Market trends

This part comprises three chapters which provide an overview of Basin water markets and introduce key concepts and issues which are explored in greater detail in other parts of this report.

Chapter 2 briefly describes the purpose, function and governance of Basin water markets, and the kinds of rights that are traded.

Chapter 3 provides an overview of recent trends in water markets, for the period 2012–13 to the present. It then examines key supply and demand drivers, and considers some implications of trends and drivers for water market outcomes.

Chapter 4 describes the different types of traders who participate in Basin water markets, and discusses traders’ ‘water ownership and trading strategies’. It then considers potential barriers to more effective water market engagement, with a particular focus on irrigators as the largest group of water users, and traditional owner groups, who face unique issues in accessing water and water markets.
2. Water market basics

Key Points

The Basin is not characterised by just one market for just one product called ‘water’. There is a set of interrelated markets, involving many types of tradeable water rights and geographic areas, that support the trade of:

- rights to access or receive water (water access rights and irrigation rights)
- rights to delivery capacity or to have water delivered through certain specified infrastructure (water delivery rights).

Key reasons for having water markets are:

- Water is scarce. Its most valuable use will change over time as commodity prices and other supply and demand drivers change. Trading in water markets helps people access water where it is valued most; to put it to its most productive use.
- Markets and trading give individual people and businesses more choice in, and more responsibility for, their tradeable water rights.

Markets for tradeable water rights in the Murray–Darling Basin involve many participants and facilitators, variously under private, co-operative and government control. Key participants include:

- irrigation infrastructure operators
- irrigators
- infrastructure operators, such as the Murray–Darling Basin Authority, Goulburn–Murray Water and WaterNSW, who operate key storages, rivers and delivery infrastructure
- investors, being parties that hold water assets to make money out of trading or holding them
- intermediaries, such as brokers.

The dominant determinant of total supply across the Basin is rainfall, followed by the Murray–Darling Basin Plan. Rules and policies, such as trading zones and Basin State water regulations, also strongly shape how much water is available, where and when. River flow considerations and state borders have led to the development of a complex set of location-based trading rules, particularly rules governing trade between trading zones, and into and out of irrigation networks.

This chapter explains how and why water is traded in the Murray–Darling Basin (the Basin) and gives a broad overview of who is trading, what and where.

2.1 Introduction to the Murray–Darling Basin

The Basin extends across southern Queensland, New South Wales, the Australian Capital Territory, Victoria and South Australia (the Basin States). The water rights traded in the Basin largely relate to the water flowing in the catchments of the Basin’s rivers, such as the Murray, the Goulburn, the Murrumbidgee and the Darling. Basin water users may also use and trade groundwater, from aquifers, and use water that falls or flows directly onto their properties.23

The Basin is broadly split into two large regions: the Southern Basin and the Northern Basin (figure 2.1).

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23 Where use of water that falls or flows directly onto a property involves intercepting water that would otherwise flow, directly or indirectly, into a watercourse, lake, wetland, aquifer, dam or reservoir that is a Basin water resource, it is referred to as an ‘interception activity’. See Water Act (2007) (Cth), s.4. This form of water use may or may not occur under a water access right; this is governed differently across Basin States.
Figure 2.1: Map of Northern Murray-Darling Basin and Southern Murray-Darling Basin

Source: Murray-Darling Basin Authority. ²⁴

2.1.1 Southern Murray–Darling Basin

The Southern Murray–Darling Basin (Southern Basin) comprises surface-water systems – rivers, lakes and wetlands – incorporating the Murray River and its various tributaries across the ACT, NSW, Victoria and South Australia, as well as the groundwater systems (not including the Great Artesian Basin) underlying these surface-water systems.26

The Southern Basin accounts for a large proportion of Australia’s irrigated agricultural production, which includes significant areas of broadacre cropping in southern New South Wales (including annual crops such as rice, cotton and pasture), dairy farming and horticulture in northern Victoria, and horticulture in South Australia. The Southern Basin also contains many significant communities and internationally-recognised environmental sites.

The Southern Basin also accounts for a large volume of Australia’s ‘water access entitlements’ (entitlements) on issue. Over 95% of the nominal volume of entitlements on issue in the Southern Basin are within regulated surface water systems. A ‘regulated system’ is one where the water flow is managed through artificial structures such as large dams and weirs. This means that water management authorities can, to a degree, manage the amounts and timing of water flowing down the river and also store it. Many sections of the largest rivers in the Southern Basin are ‘regulated’. For example, the River Murray is regulated by Hume and Dartmouth Dams and other water infrastructure such as locks and weirs. Smaller water courses are often ‘unregulated’, which means they do not have the infrastructure to regulate the flow of water.

There is a high degree of ‘hydrological connectivity’ between many of the regulated surface water systems in the Southern Basin. In general terms, this means the water sources are connected and water originating from one can be diverted or extracted from the other, within certain limits. This has meant that the Southern Basin has become Australia’s most significant water market, accounting for between 80 and 90% of all water rights trading activity across Australia.26 Further, it is regarded by many as the most sophisticated water market in the world.27 For this report, these connected regulated surface water systems are defined as the Southern Connected Murray–Darling Basin (Southern Connected Basin) and include the New South Wales systems of New South Wales Murray, Murrumbidgee and Lower Darling systems; the Victorian systems of Goulburn, Victorian Murray, Ovens and Loddon; and the South Australian River Murray system.28

Groundwater and unregulated surface water are also important water resources for producers, consumers, communities and the environment in the Southern Basin. For groundwater, key water systems in the Southern Basin include Murray Alluvium and Murrumbidgee Alluvium in New South Wales and Goulburn–Murray in Victoria.

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25 Groundwater is the water that sits beneath the earth’s surface. It is stored in fractured rocks, porous rocks and soils called aquifers or groundwater systems. Groundwater can be connected to surface water, which includes the water in our rivers and wetlands. Unlike surface water, groundwater resources can take longer to recharge – or refill with water – when water is taken. This may be weeks, months, years or even hundreds of years in some systems. Source: Murray–Darling Basin Authority (MDBA) 2019, https://www.mdba.gov.au/basin-plan-roll-out/groundwater, viewed 11 June 2020.


