] As numbered earlier in Table 10.

Consistent price disclosure guidelines that are developed in consultation with industry associations will enable market-wide education and buy-in from key groups such as the Australian Water Brokers Association (AWBA). It is important that the MDBA seek final input from the Basin States to ensure any guidelines align with current and future changes to trading processes and forms. This will ensure that the guidance remains relevant.

Consistent price disclosure can also increase the quantum of legitimate zero value trades – in our opinion it is much better to disclose legitimate trades with prices that appear as outliers in the Water Registers (e.g. Forwards or Leases) than to report legitimate commercial trades at zero value. This is because if legitimate commercial trades for Secondary Products are reported at zero value, it is not possible to identify them from the Spot Allocation trade data at all, and it is equally hard to assess what is the proportion of legitimate zero value trades such as related party transactions. Further, according to stakeholder consultation and our experience, price signals for Spot Allocation markets within the MDB are typically relatively clear and are extensively reported both by the industry and the State Registers. Therefore, we do not see any issues with having Secondary Product trades reported in State Registers at prices which seem to be outside of the Spot Allocation market price. This also teaches the market to report different products in a consistent manner in anticipation of transfer forms and reporting systems being able to capture the more nuanced trade data.

Regarding Entitlement Trades, reporting the full unit price, regardless if any allocation was included in the sale price or not, is the only consistent way to report trade prices under the current State Registry systems. For example, in New South Wales whole of licence entitlement transfers the allocation account (and any water on it) will be transferred to the new owner at the same time. Hence, separating the value of the allocation trade from the unit price and disclosing that separately as part of an allocation trade is not possible since there is no separate allocation transfer.

Whilst information is readily available on New South Wales, South Australia and Victoria Water Registers regarding environmental water trades, the awareness of environmental water trades amongst market participants is poor.

Better awareness would enable the participants to better understand the scale of legitimate zero value trades – for instance, based on our analysis in both 2017/18 and 2018/19 water years, environmental trades accounted for more than 50% of all zero value Allocation Trades across the Basin.

3.4.3 Short-term solutions

Table 14 sets out short-term options that seek to address any data and information shortfall and failures within existing systems – including the misclassification of water products and the misrepresenting of price information (assuming data collection and capturing is improved).

Table 14: Short-term solutions

<1-2 Years Short term	Issue # addressed
Making better use of current data captured by States (water or land titles). This could be achieved by through consultation with Basin States and the BoM. For example, information relating to Term Transfers in New South Wales is collected but not published. Making this information publicly available would improve market transparency of the Lease product for all users. In addition, some data that is reported to the BoM is not currently published (such as trading zones for Queensland Entitlement Trades). The BoM should consider making changes to its reports/data exports to include this detail.	**4** **6** **8** **9**
Intuitively, the easiest way to start capturing lacking information would be to **amend trade application forms** e.g. by adding tick boxes for different trade types. Following this, if it would be feasible to implement incremental changes to the current reporting systems in the short term, this would result in some immediate benefits. For instance, inclusion of a date of contract would allow the lag between application submission and water delivery to be determined, enabling participants to better interpret raw data and identify different trade types (e.g. Spot vs. Forward).	**1** **2**
A key issue across the MDB is the level of information that needs to be collected to properly inform the market will require cooperation and investment by all Basin States, the Commonwealth and the BoM. As discussed earlier in the report, there is a range of information collected by the water market industry and intermediaries. The use of an **industry-based information aggregator** could allow quicker/lower cost aggregation of data to properly inform market participants.	**Hypothetically 1-10**
Improve reporting in accordance with the requirements under the Commonwealth Water Regulations. There exist requirements where certain larger IIOs are required to send internal trade data to the BoM. Making sure that reporting requirements are met would be beneficial for improved transparency in relation to internal IIO trades.	**5**

Based on stakeholder engagement, we understand that there are no significant barriers within Basin States that restrict changes being made to trade application forms. The MDBA should consult with Basin States to align their trading forms and improve the level of data capture such as a field to capture trade type/purpose such as environmental, Lease, Forward etc.

In most cases work is already underway across Basin States and the MDBA should be focusing on ensuring these charges are harmonious between States so that the changes can feed into the longer-term solutions outlined below.

3.4.4 Medium-term solutions

Table 15 sets out medium-term options that seek to capture and report the transaction information for emerging products and products misclassified and/or not currently classified within existing systems.

Table 15: Medium-term solutions

2-5 Years Medium Term	Issue # addressed
Improve the nuance and level of detail reported in the current State Registers. Intuitively, if nuanced trade data is captured in trade application forms, this data should ultimately be made available in the public Water Registers. However, we appreciate that fact that it is one thing to collect more data (e.g. via transfer form changes), and another to have sufficient information systems to facilitate efficient reporting of that data as this would require improvements to the current Registers. Thus, this solution would necessitate funding to implement the required changes.	**1-4** **6-10**
The above could coincide **with extending the current data collection obligations**. Under the Basin Plan, Section 12.48 requires water sellers to provide the trade price. This obligation could be extended to report both the trade price and purpose (assuming there's a tick box in the application form enabling to fulfil that obligation). In addition, the obligations in Water Regulations could be extended to cover smaller IIOs as well.	**1-2** **5-8** **10**
To improve data reporting without major upgrades to current Registers, as a lower cost solution Basin States could initially **collate the raw information and make it available for download**. Following this, the extra information could be embedded into reporting systems later as either funding or support becomes available. Alternatively, dissemination of the raw data could be done by a third party from the private sector. This would mean that funding to support State system updates would not be required, and/or it could be a quicker way to publish more detailed data.	**1-2** **4** **6-8** **10**

Publishing more nuanced data would require improvements to the current reporting systems, necessitating funding to implement the changes. However, feasible low-cost solutions may exist as interim and/or short-term options.

For instance, Basin States noted that there are few barriers restricting publishing raw data (with additional details once collected) as an interim measure. It was also suggested that third parties may be able to contribute when considering options to aggregate and publish water market information from various jurisdictions. Some interviewees saw that "governments do not have to provide everything for everybody" and leaving government to focus primarily on collecting the information may assist in fixing the issue.

In terms of extending the current data collection obligations under Section 12.48 of the Basin Plan, consideration needs to be given to the ability to compliance and monitoring. Some stakeholders noted that the Victorian broker portal already effectively has *de facto* enforcement powers that

people acknowledge when they use the system. An alternative to expanding s12.48 obligations could therefore be a similar Basin-wide shared portal across Basin States that could give improved rigor without actual changes to legislated powers which can take considerable time.

3.4.5 Long-term solutions

Table 16 below highlights longer-term options that seek to optimise water market reporting arrangements over a 5 to 10-year timeframe. The ability to achieve these solutions is contingent on progressing all dependent prior solutions. This implementation process is mapped and discussed further in this paper.