28 For the purpose of this report, the ACCC defines the Southern Connected Murray–Darling Basin as comprising the following trading zones: 1A Greater Goulburn, 1B Boort, 2 Broken, 3 Lower Goulburn, 4A Campaspe – Eppalock to WWC, 4C Lower Campaspe, 5A Loddon – CC/Tull to LWP, 6 VIC Murray – Dart to Barmah, 6B Lower Broken Creek, 7 VIC Murray–Barmah to SA, 10 New South Wales Murray Above Choke, 11 New South Wales Murray Below Choke, 12 SA Murray, 13 Murrumbidgee and 14 Lower Darling.
2.1.2 Northern Murray–Darling Basin

The Northern Murray–Darling Basin (Northern Basin) comprises the catchment of the Barwon–Darling River system and its tributaries upstream of Menindee Lakes (figure 2.2). This is primarily a range of systems along tributaries of the Darling River.\(^{29}\)

**Figure 2.2: Map of Northern Murray–Darling Basin**

The Northern Basin includes over half of the Basin’s total area. It is more arid and flat than the Southern Basin, and rainfall and resulting stream flows are more variable compared to the south. Northern Basin rainfall is summer dominant (more rain falls in the summer) compared to winter dominant in the Southern Basin. These features of the Northern Basin have meant that the surface water resources have been developed and managed differently to the Southern Basin. The proportion of flows regulated by dams is much lower and a significant proportion of irrigation production relies on diverting unregulated flows directly into large, privately constructed, off-stream storages.\(^{31}\)

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\(^{29}\) For the purpose of this report, the ACCC defines the Northern Murray Darling Basin as incorporating the following systems: Barwon–Darling, Lachlan, Macquarie–Castlereagh, Gwydir, Namoi, New South Wales Border Rivers, Queensland Border Rivers, Moonie, Condamine–Balonne and Warrego–Paroo–Bulloo–Nebine. The Lachlan River, an intermittent tributary of the Murrumbidgee, is included in the Northern Basin.


In general, water markets are less developed for the Northern Basin compared to the Southern Basin. This has been attributed to a range of factors, including that, compared with the Southern Basin, the Northern Basin:

- has fewer regulated systems, with less hydrological connectivity – that is, water from one system cannot be diverted or extracted from the other easily or at all
- has more variation in water supply
- has irrigators that rely more on groundwater
- has irrigators that use more on-farm storages
- has fewer irrigators
- historically has been monitored less strictly for extractions
- has greater ‘homogeneity’ among water users – that is, less differences in demand, which is a key driver of potential gains from trade.32

2.2 Water sources and uses in the Murray-Darling Basin

The starting point for and dominant determinant of how much surface water can be supplied is the amount of precipitation – rain and snow – that is received in catchments. How much of that water is available in a particular storage or river reach at any one time is then shaped by:

- hydrology – the amount and timing of flows and physical limits on them
- climatic conditions, such as evaporation rates
- human decisions on water management.

By agreement, Basin State governments have capped the total amount of water that can be extracted in the Basin. This is designed to ensure that the total amount users can extract is sustainable in the long-term. The exact level of the cap has changed over time. Basin States introduced the first cap on diversions in 1995. The Basin Plan 2012 (the Basin Plan) introduced a new water accounting and compliance framework based on ‘sustainable diversion limits’, which came into force on 1 July 2019.

The water held in storages and flowing down the rivers broadly falls into one of several different use classes. Much of the water is allocated, through the entitlement framework, to ‘consumptive uses’, to be consumed by people for drinking and other domestic use (‘critical human needs’); watering cattle, sheep and other stock; and in business activities that use water intensively, including mining and irrigated agriculture. The single sector that uses the most water in the Basin is irrigated agriculture, which includes growing crops such as cotton and rice, horticulture (including nuts, fruit and vegetables) and dairy (see chapter 3).

In addition to consumptive uses, water resources are also allocated to sustaining the natural environment. Minimum flows for the environment have been a part of the water management framework for a long time. However, since at least the late 1990s, governments have recognised that those minimum flows were insufficient to maintain the Basin’s water systems on a sustainable footing. As part of a process of resetting the balance between consumptive and environmental water uses, governments established statutory bodies referred to as environmental water holders (see section 2.10), and acquired entitlements from consumptive users for these environmental water holders to use to achieve environmental outcomes. This process has reallocated significant volumes from consumptive water to environmental water. Other non-consumptive uses also exist; for example, many cultural or recreational uses of water.

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2.3 Types of tradeable water rights

To best understand markets for tradeable water rights in the Basin, it helps to understand that the Basin area is not characterised by just one market for just one product called ‘water’. There is a set of interrelated markets, split across product types and geographic areas, which support the trade of rights to access or receive water; and rights to delivery capacity or to have water delivered through certain specified infrastructure. Not all rights to water are tradeable. The key types of tradeable water rights are:

- water access rights, including entitlements and allocations
- water delivery rights (delivery rights)
- irrigation rights.

Different Basin States use different terminology for tradeable water rights. This report uses the generic terms for tradeable water rights as defined in the Commonwealth Water Act 2007 (Water Act), such as ‘water access entitlements’, or a shorthand term for these, such as ‘entitlements’.

Another key concept to understand is ‘carryover’, which involves holding or ‘carrying over’ water allocated in one period, for use in a subsequent period (see box 2.1).
Historically, water accounting operated on a simple annual basis, under which users forfeited any water not used or traded by the end of the water year back into the general pool of water in storage, and therefore available to be re-allocated in the following water year. Under this system, users had incentive to use or trade all their water in the current water year, because they could never be certain how much water they would be allocated in the following year. This was one driver of inefficient water use.

In recognition of this incentive encouraging inefficient water use, and to help water users to plan, governments have developed several mechanisms to allow water users to retain at least some of the water allocated to them during one water accounting period, for use during a subsequent period. These mechanisms give individual entitlement holders tools to better manage their access to water over time, allowing farmers to save their unused water from wet years for later use in dry years. These mechanisms differ between states, river systems and irrigation infrastructure operators (IIOs), and are affected by how allocations are made by states and the license type.

- **Carryover** is a mechanism used in systems that have kept the annual approach to water accounting. Instead of re-setting account balances to zero at the start of the new water year (as happened under historical approaches), carryover allows water users to keep at least some (if not all) of their water in their water accounts at the end of the year, for use or trade in the next water year. Carryover was initially introduced by states as a temporary measure during the Millennium Drought (1996 to 2010). Its aim was to help farmers deal with the impacts of the drought, allow farmers to smooth out their consumption of water and reduce the ‘use-it-or-lose-it’ approach. All states kept carryover following the end of the Millennium Drought. Carryover can be particularly beneficial to water users where there are limited opportunities for on-farm storage (as is the case in much of the Southern Basin) or to trade water.

- **Continuous accounting** adopts a different approach. It effectively removes the artificial construct of the annual water accounting period, and simply allocates water resources as inflows occur. There is no re-setting of account balances to zero at the start of a water year, and so there is no need for an additional ‘carryover’ mechanism, since account balances in a sense automatically carry over. Annual accounting may still be used for reporting on aggregate allocation, trade and use, and still may be a relevant concept in terms of setting the maximum amount of water any person is eligible to receive or use, but the key difference is that the end of the water year (usually 30 June) does not have a significant impact on water users’ account balances.

Carryover and continuous accounting mechanisms have important implications for trade, as they allow water users to move water use or trade in time as well as geographically. The contribution of these mechanisms to water market trends is discussed further in chapter 3. Carryover policy is discussed in more detail in part 5.
2.3.1 Water access rights

A water access right is a generic term referring to a statutory right to take (use) or hold water.\textsuperscript{36}

Historically, water access rights were tied to land. This meant that ownership of the water right only changed when ownership of the land changed; and use of that water right was bound to one specific location. Increasingly in the Basin, many forms of water access rights have been separated or ‘unbundled’ from the land.\textsuperscript{37} A right holder can continue to use their water access right on their land; but can also trade it away, for use in another place, permanently or temporarily. The right holder can also sell their unbundled water access right to another person, without also selling their land.\textsuperscript{38} There are however some significant exceptions, where the rights holder cannot trade away the right. These include what are called ‘riparian’ (essentially riverside) rights and rights for watering stock.

The two key categories of water access rights are entitlements and allocations:

- An entitlement is a perpetual or ongoing statutory right to a share of a water resource.\textsuperscript{39} It is often called a ‘permanent’ right; and so is one kind of right traded in ‘permanent markets’ (also referred to as ‘permanent trade’). Entitlements are often specified as a volume amount per year, typically in megalitres (ML) or number of shares of the water resource.

- An allocation is a specific volume of water allocated to an entitlement in a given water accounting period, usually a water year.\textsuperscript{40} It is sometimes called a ‘temporary’ right, and so is one type of right traded in ‘temporary markets’ (also referred to as ‘temporary trade’). Allocation policies differ across water systems and states, and are discussed further below.

There are different classes of entitlement, often relating to ‘reliability’ or ‘security’, which each Basin State assigns different names (Table 2.1). Given water is scarce and the amount available varies greatly from time to time, classes of rights holders are often ranked in terms of who will be supplied ‘first’ and who receives lower priority, and how much of their nominal full entitlement they are likely to receive. Entitlement classes can be distinguished in terms of their historic reliability, which is a parameter indicating the likelihood that an entitlement will receive 100% of its ‘face value’ by the end of the water year.\textsuperscript{41}

\textsuperscript{36} See Water Act 2007 (Cth), s. 4.


\textsuperscript{38} The water rights holder could also sell the land and keep the water rights.

\textsuperscript{39} See Water Act 2007 (Cth), s. 4: ‘water access entitlement means a perpetual or ongoing entitlement, by or under a law of a State, to exclusive access to a share of the water resources of a water resource plan area.’

\textsuperscript{40} See Water Act 2007 (Cth), s. 4: ‘water allocation means the specific volume of water allocated to water access entitlements in a given water accounting period.’

\textsuperscript{41} Note that the timing of announced allocations, while an important factor for water users, does not factor into reliability calculations. Therefore, historic reliability only partially characterises the ‘yield’ of different entitlement classes.
### Table 2.1: Key entitlement classes in regulated surface water systems