Table 16: Long-term solutions

5-10 Years Long Term	Issue # addressed
A long-term goal for water markets across the Murray-Darling Basin (and potentially beyond), is a **central Water Register** or repository that could possibility be run by the BoM which already has power under existing legislation to collect water market information. A central Register (capturing all the data to fully inform the market and underpinned by the work done in the short and medium-term) would lower the transaction cost of all market participants. We note that the proposed solution is a central Register or repository to view water market information, *not* a central exchange or a clearing house. An alternative approach would be to **harmonise existing Registers** e.g. in terms of information offering and product definitions. However, in this approach there would still be several separate Registers, and the benefits regarding lower transaction costs might not be as great as with a centralised Register.	**1-10**
Across Basin States, the naming conventions vary and cause confusion among market participants. Given water can generally be trade separately from land and across State boundaries in the case of the southern Murray-Darling Basin, **universal water market definitions** should be developed and deployed to ensure market products and trading terms are more easily understood and provide confidence to market participants. We note that this was one of the objectives of the NWI, but little progress has been made over the last 15 years.	Overarching transparency
Current regulatory requirements see the BoM as the central point of water data collection, and the MDBA has regulatory and compliance obligations regarding the Basin Plan Water Trading Rules. The ACCC is the enforcement agency for the water market rules and water charge rules which primarily affect IIO's, irrigators within IIO's and water delivery operators. Moving forward, it may be prudent to **review and adjust regulatory roles** as the water markets continue to evolve.	**1**

Efficiency of water market information is a key challenge. Water market information in Australia suffers at the same time from there being too much (on some issues) and too little information

available (on others), making it confusing for market participants. For example, in the southern MDB there is a huge amount of (often overlapping) data disseminated daily by many stakeholders (Registers, intermediaries, information platforms) just on Spot Allocation products. This can be daunting for many participants as too much information means higher barriers to trade and/or reliance on brokers. At the same time the information on Secondary Products and entitlements is not nuanced enough, also constructing barriers to trade. The real challenge is to disseminate the information so that it won't confuse participants more but provides them with all the necessary information needed to make an informed participation choice.

There is also a market development challenge in relation to the role/powers of the State-based public Water Registers. States and Territories have historically developed Water Registers in isolation with little interoperability. This stems from States establishing their initial water trading Registers at differing times, but also reflects States are responsible for the licensing and managing of water resources in their respective States.

In areas of the Basin where systems are interconnected and water participants can trade across State boundaries, often Registers are duplicating the trade information by publishing interstate trades in both State of origin and destination. In addition, internal IIO trades constitute a significant proportion of the trade but are not reported on State Registers.

The intuitive long-term solution to resolve both issues is to provide a singular point of access for Register data through a central Water Register or repository. Unbiased, "central point of truth" argument is sound and broadly supported by stakeholders. It is also recognised that there is a role for the government to make data freely available to everyone. It is important to note that a singular point to Register data would not preclude the statutory role of the States, however there would need to be a clear delineation between any statutory approval/Register maintenance obligations.

A centralised Register would ideally have a real-time link with the States' approval processes, and have a set of regulation sitting underneath, effectively auditing trade information sent by the intermediaries. This way people could trust the information, and there would be built-in alignment between broker sites and the Register.

The current role of the BoM is seen amongst stakeholders as sometimes problematic, but also the potential answer to many issues:

- The operator of the central Water Register would most naturally be the BoM as there is already existing legislation that give the authority to collect water market information across Australia[17]
- At present, if the States start to collect more nuanced data, there are no barriers for the BoM to collect and publish that data as they can publish whatever data "in the public interest"
- There are also no insurmountable barriers (over the long-term) to make data from the States/IIOs available close to real-time
- Further, there are no fundamental reasons why existing obligations regarding Water Regulations could not be better enforced or expanded. We acknowledge that expanding the

[17] For instance, the BoM is the legislated recipient of IIO trade data whereas Basin States do not have any powers in that regard.

obligations would have to represent good value for money if this is to be implemented, especially since the 2016 interagency review[18] into providing water information to the Commonwealth recommended measures to reduce the regulatory burden and costs of providing water information to the BoM and other agencies.

In discussions with stakeholders there is a perception that the awareness of the role the BoM plays in water markets is low. It was suggested by some that the MDBA or a National Water Commission type of organisation would be a better fit for hosting a potential central Register.

An alternative to the centralised approach is to 'harmonise' Registers, or share common modules between jurisdictions. It is recognised that good interoperability between the State Registers is needed. If not centralised, parts of the system should be shared such as trade feasibility check and validation methodologies.

Some of the interviewed industry stakeholders, such as the AWBA, supported rolling out the Victorian broker portal model as it has heightened rigor in relation to accountability and integrity of brokers that results from annual audit processes. Some stakeholders also suggested that a similar approach to the Victorian broker portal could be shared as a 'module' for all States to implement and harmonise these aspects of the Registers. We acknowledge that there are practical considerations in terms of sharing existing Register modules between Basin States, particularly as implementing shared features may require broader redevelopment actions, therefore being a longer-term solution rather than immediate.

Finally, there is no clear view presented by stakeholders on benefits resulting from a regulator change as a long-term solution. For example, at this stage there is no consensus that if there were additional powers to enforce, who should have the powers and whether a broader view of water markets needs to be taken beyond the MDB. Acknowledging that the further evolution of water markets is likely to encompass markets outside of the Murray-Darling Basin, consideration should be given to moving or adjusting the regulatory responsibility of water markets to a national regulator like the ACCC.

3.4.6 Solution roadmap

It is pivotal that the shorter-term actions support the long-term goals. That early solutions should be implemented in a manner which contributes towards meeting the eventual objectives. Furthermore, it is almost more important to lock in the long-term objectives as soon as possible so that incremental solutions can support this.