<table>
<thead>
<tr>
<th>State</th>
<th>Class</th>
<th>Explanation of right</th>
<th>System</th>
</tr>
</thead>
<tbody>
<tr>
<td>NSW</td>
<td>High security</td>
<td>Holder will generally receive its full water allocation before general security entitlements receive an allocation. NSW high security entitlements are generally not eligible to access carryover.</td>
<td>Belubula, Gwydir, Lachlan, Lower Darling, Macquarie–Cudgegong, Murrumbidgee, Namoi, NSW Border Rivers, NSW Murray, Peel</td>
</tr>
<tr>
<td></td>
<td>General security</td>
<td>A lower priority to receive allocation. Once system commitments have been met, the available water asset is then available for distribution to the access licence categories in order of priority; general security entitlements have a lower priority than high security and conveyance entitlements. NS</td>
<td>Belubula, Gwydir, Lachlan, Lower Darling, Macquarie–Cudgegong, Murrumbidgee, Namoi, NSW Border Rivers, NSW Murray, Peel</td>
</tr>
<tr>
<td></td>
<td>Supplementary</td>
<td>Supplementary flow events are announced periodically during the season when high flow events occur, with the period of extraction and volume of water to be extracted determined based on the rules as set out in the relevant water sharing plans.</td>
<td>Belubula, Gwydir, Lower Darling, Macquarie–Cudgegong, Murrumbidgee, Namoi, NSW Border Rivers, NSW Murray</td>
</tr>
<tr>
<td></td>
<td>Conveyance</td>
<td>Water needed to operate off-river water infrastructure such as irrigation networks. Some NSW irrigation infrastructure operators (IIOs) (discussed in box 2.2), but not all, hold such entitlements. NSW conveyance entitlements are generally eligible to access carryover; rules vary across systems.</td>
<td>Lachlan, Murrumbidgee, NSW Murray</td>
</tr>
<tr>
<td>Vic</td>
<td>High reliability</td>
<td>Holder will generally receive its full water allocation before Low reliability entitlement holders receive an allocation. Victorian high reliability entitlements generally have access to carryover, with carryover in excess of 100% of entitlement volume subject to spillable water account rules, although rules vary across systems.</td>
<td>Broken, Bullarook, Campaspe, Goulburn, Loddon, Victoria Murray, Ovens and King</td>
</tr>
<tr>
<td></td>
<td>Low reliability</td>
<td>A lower priority to receive allocation. Victorian low reliability entitlements generally have access to carryover, with carryover in excess of 100% of entitlement volume subject to spillable water account rules, although rules vary across systems.</td>
<td>Broken, Bullarook, Campaspe, Goulburn, Loddon, Victoria Murray</td>
</tr>
<tr>
<td></td>
<td>Spill reliability</td>
<td>Available to customers while the storages in these systems are spilling.</td>
<td>Ovens and King</td>
</tr>
<tr>
<td>State</td>
<td>Class</td>
<td>Explanation of right</td>
<td>System</td>
</tr>
<tr>
<td>-------</td>
<td>---------</td>
<td>----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------</td>
<td>---------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Qld</td>
<td>High priority</td>
<td>Chinchilla Weir Water Supply Scheme (WSS) and Upper Condamine WSS: Announced allocations for High Priority water allocations are calculated and announced on the first day of each water year. St George WSS: continuous sharing rules apply (which operates as an alternative to carryover), but High priority is prioritised over medium priority.</td>
<td>Chinchilla Weir WSS, St George WSS, Upper Condamine WSS*, Border Rivers WSS</td>
</tr>
</tbody>
</table>

Source: Adapted from water products information available on MDBA website.
Notes: This table summarises the main categories of entitlements on issues but is not an exhaustive list. WSS = Water Supply Scheme.

- a Upper Condamine WSS has High Priority Class A and High Priority Class B.
- b New South Wales Border Rivers has General Security A and General Security B.
- c Murrumbidgee has Supplementary and Supplementary (Lowbidgee).
- d Murrumbidgee has Conveyance, Coleambally Irrigation Conveyance and Murrumbidgee irrigation Conveyance.

Further information on how carryover eligibility varies by entitlement class and water system is available in section 15.2 in chapter 15.

### 2.3.2 Basin State governments allocate water

The Basin States, the Murray-Darling Basin Authority and the Border Rivers Commission jointly manage the Basin’s rivers. The Murray-Darling Basin Authority (MDBA) operates the River Murray on behalf of New South Wales, Victoria and South Australia (the MDBA’s roles are explained in more detail in section 2.11). Under the Murray-Darling Basin Agreement, the MDBA determines the amount of water available for each state. It is then up to the states to determine how that water is allocated to individual entitlement holders, and the MDBA is not involved in these decisions or processes. The Border Rivers Commission plays a somewhat similar role in the Queensland-New South Wales border region, operating and maintaining jointly “owned” water infrastructure and implementing agreed water sharing arrangements in that region, on behalf of the New South Wales and Queensland governments.42

### Allocations and entitlements in regulated systems

Water allocation decisions are made by the manager of a water resource and in line with the relevant jurisdiction’s allocation rules and policies. In making allocation decisions, resource managers take into account a range of factors such as precipitation (rainfall) and snow melt and the resulting inflows into the system, expected future inflows, storage levels, operational commitments such as water needed to cover expected losses, and the volume of different classes of entitlement on issue and the priority order of those entitlements.

Most regulated systems in the Basin operate on an ‘announced allocation’ system, where allocations are made against entitlements on a periodic and incremental basis, up to a nominal volume which depends on total water availability. The resource manager announces a starting or ‘opening’ allocation, and then may increase or ‘improve’ it over the course of the water year, as additional inflows are received into storages. This is particularly common with lower reliability rights such as general security entitlements in NSW; some high reliability rights may be allocated 100% of their volume in the ‘opening’ announcement for the water year, particularly in years of relatively higher water availability. For example, for an entitlement of 100 ML, an ‘opening’ announced allocation of 30% would mean that 30 ML of allocation would be available for use (or trade). Later in the water year, as water availability improves, a further 20% of allocation may be announced. This would mean that in total 50 ML would have been allocated against the 100 ML entitlement. If absolutely necessary, the resource manager can also decrease announced allocations, although this only occurs under severe water shortage circumstances as it has significant implications for water users. For historical data on allocation announcements, see section 3.2.1.

Water users then are able to order or take the water allocated against their entitlement, placing obligations on infrastructure operators to provide access to it.

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Water sharing and entitlements in unregulated systems

In an unregulated system, water users are not allocated a specific volume at a point in time, and do not order any water against their water access right. Instead, right holders may extract water under specified flow conditions or events, in accordance with the maximum volume, and any other conditions, specified in their entitlement. Entitlements in unregulated systems (and regulated systems with continuous accounting rules) can specify maximum volumes that can be taken either in one year or in relation to an average annual volume over a period of several years.

2.3.3 Irrigation rights

Water users located within irrigation networks in New South Wales and South Australia commonly hold ongoing rights to receive water from their off-river water infrastructure provider, known as an irrigation infrastructure operator (IIOs). These non-statutory rights are known as ‘irrigation rights’, and are often called ‘permanent’ rights to indicate their ongoing nature. Trade of these rights is often referred to as ‘permanent trade’. The specific volume of water a person can access in a given period under a permanent right is sometimes called a ‘temporary’ irrigation right. An IIO’s approval is required to trade an irrigation right.