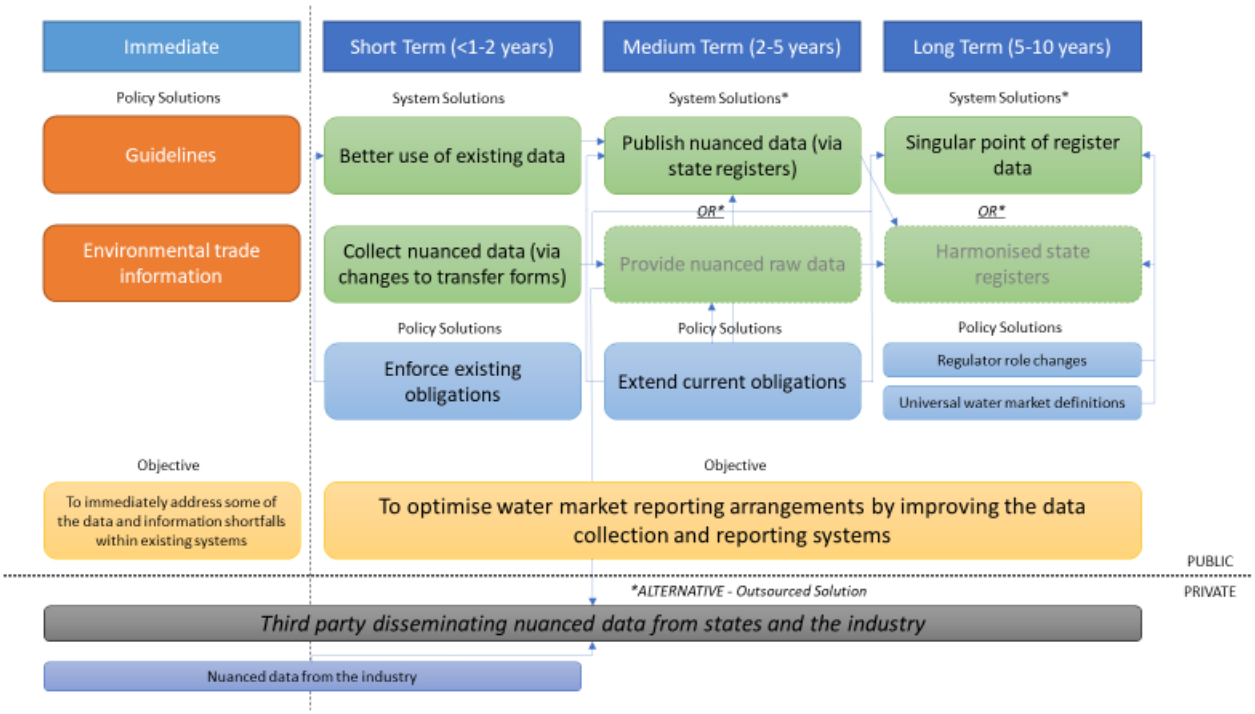
Figure 2 illustrates how the solutions presented in this report are connected, and how they can be deployed gradually to meet the ultimate market reporting targets. We note the following:

- This is a high level, 'blank canvas' type of roadmap, not factoring in all real-world barriers (such as funding). In reality there would have to be some detailed cost-benefit analysis done to justify investment in each solution

[18] See http://www.bom.gov.au/water/regulations/document/IAWGOutcomes.pdf

- All solutions should be looked from a point of view where ALL related water information (e.g. storage levels, inflows, trade limits) – not just trade data – is easily available to support market participants in an ideal fashion
- We acknowledge that some Basin States have different execution timelines, and moving forward may not realistically happen in step with other States
- In our roadmap some solutions are optional – e.g. the long-term objective can either be a centralised interface (Register) OR harmonised State Registers
- Immediate solutions won't fix the underlying data capturing and reporting issues, but serve a worthwhile purpose
- We acknowledge that collecting and reporting data are two different things – however there are viable low-cost options to disseminate data if it exists (e.g. States provide detailed raw data -> industry can take this and disseminate/make use of that). Third-party involvement might be beneficial in this regard
- We believe that a central Register/data interface can be a relatively lean approach – for instance, States collect (better) data, which is aggregated and published by the BoM or another entity. Aiming for a centralised solution does not mean that everything needs to be re-invented, but some of the current models and modules could be rolled out for a broader use.

Figure 2: Roadmap to achieve improved water product reporting



3.4.7 Perceived barriers

The solutions and the roadmap presented in the above sections are based on 'blue sky' thinking, not factoring in all the real-world impediments and restrictions. Whilst thinking about solutions on a

conceptual and idealistic level was the objective of the stakeholder engagement, certain barriers were perceived by some interviewees. These are discussed and addressed as follows.

Central Register: it was pointed out that a national approach was attempted some years ago with the National Water Market System (NWMS). Some stakeholders argued that the NWMS did not meet its objectives, and that experience would be a major impediment to get sufficient buy-in from the Basin States for a centralised Water Register. It was also questioned whether many participants would be interested in getting information across Australia from a singular point, and the main benefits may be achieved in connected systems such as the southern MDB.

However, the knowledge base has improved and if it was well executed the benefits from a centralised Register/data access point would outweigh the barriers and concerns. Compared to the current situation where all States are cyclically developing their own systems in isolation, a centralised solution has the potential to achieve efficiencies for the States and all market participants through lower development and transactions costs over the long term. The non-ideal outcomes of the NWMS should not be the reason why a perfectly viable solution should not be attempted again.

Immediate Guidelines to fill in trade applications: some noted that trade processes vary slightly between jurisdictions. Thus, it was questioned whether the guidelines should be jurisdiction specific. We consider this to be a valid point, but if guidance is done well on a specific product level (e.g. if you've contracted Forward allocation, the price you should declare should be X in all jurisdictions), supported by visual examples, it may be possible to product Basin-wide information products to address the issues.

Changing Transfer Forms to collect more detailed data: a small number of interviewees noted that if the States are not granted additional powers to enforce data collection and compliance, additional detail may not be accurate even if it is collected. This view was not supported by most of the interviewees. We are strongly of the opinion that lack of additional enforcement does not provide a reason for the States to not collect better data as most participants are and continue to do the right thing in this regard. Importantly, transfer form changes would be supported by the intermediaries who lodge most of the trades in the major trading areas.

Nuanced Information: one interviewee believed that nuanced trade information will not benefit the average farmer, just the specialists. Again, this view was not supported by most of the interviewees, but it was broadly agreed that even if people don't engage directly with this information, ultimately it filters through to them one way or another. This is not going to happen if the data does not exist. We are firmly of the opinion that better data underpins understanding, and understanding gives participants confidence to act on the market and make informed decisions.

Communication and Collaboration between Basin States: it was pointed out by many that all States work with the same issues, but then to try to find solutions in isolation. Hence, for the States to use consistent procedures and formats would require changes to entrenched bureaucracy and 'tribe mentality'. Federal leadership and bipartisanship are required to overcome this barrier.

4. Water Products: Market Metrics

Due to the market information issues discussed in the previous section, estimating the popularity of different products may be difficult. This is especially the case with Secondary Products. As Leases (via allocation transfers), Forwards and Carryover Parking trades are reported amongst Spot Allocation Trades in State Registers, it is hard to estimate the popularity and annual trade volumes for these products based on public data.

4.1 Estimated uptake and popularity of market products

Regarding the uptake of different water market products, the popularity of the basic Spot Allocation and Permanent Entitlement Trades has been high since water markets were established in Australia.

However, the interviewees noted that over the last 5-10 years there has been a gradual change of paradigm regarding holding Permanent Entitlements. Two to three decades ago permanent crop growers relied almost exclusively on permanent water. Today, according to interviewees, it is harder and harder to find a participant who wouldn't have a degree of exposure to allocation risk, i.e. a strategy where only permanent water is held is becoming rare.

4.1.1 Spot Allocation and Carryover Parking are regularly traded

The consensus amongst interviewees was that a Spot Allocation trade is the most common market instrument to be used for water risk management. Also, Leases have 'always' been popular, because it is a product that's easy to understand and offers a long-term solution for both parties (albeit typically comes with a risk to the lessee). Intermediaries noted that a lot of Leases have been written in the last 12-24 months, indicating a growth in popularity.

Carryover Parking is also considered a widely used instrument that has been around for many years. Equally, it is a relatively easy product to adopt as the benefits are clear and tangible for a single purpose (carryover).

4.1.2 Uptake of Secondary Products is growing but remains a small proportion

It is our understanding that only a small proportion or irrigators use alternative water market products – interviewees estimated this to be roughly at 5-10% (for Leases this can be higher). Even though Forwards market is anecdotally growing, and an increasing number of different participants are using them, it's still mostly a corporate to corporate type of market.

According to the stakeholders, the main reasons and impediments for the slow uptake of Forwards include:

- Lack of understanding by irrigators
- Lack of time to research pros and cons
- Significant counter party risk for both sides - intermediaries do not hold a security from a seller. So far, no defaults have been reported, and even multi-year Forwards have been respected despite drastic market movements

- Product not suitable for all crops – e.g. in the Murrumbidgee growers can forward sell cotton, but in the Murray growers can't forward sell rice, so consequently more Forwards are written in the Murrumbidgee
- Lack of market transparency (albeit some argue that there's enough of it with Forwards, parking etc.)
- Product realistically only available if the buyer is requiring significant volumes (gigalitres or at least several hundreds of ML) of water as sellers often not considering small parcel sizes
- Farmers can be overly optimistic about water prices next year, hence not willing to commit to a price ('it's going to rain')
- Farmers are prone to think about the 'losses' even though what they're doing with Forwards is locking in their profits. In other words, they only see the risks, even where they don't exist, but don't see the upside
- Cost of product can be high (especially right now) – this means that corporates with a stronger balance sheet and greater access to financial resources are better positioned to use these products, whereas smaller family farmers may be somewhat limited.

Outside of Leases and Forwards, the uptake for other Secondary Products has been low. Deferred Delivery, for example, is only offered by one or two providers (self-funded by intermediaries – would require a financial institution backing in a wider scale). Hybrid Leases (lease with a capped downside risk) have been offered in recent years, but there not a whole lot of providers for that sub-product.

4.1.3 There is interest but limited uptake of other products

Water Finance (e.g. line of credit) products have been rare in the market, most likely due to AFSL requirements. Whilst the interviewees saw potential in this product, some pointed out that it would only be suitable for certain crop types.

Water Insurance products (e.g. top up if allocation doesn't get to certain %) are not widely offered, yet but are perceived to be interesting for both everyday irrigators and sophisticated sellers of other products (e.g. an institutional investor we interviewed was keen to *take* such an insurance, not supply).

Regarding Call Options, one intermediary reported that they have already done a 'couple' of them; another intermediary mentioned that they are close to starting to offer such products.

There were mixed opinions about the market potential of call options. Some stakeholders argued that market volatility would the best time to conduct such contracts, but this would increase the premium, making it accessible to a smaller group of participants. Also, the providers of Call Options are likely to restrict sellers to the sophisticated end of the market (to reduce counter party risk), which reduces the availability of the product. Some stakeholders noted that demand side call options will be likely to be supported by sophisticated groups, but there's limited market on the demand side outside of them.

4.1.4 Markets for many products are still immature

Some intermediaries believed the water trading industry is not selling enough Forwards to justify the existence of options – '*90% of people have never even used Forwards'*.

This means that the market for Forwards and other Secondary Products is still relatively new and immature when compared to 'regular' Spot Allocation, Lease and Entitlement markets.

A key point of note is that stakeholders confirmed that a lot of market participants are yet to be introduced to any products outside of spot allocation trading. In the future the demand will continue to shape the uptake of market instruments, and at present the southern MDB market may not ready for a large-scale adoption of sophisticated products. For instance, here appears to be very limited current demand for complex derivatives or options with cash settlements simply because in the end buyers want the water.

Geographical differences appear to be a key influence over product uptake with location impacting the uptake (or lack thereof) of different market products, or making them less accessible. For instance, in the Murrumbidgee the IVT trade limit has been closed both ways in the recent years, making commitment to interstate Lease or Forward contracts hard for irrigators. Also, local entitlement and market characteristics can create incentives or disincentives to use water market products.

Whereas leases are understood to be growing in popularity in South Australia, uptake of Forward contracts is proving to be slower than is the case inter-state. Based on our interviews and market analysis there appears to be several reasons for this.

South Australian irrigators benefit from high and early access to their water allocations. Since 2011, irrigation on the South Australia Murray have received the full (100%) allocation for their entitlements, and in all but two years they received the full allocation at the start of the water year. Additionally, the quarterly meter reading cycle (which is less frequent than in New South Wales and Victoria) means that instead of purchasing forward water in years when allocation is low they can instead actively rebalance their water use over the three month period.

Growers have commented that they are concerned about counterparty risks, namely that they have paid for the Forward but the counterparty fails to meet their obligations. Although there are no apparent case studies of counterparty failure, this is nonetheless a disincentive particularly as they are likely to be buying forwards when market prices are elevated.

Finally, most water in South Australia is used on permanent horticulture and viticulture. Because inadequate water can have significant implications for future plant yields growers traditionally took a risk averse permanent holding position to minimise water allocation risk. However, since the water efficiency grant programs, some interviewees commented that many irrigators have reduced their water holdings and are more reliant on temporary water to meet their needs. Additionally, there are some suggestions that the inter-generation transfer that has been occurring in the region has seen more irrigators opt for lease arrangements because it is too expensive to buy both the land and water. This could see interest in Lease and Forward contract grow into the future.

Box 1: Northern MDB and Secondary Market Products

The utilisation of Secondary Products in the northern MDB is much lower compared to the southern MDB. Some Forward contracts have been written in the Lachlan, Macquarie and New

South Wales Border Rivers, but generally markets for Secondary Products are thin or non-existent[19].

Volatile allocations: Broadly, water availability in the northern MDB is much more volatile compared to the southern MDB. For instance, some catchment can go many years in a row without any announced allocation for general security entitlements, and growers must carefully regulate their available carryover water or use groundwater (if available) in order to grow a crop. Simply put, even when availability is high, there's less 'lazy' water available, meaning that supply to the market will be limited for Secondary Products.