Where irrigation rights are specified, the IIO holds entitlements to fulfil obligations to customers who hold irrigation rights. Consequently, IIOs are significant holders of water access rights (entitlements and allocations) in the Basin, particularly in New South Wales and South Australia.43

Irrigation right holders within an irrigation network are able to ‘transform’ their (permanent) irrigation rights into statutory entitlements. When transformation occurs, the volume of the entitlements held by the IIO itself is reduced via a subdivision of the IIOs entitlement, or a permanent trade from the IIO’s entitlement. Correspondingly, a new entitlement (or increase in volume to a pre-existing entitlement) is issued, either to the transforming irrigator or another person if the transformation happens as part of a trade. The holder of the entitlement resulting from transformation can trade the entitlement or the water allocated to it outside the area and membership of the irrigation network, without needing IIO approval.

2.3.4 Water delivery rights

A water delivery right is a right to have water delivered by an Infrastructure Operator. It may take the form of a statutory right or be an express or implied contractual agreement that allocates a share of an infrastructure network’s delivery capacity to the holder. Having these rights on issue helps allocate and manage infrastructure capacity.

2.4 Temporary trade: water allocation and temporary irrigation rights

When water allocation was first introduced as a concept, it was, in a sense, a ‘temporary’ right, in that holders of entitlements had to use (or, when available, trade) the volume of water allocated to their entitlements within the water year; any remainder was forfeited back into the general pool of water for reallocation in the following year. Therefore, markets for allocation are often referred to as ‘temporary markets’.

However, since the introduction of ‘carryover’ and ‘continuous-accounting’ rules (see section 2.3), allocation can be banked for use or trade in a future period, subject to the rules. Therefore, allocations continue to be ‘temporary’ in the sense that allocations credited to a user’s account are drawn down as a person uses or sells water, but no longer necessarily expire at the end of the water year.

The issuing or crediting of new allocations is still linked with entitlements, as entitlements are the mechanism used to determine what proportion or volume of water to credit to water accounts.

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43 See section 4.1.3 in chapter 4.
Once allocations have been issued, they can usually be traded and held independently of entitlements. Generally, a person does not need to hold an entitlement in order to purchase and use an allocation, and a person who does hold an entitlement can independently sell any allocation they have been issued. An entitlement holder can trade away this allocation, while retaining their entitlement long term. Such transactions are therefore often called ‘temporary trades’ and are the most common type of trade in the Basin (see chapter 3).

Likewise, trade of specific volumes of water within IIOs is also known as ‘temporary trade’. Temporary trade of irrigation rights functions much the same as allocation trade outside of IIOs (see box 2.2).

**Box 2.2: What is the difference between an allocation trade and temporary trade of irrigation right?**

The key differences are:

- For temporary irrigation right trades wholly within an IIO’s irrigation network, the IIO itself is the trade approval authority, and the Basin State authorities are not involved in approving or recording the trade.
- Where a person located within an IIO’s irrigation network wants to undertake a temporary trade with a person located outside the network, two transactions occur in tandem. For the case of an internally located seller:
  - Within the irrigation network, the seller relinquishes some of their temporary irrigation right to the IIO.
  - Outside the irrigation network, the IIO’s undertakes an allocation trade from its allocation account (or licence, if in New South Wales) to the account (or licence) of the externally-located buyer.

This process is reversed for an external seller-internal buyer.

There are several different ways allocations (and temporary irrigation rights) can be traded:

- **Ownership transfer**: changing the ownership of the whole or part of an allocation or temporary irrigation right from one owner to another. In this case the seller’s water account will be debited, and the buyer’s account credited, to reflect the trade. In some systems, a transmission loss factor may be applied to the trade (such that the buyer’s credited volume differs from the seller’s debited volume), but in most cases the amount sold equals the amount purchased.
- **Intra-zone/intra-valley trade**: this kind of trade changes the location at which allocation/temporary irrigation right may be taken, within a given trading zone or ‘valley’.
- **Inter-zone/inter-valley trade/transfer (IVT)**: changing the trading zone in which allocation can be used and carried over. This kind of trade occurs via the Basin State debiting the seller’s account in the origin trading zone, and crediting the buyer’s account in the destination trading zone. It effectively results in allocation issued in one zone being cancelled and re-issued in another zone. This kind of trade is subject to inter-valley trading rules (discussed in section 2.6).
- **Tagged allocation trade**: This kind of trade means that the water that is allocated in one location (for example, a catchment or trading zone) can be physically extracted (used) in another, as a result of a ‘tag’ placed on the water user’s account in the Basin State water register. This is different to regular inter-zone allocation trade because the allocation is still linked to the origin zone – for example, it is

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However, in New South Wales, a person must hold a New South Wales Water Access Licence (WAL) in order to hold a water allocation. In this case, the WAL performs the role of forming the basis of a water account. This WAL does not need to have any entitlement volume associated with it; users are able to hold ‘zero-share WALs’ which do not receive any allocation when available water determinations are made (because the holder is entitled to a ‘zero share’ of available water resources), but which enable the holder to purchase and use water allocations.

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assessed against origin zone rules for carryover or further trade. This type of trade is currently only available in Victoria and the NSW-Queensland Border Rivers.  

- **Forward contracts**: for allocations: a contractual agreement to trade allocation in the future.
- **‘Carryover parking’**: an agreement or contract to conduct paired allocation trades at the end of one water year and the start of the next water year, to take advantage of differential access to carryover (see box 2.1 for an explanation of carryover)
- **Options contracts for allocations**: a contractual agreement to provide an option to purchase allocation at a future time, when specified conditions are met.

A given trade may combine elements of these different trade types. For example, a trade between one irrigator located in New South Wales with another in Victoria involves both a change of ownership and an inter-zone change of location. Also, forward contracts, carryover parking and options contracts are private agreements between parties, and to give effect to them one or more of the methods above will need to be used (i.e. ownership transfer, intra- or inter-zone trade, etc.).

### 2.5 Permanent trade: entitlements and permanent irrigation rights

Entitlement trades, also known as ‘permanent trades’, are transactions which change the ownership and/or location of entitlements and permanent irrigation rights. Traditionally, water users traded entitlements in a simple sale transaction to change the ownership of the right; for example, as part of the process of changing the ownership of an irrigated farm. However, now that entitlements have been unbundled from land, there is a variety of options for trading entitlements and permanent irrigation rights:

- **Entitlement ownership transfer**: changing the ownership of the whole or part of a permanent right from own owner to another.
- **Tagged entitlement trade**: This kind of trade means that the water that is allocated to an entitlement issued in one location can be physically taken in another, via the process of placing a ‘tag’ authorising the different extraction location on the entitlement in the relevant Basin State water register. When an allocation announcement is made to the entitlement in the source zone, the tag is automatically activated and the purchaser is credited with the volume allocated and can order water for delivery in the destination zone (unless restrictions apply).
- **Multi-year entitlement leases**: a statutory lease or contractual agreement to give the lessee the right to use, trade, or carryover a whole or part of allocations made in respect of a particular entitlement for the term of the lease.

### 2.6 Overview of location based trading rules

Physical parameters and legal frameworks shape the locations and boundaries of trade. When water access rights are traded, it is important to consider two locational aspects of the right:

- First, the ‘source’ of the water. This is generally defined in geographic terms with respect to water catchment areas and state borders. For example, the Murray catchment is divided up into New

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46 Entitlement trades include where right holders trade only a portion of their entitlement, such as in a share component trade in New South Wales, and also leases of entitlements and permanent irrigation rights.

47 Basin Plan Water Trading Rule 12.23 provides that if a restriction is in place on allocation trade between two locations, that restriction must also be applied to delivery of water available under a tagged water access entitlement, except if the limited exemptions set out in that rule apply. See section 14.1.7 in chapter 14 and section 16.3.2 in chapter 16 for further discussion of tagging arrangements.
South Wales Murray, Victorian Murray and South Australia Murray, as this catchment crosses state boundaries; whereas the Goulburn constitutes one single catchment, wholly within Victoria.

- Second, the ‘destination’ or ‘delivery’ location. This is where water available under the right is able to be extracted for use. When thinking about the delivery location aspect, it is important to keep in mind the physical ability to deliver water, which may need to take into account natural or operational constraints – for example, the physical size of the delivery channel or watercourse and environmental constraints.

There are at least two levels to think about when considering trade. At one level (often called the ‘retail’ level), there are right holders, such as irrigators and other water users; on another level (often called the ‘bulk’ or ‘wholesale’ level), there are the parties that have the role of providing the water to which the right holder is entitled: the infrastructure operators, who administer the water contained in their storages and operate the rivers and man-made infrastructure through which water is delivered.

Trading rules are needed to govern where and when changes to the source and/or delivery locations are allowed, taking into account potential impacts of these changes on third parties, including the environment. While it might be straightforward to change arrangements to give effect to a single trade, facilitating inter-zone trade in aggregate can entail complex considerations at the bulk level to make sure all users’ demands can be met with minimal impacts on other water users and the environment (see box 2.4).

**Box 2.3: Example of how allocation trade changes infrastructure operator obligations at the wholesale level**

John is an irrigator located within Goulburn-Murray Water’s (GMW) irrigation network in the Goulburn system in Victoria. John sells some of his allocation to Sarah, who is a ‘private diverter’ (that is, not within an IIO) located on the New South Wales River Murray. Before the trade, GMW has the obligation to supply John using water in the Goulburn System. After the trade, WaterNSW, in conjunction with the Murray–Darling Basin Authority (MDBA) (who operates the River Murray on behalf of New South Wales, South Australia and Victoria), has the obligation to supply Sarah at her property on the River Murray. GMW, MDBA and WaterNSW need to work together to transfer this supply obligation and ensure Sarah can use, or further trade, her new allocation when she wishes, which could be a long time after the actual trade has occurred.

When irrigation rights are traded purely within an IIO’s network, the obligations at the wholesale level remain the same as before, because water is still delivered from wholesale storages to the IIO’s extraction point. However, for this kind of trade, there is another intermediate level to consider – the obligations against the IIO itself. The extraction point may change from one location inside the network to another, and while this occurs on a much smaller scale than is possible for allocation trade, there may still be important differences in how the IIO needs to manage its network to continue to honour its obligations to its customers after the trade has occurred.

### 2.6.1 Borders and trading zones

As discussed in section 2.1, the Basin can be considered as two quite different and only loosely connected systems:

- the **Northern Basin** has both regulated and unregulated systems, and in general regulated systems are not hydrologically connected to each other;
- the **Southern Basin** has largely ‘regulated’ systems, with a good degree of hydrological connectivity between different regulated systems (although connectivity changes at different times).

The Darling River connects the Northern and Southern Basin, although it is ephemeral in many parts. Authorities have defined trading zones throughout the Basin. Their boundaries are shaped by a mix of jurisdictional boundaries, such as state borders, and physical/hydrological considerations – largely that users in the zone will be drawing from the same source point, such as a particular storage or water course. Authorities place more restrictions on trade between zones than on trade within zones.
Trading zones are often defined as areas within which trade can freely occur. Authorities impose rules to ensure that there is enough water to meet the calls made on the water source, which in theory could come at any time in a year, and to take account of the impacts of trade on other water users and the environment.

Trading zone definitions could match the borders of a water source or catchment, but could also be a subset of the catchment, if there are delivery constraints that need to be taken into account. One key example is that the Victorian Murray and New South Wales Murray water sources are each divided up into zones above and below the significant natural constraint of the Barmah Choke (see below for more detail on the Barmah Choke trade restriction).

**Trading zones in the Southern Basin**

In the Southern Connected Basin, 15 trading zones have been defined (figure 2.3).

*Figure 2.3: Inter-state trading zones, Southern Connected Murray-Darling Basin*

Although the Murray is one river, it is split into 5 different zones. First, it is split down the middle for trading purposes all the way along the NSW-Victorian border. This NSW-Victorian section is further split into zones above and below the Barmah Choke, making two zones for the Victorian Murray (zones 6 and 7), and two for the NSW Murray (zones 10 and 11). When the Murray reaches the border with South Australia, it enters a new trading zone (zone 12).