At the time of writing most northern catchments have ongoing restrictions in terms of accessing water they have on their accounts (for instance, in the Lachlan water users have access to 57% of their general security carryover balance). Thus, according to intermediaries, in the current environment no one is even considering Forwards or Leases as access to any water in the future is uncertain.

Entitlement mix: In all northern New South Wales catchments, there's only a combined total of 67.5GL of high security entitlements on issue. In comparison, in Murray and Murrumbidgee there's more than 570GL of high security entitlements. This means that the markets in the north are lacking secure supply for Forwards and Leases year on year.

Crop mix: Cotton is the dominant crop in most northern MDB catchments. Put simply, markets generally work more effectively and efficiently when there are multiple market segments with different capacity to pay and timing of water requirements. In northern MDB most water users have very homogeneous requirements, meaning that lack of diversity will hinder the uptake of secondary market products.

4.2 Estimated trade volumes for Secondary Products

As previously mentioned, Secondary Products such as Forwards, Leases and Carryover Parking are not separately recorded in the State Water Registers. Consequently, it is hard to estimate the annual trade volumes for different products. This study has used the following data sources to support estimates of genuine Allocation Trades versus those that use Allocation Trades to facilitate other products:

1. BoM trade data for Term Transfers
2. Public data on the intermediary websites
3. Anecdotal evidence collected from the interviews
4. Waterflow data for 'cluster analysis' to approximate annual trading volumes for Forwards
5. Assess the baseline supply of Forwards and Leases from known water investors.

Estimates have only been made for southern MDB catchments due to data limitations, and the fact that the market penetration of alternative products, in our assessment, is of small scale.

[19] With one exception; for supplementary water Allocation Trades some northern NSW systems have relatively active markets with up/down payment arrangements (pay up front a smaller $/ML fee, full payment if access is declared). However, access to supplementary water is very cyclical, and there may be no events for many years.

4.2.1 Estimating the baseline supply for Lease and Forward products

Based on interviews with intermediaries and our prior market analysis, we note that one way of estimating the potential market size for alternative market products is to investigate the known suppliers of those products and their current water holdings.

It is well established that the largest suppliers of Forwards and Leases are the institutional investors that have invested large amounts of capital in water assets, and the investment model is based on creating a financial return primarily from these assets alone (instead of creating a return based on farmland and water). Our research has identified that the major institutional investors altogether hold an estimated volume of 400 gigalitres (GL) of water entitlements, of which nearly all are held in the southern MDB.

It is further estimated that roughly 260GL of the 400GL are high security/reliability entitlements in the southern MDB. Based on public information and our experience, we conservatively assume on average 70% of these entitlements are under lease at any one time. This results in the baseline for the Entitlement Lease product being approximately 180GL.

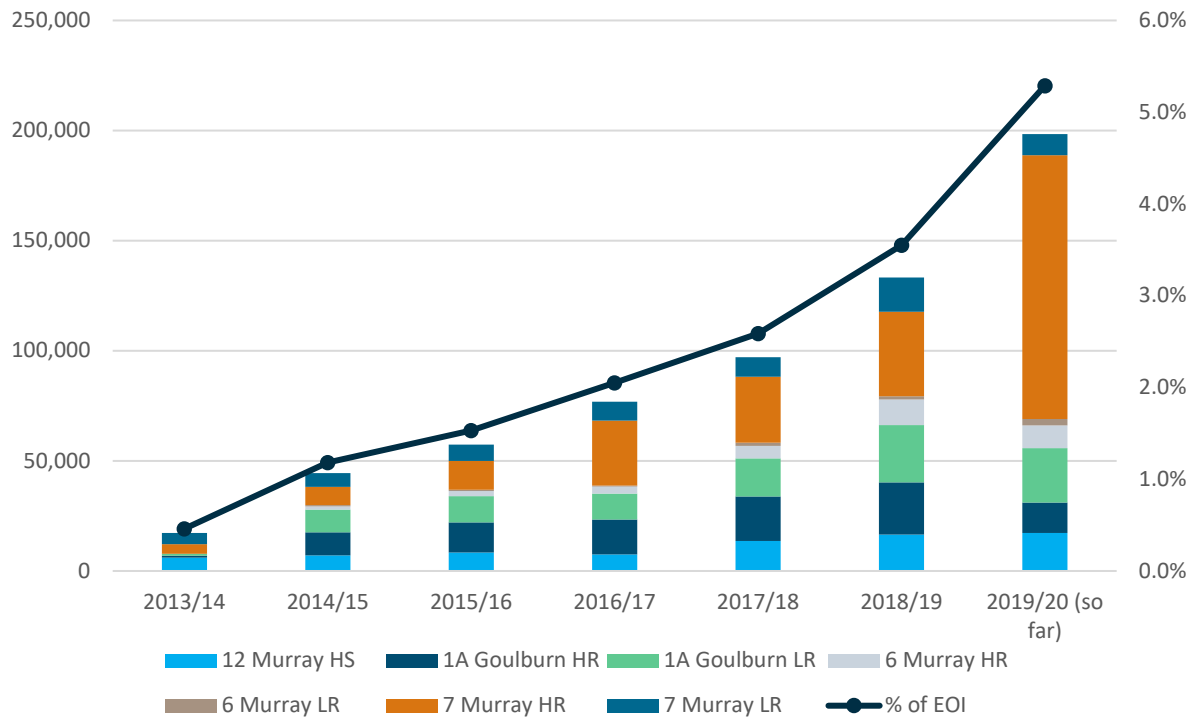
4.2.2 Estimated trade volumes of Entitlement Leases

On top of the 180GL baseline coming from institutional investors' higher reliability entitlements, a proportion of other entitlements of these investors would also be under lease. Our conservative estimate is that on average 50GL of general security and low reliability entitlements held by the institutional investors are under lease.

We also estimate that another 30-50GL across different licence categories are supplied as Leases by other large corporations and agriculture funds, and another 30-50GL across licence categories is supplied by private irrigators. Based on our supply side approximation, we estimate that the total annual trade volume of the Entitlement Leases is between 290 and 330GL in the southern MDB.

This estimate can be validated with available Register and intermediary data. For example, the BoM dashboard trade data includes Term Transfers in Victoria and South Australia (but not in New South Wales). Figure 3 presents the summary of cumulative volumes of entitlements under lease 2013-2020, overlaid against the proportion of these volumes to the total entitlements on issue for applicable licence categories.

Figure 3: Cumulative volumes of entitlements under lease (recorded Term Transfers only) 2013-2020[20]



Source: BoM data and Marsden Jacob analysis

As seen above, the total volumes under Term Transfers have increased significantly. Whilst this exemplifies the increase in popularity of the Lease product, it also aligns with the increase in sizes of the institutional investors' entitlement portfolios and supply to the market. It is acknowledged that not all of the current volumes under Term Transfers are strict Entitlement Leases for water only; in our experience some Term Transfers are a result of sale and leaseback transactions, where the seller continues to operate the land and water assets.

If approximately 200GL of entitlements from Victoria and South Australia alone are under Term Transfers, this Register data aligns with our total supply side estimates. Further, it implies that if the 200GL is mostly exclusive of institutional investor supply (since Term Transfers are reportedly not preferred by most suppliers of the Lease product), the total volumes under lease in the southern MDB can be even higher than what was estimated based on supply side approximation. Our conservative estimate based on both estimation methods is that the market share of the Entitlement Lease product is between 290-450GL in the southern MDB.

4.2.3 Estimated trade volumes of Forwards

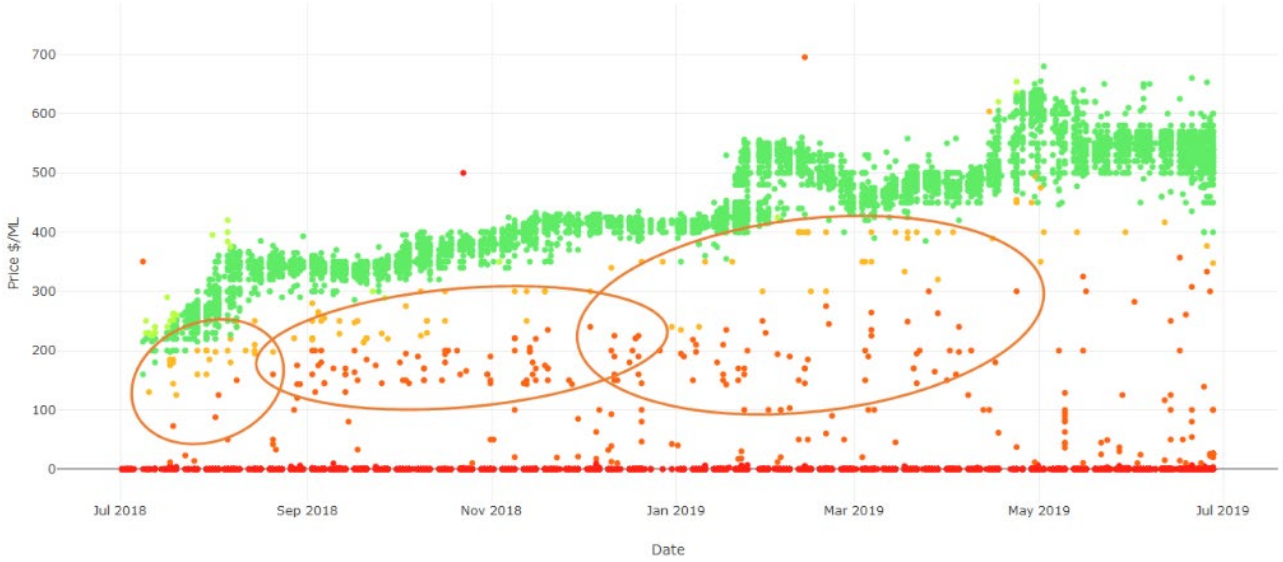
Based on the supply side baseline analysis, we estimate that annually up to 170GL of the institutional investors' portfolio is used for other products than Entitlement Leases. Depending on the year and average prices on the Spot Allocation market, the investors may or may not be incentivised to deploy a higher proportion of their allocation to the Forward market compared to the spot market. Thus, we

[20] 2019/20 data as of March 2020

estimate that the annual supply from these investors to the Forward market can range between 50 and 150GL.

To validate this estimate, we've researched and interpreted the available Register and intermediary data. Using data from Waterflow™ we have identified clusters of trades that appear to be Forward trades in the southern MDB during the last two irrigation seasons (see indicative Murray Below Choke cluster analysis in Figure 4 below).

Figure 4: Murray Below Choke allocation market cluster analysis 2018-2019



Source: Aggregation of market data using Waterflow

Based on the cluster analysis, we estimate that the trade volumes contracted in the Forward market in those seasons have been between 130 and 160GL (Table 17). This analysis is indicative only, and comes with certain limitations:

- The assumed Forward trades are based on certain assumptions regarding parcel sizes and price points across the season – there's no bulletproof way to ascertain which trades have been 'real' Forwards.
- Some assumed Forward trades can be Leases as well.
- It assumes that all Forward trades are reported with the real unit price, which may not be realistic in all cases.

Table 17: Southern MDB allocation market trade volumes (ML traded) 2017-2019

Trade type	2017/18	2018/19
Total Forwards traded	134,000	161,000
Total Spot Allocation traded (excluding outliers)	1,571,000	1,246,000
Forwards as % of spot allocation trade	8.5%	12.9%

Source: Marsden Jacob analysis

Based on our review of the reported Forward trade history available on various intermediary sites (such as *Ruralco* and *Wilks Water*), we estimate that the size of the Forward market in 2018-19 could

have been as high as 200GL. Thus, we conclude that the size of the southern MDB Forward market in 2018-19 was in the range of 130-200GL.

4.2.4 Estimated trade volumes of Carryover Parking

The size of the Carryover Parking market is harder to estimate compared to Leases and Forwards. The popularity of the parking product fluctuates year-on-year depending on overall water availability. The Register data is harder to interpret for this product as it is uncertain how Allocation Trades associated with parking are reported (e.g. is trade price reported when the water is first placed to the holder's account, or when it's returned to the placers account, or in both or neither cases). In addition, intermediaries are not reporting contracted Carryover Parking volumes to the same standard as other Secondary Products.

Thus, anecdotal evidence from interviews is the best source for market size estimation. Based on these, our indicative assessment is that the carryover product market size in the southern MDB varies between 50 and 200GL, depending on seasonal conditions and how much water has been allocated and used during any given season.

5. Conclusions

The analysis and interviews undertaken by Marsden Jacob have confirmed that Spot Allocation and Permanent Entitlements continue to be the most popular products, but at the time of writing (March 2020) Entitlement Leases are in very high demand.

At this time, only the more sophisticated water market participants actively engage with Secondary Products, and the uptake by others appears to be hindered by the lack of market transparency and structural and regulatory issues. Many of these products are primarily being transacted off-market with direct corporate-to-corporate or investor-to-corporate contracts being negotiated, particularly for Leases and Forwards. Because these trades are not separately identifiable on State Water Registers, unfortunately this means that there is little market transparency over the number and value of these trades.