Trade between zones in the Southern Connected Basin is possible, but is subject to inter-zone trading rules (sometimes also referred to as ‘inter-valley trading rules’ or ‘interstate trading rules’).

The four major allocation trade restrictions in the Southern Connected Basin are:

- Murrumbidgee inter-valley trade limit

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- Goulburn to Murray trade limit
- New South Wales to Victoria spill risk trade limit
- Barmah Choke trade restriction, which is used to manage the most well-known hydrological constraint in the Southern Basin: the Barmah Choke, where the Murray River runs through the Barmah–Millewa Forest, upstream of Echuca in Victoria.

Figure 2.4 provides a stylised representation of these trade limits, and also uses different colours to show each regulated system. Note that some systems (for example, the Murrumbidgee) are comprised of just one trading zone, whereas other systems (for example, the Goulburn and Murray) are comprised of several.

Chapter 3 and part 5 discuss the operation of inter-zone trading limits in more detail.

**Figure 2.4: Southern Connected Basin trading zones and trade restrictions**

In the Northern Basin, there are only a few places where the level of hydrological connectivity is sufficient to allow trades between different zones. The main areas where this is permitted is in the Border Rivers catchment (figure 2.5). Trade mechanisms in the Northern Basin are unique in several different ways.

In Queensland, all regulated systems (water supply schemes) and unregulated (water management areas) areas have zones established. Owing to the type of water supply and objectives associated with managing third-party impacts and environmental objectives, temporary and permanent trading

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49 Queensland uses “supplemented” and “unsupplemented” to refer to regulated and unregulated systems, respectively.
within and between zones in a regulated water supply scheme is generally more flexible than for unregulated areas.

In the Macintyre Brook Water Supply Scheme (Queensland), when a water allocation is traded from one zone to another zone, a factor is applied to determine the water available at the new location. The factor effectively takes into account the estimated differences in delivery losses (e.g. evaporation, seepage or overbank flows) that occurs between the major headworks infrastructure and the destination zone. In most other regulated systems, transmission or ‘conveyance’ losses are shared among all water users, not just those involved in a trade, so a buyer is credited with exactly the same volume of water that is debited from the seller and no account is taken of delivery losses (this is commonly referred to as ‘socialisation’ of losses).

In the case of trade across state borders in the NSW-Qld Border Rivers, allocation trade does not operate via cancelling allocation in one state and re-issuing it in the other state (‘exchange rate allocation trading’). Rather, the framework for interstate trading is based on the entitlement continuing to be authorised in the state of origin, managed in accordance with the water sharing rules in the state of origin and delivered by the infrastructure operator in the state of origin. The process for dealing with an application for interstate trade is essentially seeking confirmation from the state of destination that the nominated works are authorised and equipped with an approved meter and they have no objections to the trade. This model is commonly known as the ‘state of origin’ or ‘tagged allocation trade’ approach.

This interstate trading approach is facilitated by several key elements. First, NSW and Queensland water management law provide for the infrastructure operator in the state of origin to deliver water under a state of origin water entitlement to approved works (e.g. pump) in the state of destination. The ACCC understands this functionality is not available in the Southern Basin; that is, in the River Murray, water in a Victorian water account is not able to be delivered for extraction by works in NSW, and vice versa.

Second, NSW and Queensland have an agreement regarding the interstate trading framework and a requirement to establish procedures and protocols to give it effect. Because the Border Rivers water supply scheme (Qld) and equivalent in NSW is managed under continuous accounting, the states administer the water accounting through a holding account arrangement (which effectively uses the air space in the headwork storage). On approval of an interstate trade, the approved volume is credited to the holding account and debited according to water orders. From the NSW perspective, use of the NSW works to extract that delivery is authorised even if that user holds no account in NSW, because NSW recognises that Queensland has provided the authorisation for that water to be taken (as specified in the ‘seasonal water assignment notice’ issued by Queensland to give effect to the trade).

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51 In the Macintyre Brook water supply scheme, water sharing rules include what is referred to as a ‘storage factor’ which applies a different (and increasing) percentage loss to zones further from the headworks storage. This approach also applies to temporary and permanent trades between zones. In contrast, in the Border Rivers water supply scheme, the water sharing rules do not include a ‘storage factor’; water may be traded temporarily or permanently from zone to zone on a one-for-one megalitre basis. According to Queensland department staff, these approaches were discussed with entitlement holders prior to introducing the rules and there was general agreement that some potential change in performance (following the original granting of a water access entitlement) would be offset by having greater trading flexibility.

Water trading does not usually result in movement of water at the time of trade

It is important to recognise that entitlements and allocations do not ordinarily specify that the water user must draw down any particular portion of the water on any set days or in any set seasons of the year; and rights are generally not traded with any stipulation about when, by date or season, the buyer must access the water available under that right. For instance, a party that has bought an allocation is free to seek to draw it down over that year as it wishes, or in subsequent years, subject only to carryover rules.

One important implication of this is that when parties trade water access rights, water is not physically moved from the location of the first party to the location of the second. After the trade, the water infrastructure operator has an obligation to deliver the water to a different location, when the new owner later requests delivery of that water. This is important because rules governing trade between zones or valleys are generally specified with a view to ensuring the future obligations to supply water users at different locations don’t change ‘too much’. Part 5 considers these issues in more detail.

Source: Murray–Darling Basin Authority.\textsuperscript{53}

2.7 Overview of trading rules supporting market integrity and fair trading

Water markets are also subject to certain rules which are designed to promote ‘fair trading’ or a ‘level playing field’ for traders, and to help ensure there is sufficient information available for traders to make their decisions.

The Basin Plan Water Trading Rules provide a basic framework that is consistent across Basin States (see box 2.4). State legislation also contain provisions designed to help ensure water markets operate efficiently and effectively.

Box 2.4: Overview of the Basin Plan Water Trading Rules

The Basin Plan Water Trading Rules, which are set out in chapter 12 of the Basin Plan 2012, are intended to provide greater clarity and consistency for water markets across the whole of the Basin. They set out a consistent framework for water trading across the states, without duplicating existing rules.