Despite this we note that secondary markets are growing. Based on the analysis and interviews undertaken to inform this report Marsden Jacob estimates that the indicative trading volumes of Secondary Products across the southern MDB market to be as follows:

- Entitlement Lease is approximately 290-450GL
- Carryover Parking is approximately 50-200GL
- Forwards is approximately 130-200GL

However, we note that due to limited transparency, it is difficult to ascertain the precise volume traded in secondary water markets, which is reducing market confidence and awareness. See also Table 18 for a summary of the findings from this study regarding different market products.

Based on the study, it appears that water market information in Australia suffers from an important information challenge – at the same time there's too much and too little information available. For example, in the southern Basin there is a large amount of data disseminated daily just on the Spot Allocation product. This can be daunting for participants as too much information means higher barriers to trade. At the same time the information on Secondary Products is not nuanced enough, also constructing barriers to trade. Therefore, the real challenge is to disseminate the information so that it won't confuse participants more but provides them with all the necessary information needed to make an informed participation choice.

There are a number of potential solutions to the current problems with market information, and there are few barriers to solutions improving the data collection process such as updating trade applications forms. In particular, if more detailed data is collected, this would underpin reporting Secondary Products such as Forwards, Leases and Carryover Parking as separate products within Basin State Water Registers instead of misrepresenting them as Spot Allocation Trades. The intuitive long-term solution (over 5-10 years) is to provide a singular point of access to trade data and information.

Table 18: Summary of findings for in-scope water market products

Product	Contract features	Geographical coverage	Economic appeal (seller)	Economic appeal (buyer)	First appearance	Market uptake	Main user segments	Current trend
Permanent Entitlement Trade	Price Buyer deposit 'Wet' or 'Dry'[21]	Whole of MDB	Capitalise on value appreciation, free up capital	Secure water to maximise long-term crop opportunities	Early 1980s	High	Everybody	Stable
Spot Allocation Trade	Price Buyer deposit	Whole of MDB	Maximise returns on excess allocation water	Secure water to maximise crop in-season opportunities, minimise input cost	Go as far back as 1960s	High	Everybody	Stable
Entitlement Lease	Duration Price How allocation is transferred (Term Transfer vs. separate Allocation Trades) Who pays ongoing fees Downside risk capped or not ('hybrid lease')[22]	Whole of MDB but most Leases written in the southern MDB	Long-term return on investment	Secure water to maximise long-term crop opportunities and hedge against low allocation risk	Since 2004 (depending on the state)	Medium	Corporate and investors (lessors), growers of all sizes (lessees - availability may be constrained for smaller volumes)	Up

[21] Means if the entitlement is sold with this year's full allocation (wet) or with the future allocation from the date of contract onwards only (dry).
[22] In this type of lease the lessor will 'top up' lessee's allocation if the entitlements announced allocation does not reach a certain level.

Product	Contract features	Geographical coverage	Economic appeal (seller)	Economic appeal (buyer)	First appearance	Market uptake	Main user segments	Current trend
	Price adjusted or not (e.g. via an index)							
Forward Allocation Trade	Price Delivery date Duration (multi-year Forwards) Price Buyer deposit	Southern MDB, parts of northern MDB (NSW side)	Offers long term economic security	Secure water to maximise intra- or interseason crop opportunities, minimise input costs and hedge against low allocation risk	2014 (in a broader scale)	Low	Corporate and investors (sellers), corporate and larger water users (buyers)	Down
Carryover Parking	Price Who pays storage fees Who bears spill risk	Southern MDB	Create returns from excess carryover capacity	Protect carryover water at a relatively low cost, minimise future input cost	2010-11 (in its current holder/placer form)	Medium	Everybody	Down

Appendix A – Detailed issues analysis

Table 19: Issues analysis for Primary Products

Product Segment	Issue	Concerns: Allocation	Concerns: Entitlement	Data captured by industry	Data captured by Registers	Data transferred from industry to Registers	Data not correctly reported by Registers
Primary	**Outlier pricing**	✓	✓	Yes	No	No (since there is no way to report it)	Yes (since not captured correctly)
	Time lag registered/contracted trades	✓	✓	Yes	No	No (since there is no way to report it)	Yes (since not captured correctly)
	Trading zone information missing for groundwater trades	✓	✓	Yes	No	No (since there is no way to report it)	Yes (since not captured correctly)
	Queensland trades	✓	✓	Yes	No (allocation) and yes (entitlement)	Only for Entitlement Trades (no way to report allocation trade prices)	Yes - since not captured correctly (allocation) or reported in a non-ideal fashion (entitlement)
	Trades within some IIOs	✓	✓	Yes	Only for some IIOs	No - all non-Qld MDB IIOs collect price data for both allocation and Entitlement Trades, but only some	Yes for most IIOs (since not reported at all or reported correctly)

Product Segment	Issue	Concerns: Allocation	Concerns: Entitlement	Data captured by industry	Data captured by Registers	Data transferred from industry to Registers	Data not correctly reported by Registers
						report this to the BoM a) at all, or b) correctly[23]	
	Tagged trading	✓		Yes (trade data is similar regardless if it was done with a tagged licence or not)	Only in NSW, and even there not explicitly	Yes (trade data is similar regardless if it was done with a tagged licence or not)	Yes (since not captured correctly)
	Distinction between wet/dry trades		✓	Yes	No	No (since there is no way to report it)	Yes (since not captured correctly)
	Water and land transfers		✓	Yes (typically land and water transferred are handled by solicitors or real estate agents, not water brokers)	Only in Qld, and inexplicitly in NSW	No (since there is no way to report it)	Yes (since not captured correctly)

[23] Under Water *Regulations 2008* 14 rural water utilities need to report trades (entitlement and allocation) to the BoM on a weekly basis. However, some only report $0 prices even though they are known to collect price data. Some of the smaller IIOs (RIT, WMI, WCPID etc.) have no obligation whatsoever to publish their trade data.

Table 20: Issues analysis for Secondary Products

Segment	Issue	Entitlement Lease (Term Transfer)	Entitlement Lease (Allocation Trades)	Forward Allocation Trade	Carryover Parking	Data captured by registers	Can be fixed by solving issues with Primary Products
Secondary	**NSW/Qld Term Transfer information**	✓				Yes, but not reported	No, since these are separate products that are not reported at all by Registers
	Product misrepresented as Spot Allocation Trades		✓	✓	✓	Partially, but misrepresented	Yes (in terms of separating Secondary Products from primary)

Appendix B – Contextual information to scoping study

Murray–Darling Basin

The most well-known and agriculturally productive region in Australia is the Murray-Darling Basin (MDB). It is responsible for most of the water trades in Australia and covers the Australian Capital Territory (ACT) and parts of Queensland (Qld), New South Wales (NSW), Victoria (Vic) and South Australia (SA).

The MDB is the largest and most complex river system in Australia. It runs from Qld through NSW and the ACT, Vic and SA, spanning 77,000 kilometres of rivers, many of which are connected (Figure 5). The MDB is often described as having two distinct regions, the northern MDB stretching from the NSW Lachlan valley to the Qld Condamine Balonne, and the southern connected MDB covering the River Murray and its tributaries.

Figure 5: Murray-Darling Basin area and SDL units

Source: MDBA

The connected nature of the southern system enables market participants to trade across States, pending rules, regulations and limits, which can vary throughout the year. This covers southern NSW, Northern Vic and the SA River Murray.

In the northern basin, water trade is conducted across NSW and Qld systems. Much of northern NSW has limited connectivity with most of the trades occurring in independent valleys. In each of these, water cannot be traded out of or into the region. It is often compared to users taking water from a

swimming pool; a single source. It is a similar scenario in much of Qld. Unlike NSW, water trading in Qld is a more immature concept. A greater understanding of the rules, regulations and benefits have been established over the last few years, however there is still a large discrepancy between Qld and northern NSW and even greater relative to the southern Basin.

A brief history of water markets

Water trading in Australia goes back decades, although the greatest changes to the market arrangements occurred in the 1990's and it has continued to evolve ever since.

The 1980s and 1990s saw the first tentative but far-reaching steps towards capping diversions and permitting the more flexible reallocation of water between irrigators, rather than continuing to issue more licences (upon request). The introduction of water trading was certainly not a speedy process, governments closely controlled the development of water as an economic good. Nevertheless, the first steps by State Governments to enable water to be held separately from land can now be seen as seminal moments in the development of water markets in Australia.

The initial steps towards water trading in the southern MDB States included:

- SA: The embargo on new licences in 1969 was followed by the commencement of entitlement and allocation trading between private diverters in 1983. Trading within irrigation districts began in 1989, but it was not until 1995 that trading between private diverters and those in irrigation districts was allowed.
- NSW: The embargo on new licences from 1977 was followed by trading in water allocations in 1983 and Entitlement Trading among private diverters in 1989. Intervalley allocation trading was enabled in 1991.
- Vic: State Government reports recommended no new entitlements for irrigation from the late 1970s and early 1980s. Trading in allocations was possible from 1987 but gained more momentum following the introduction of new legislation in 1989. Intradistrict Entitlement Trading was allowed in 1991, and interdistrict Entitlement Trading commenced in 1994.

Stepping forward, a major impetus for the development of cohesive water markets in Australia, particularly in the MDB, was the 1994 national reform agenda agreed by COAG as part of the broader National Competition Policy. In relation to water allocations and entitlements, the COAG water reform framework included agreement that comprehensive systems of water allocations or entitlements be established, backed by the separation of water property rights from land title and clear specification of ownership, volume, reliability, transferability and, if appropriate, quality. It also provided that cross-border trading be facilitated, and arrangements be consistent, where that is socially, physically and ecologically sustainable. These along with other conditions provided for the establishment of the cohesive water market we have today.

In 2004, a review of the 1994 agreement extended the national water reform agenda and led to the development of the National Water Initiative (NWI). The NWI is a national blueprint aimed at increasing the productivity and efficiency of water use in Australia while ensuring the health of rivers, groundwater systems and other water assets.

Major changes to water management in the MDB were given effect in interstate agreements and the introduction of the Commonwealth *Water Act 2007*. The Act built on the earlier reforms and incorporated the overarching objectives of the NWI. The Water Act provides the legislative framework for ensuring that Australia's largest water resource—the Murray–Darling Basin—is managed in the national interest. In doing so the Water Act recognises that Australian States in the Murray–Darling Basin continue to manage Basin water resources within their jurisdictions. The Water Act gave the Bureau of Meteorology (BoM) water information functions that are in addition to its existing functions under the Meteorology Act 1955, this includes the collection, holding, managing, interpreting and disseminating Australia's water information.

The Water Act also required the MDBA to prepare the *Murray–Darling Basin Plan 2012* (Basin Plan)- a strategic plan for the integrated and sustainable management of water resources in the Basin. The Basin Plan provides a coordinated approach to water use across the Basin's four States and the ACT. The Basin Plan centres around providing a share of the total available water to the environment whilst ensuring communities have sufficient water of a suitable quality for drinking and domestic uses and agricultural industries remain productive. It is a major step forward in Australian water reform, balancing environmental, social and economic considerations by setting water use to an environmentally sustainable level following decades of overallocation and environmental degradation.

Basin State water market regulation

Murray–Darling Basin Authority

The Basin Plan water trading rules operate as an overarching framework to existing Basin State rules and irrigation infrastructure operator rules. The rules aim to improve transparency and access to information, reduce restrictions on trade and improve market confidence through a more effective water market. The rules apply to the Australian Government, the Basin States, irrigation infrastructure operators (IIOs) and individual market participants. The rules only apply to water access rights that can be traded under State water management law.

NSW

The *Water Management Act 2000* provides the legislative frameworks and supporting requirements for water trading. Responsibilities for granting and managing water licences and approvals are shared between Department of Planning, Industry and Environment (DPIE), and WaterNSW. WaterNSW is responsible for managing trade of water access licences, licence entitlements, water allocations and licences for rural users, whilst the department is responsible for water licences and approvals for urban, industrial and government water users.

SA

Water resources within SA are managed under the *Natural Resource Management Act 2004*. The NRM Act provides the statutory framework for the development of water management controls. These are the management of activities that can affect water such as dams and infrastructure, water licencing, water resource plans and authorisation or restriction of water use. The trading rules for the

South Australian River Murray are contained in Chapter 7 (Transfers of water access entitlements and water allocations) of the *Water Allocation Plan for the River Murray Prescribed Watercourse.*

Vic

The Victorian *Water Act 1989* provides the legislative frameworks and supporting requirements for the management of Victoria's water resources and supply, including for water trading and the issue of water entitlements. The powers of the Victorian Minister for Water are in practice generally delegated and managed by DELWP (for water policy) and water corporations for managing customer supply and applications. The Victorian Water Act provides rights to water for domestic and stock use and Traditional Owner use, and water entitlements for both consumptive and environmental purposes.

Qld

The *Water Act 2000* provides the legislative framework for managing water resources in Qld. It requires that water planning and allocation of state's water resources must 'advance sustainable management and efficient use of water'. The *Water Regulation 2016* prescribes administrative and operational matters for the Act, e.g. statutory authorisations to take or interfere with water without water entitlement, metering water entitlements, authorised interstate water trades and reporting on water plans.

Figure 6: State and Territory water governance