These trading rules apply to the Commonwealth, the Basin States, IIOs and individual market participants. The rules address three broad aspects of market operation:

- reducing restrictions on trade
- improving transparency and access to information
- maintaining market integrity and confidence.

These trading rules provide that all water market participants have the right to trade free of certain restrictions. Providing these rights helps ensure that all people can participate in Basin water markets subject to a common set of rules.

These rules also contain certain non-discrimination provisions, to help ensure all traders can access the benefits of trade. For example, the rules provide that a person may trade a water access right (allocation or entitlement) free of any restriction which relates to:

- the person being, or not being, a member of a particular class of persons (section 12.07)
- the purpose for which the water relating to that right has been, or will be, used (with limited exceptions) (section 12.08)

The rules also require that:

- people who sell or dispose of water access rights declare their sale price
- approval authorities must notify the parties involved in a trade when a trade is restricted or refused, and must provide reasons for their decisions. They must also disclose any legal, commercial, or equitable interest they have in a trade to all parties when processing trades of water access rights
- the Australian and Basin State governments have to make water announcements generally available. Water announcements include announcements on allocations, carryover (including changes to carryover arrangements), trading restrictions and trading strategies
- persons or organisations refrain from trading activities when they are aware of a water announcement that has not been made generally available (often referred to as the ‘insider-trading rules’)
Different aspects of these kinds of rules are discussed further in this report. For example:

- rules governing the behaviour of water market intermediaries are considered in chapter 8.
- rules relating to data and information collection and transmission, including rules designed to support pricing transparency are discussed in part 4.

Stakeholder concerns about the existing rules are considered further in parts 3, 4 and 5.

2.8 Who participates in water markets?

The markets for tradeable water rights involve many people – directly as participants and indirectly as facilitators – who can be private, co-operative or government-controlled entities.

Irrigators are the most significant participant group in Basin water markets, accounting for the majority of the volume of water rights traded commercially, and the largest number of trades. Irrigators can be located within an off-river irrigation network, or may be a “private diverter”, holding their own water access right to extract (or ‘divert’) water directly from a natural watercourse. Irrigators range in size from small family farms to large scale corporate agribusinesses.

Irrigation infrastructure operators (often called IIOs) are major holders of water entitlements on issue. In New South Wales and South Australia, IIOs hold entitlements (sometimes referred to as ‘bulk licences’) on behalf of customers in their networks and issue irrigation rights which entitle customers to receive water from the IIO. In contrast, in Victoria, entitlements are specified at both the ‘wholesale’ or ‘bulk’ and ‘retail’ levels: Victorian IIOs hold ‘bulk entitlements’ and their customers hold retail-level entitlements (generally ‘water shares’, the main type of retail-level entitlement in Victoria).

Since water has been ‘unbundled’ or separated from land, individuals can also participate in water markets without necessarily intending to use the water themselves.

There are also water market intermediaries and other trade service providers involved in facilitating trade. These include:

- brokers, such as Ruralco Water, Wilks Water and Elders
- exchange platforms, such as Waterexchange, H2OX and Waterpool Trading
- water information service providers, such as Waterflow, the Australian Government Bureau of Meteorology and the Australian Bureau of Agricultural and Resource Economics and Sciences, and
- state-owned trade approval authorities, such as WaterNSW, SunWater (Queensland) and Lower Murray Water (Victoria).

Government entities have roles in managing river operations, setting trading rules, approving and registering trades; and managing compliance with Basin-wide requirements under the Murray–Darling Basin Agreement and the Basin Plan. These include adherence to the cap on the amount of water extracted from the Murray–Darling Basin: the Sustainable Diversion Limit, noted in section 2.2.

Chapter 3 contains more detail on issues such as the amounts of water used in particular agriculture sectors, irrigation networks and water for the environment.

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Chapter 4 provides an introduction to the different groups who participate in water trading, and analyses water ownership and trading activity in the Southern Connected Basin.

2.9 How does trading occur in practice?

Water trade processes can be complex and involve many participants.

Sellers and buyers need to find and transact with each other:

- They often conduct their trades through brokers and over exchanges, as discussed in detail further below.
- They can trade directly with each other, without such intermediaries – although authorities retain a role in registering, or approving and registering the trade.
- Traders of rights relating to IIOs' networks, such as irrigation rights, are more likely to trade within the network, but can also trade externally. As noted earlier in section 2.3.3, irrigation right holders can also ‘transform’ their permanent irrigation rights into statutory entitlements.

The sellers and buyers also need to settle on a price. To inform their expectations, they may rely on information from such sources as brokers, online information services such as Waterflow, and their own experience and records.

As in all markets and trade, it is more difficult to settle on an ‘efficient price’ if there is a lack of good information or one party has better information than the other. Chapter 11 provides more detail on the different information sources traders draw on to make water trading decisions.

Once two parties to a trade have reached agreement, details of the transaction are then lodged on trade forms with state-owned approval or registration authorities, such as WaterNSW, SunWater or Goulburn-Murray Water. There are various separate registers used to record water rights ownership and trades. For example, Victoria’s register is maintained by its Department of Environment, Land, Water and Planning and records both permanent and temporary water rights ownership and trades. In contrast, in New South Wales, permanent water entitlement ownership and trades are recorded on the New South Wales Water Access Licence Register by the NSW Land and Registry Services, and allocation ownership and trades are recorded by WaterNSW on the allocation assignments register. Figure 2.6 provides an example for how a trade is executed.

As a rule of thumb, authorities approve allocation trades more quickly than entitlement trades. Chapter 10 provides more detail on trade approval times.
2.10 Water for the environment

Allocation arrangements throughout the Basin have long included provision for some basic environmental flows. These provisions are written into water sharing arrangements, and therefore are often referred to as ‘rules-based environmental water’.

However, over time, scientific consensus emerged that rules-based environmental water was insufficient to maintain the ecosystems and environmental assets of the Basin, and that consumptive water rights had been over-allocated – that is, consumptive water use in the Basin was not sustainable. Basin State governments have been working together with water users to address this imbalance. Key milestones in this process have been the 1995 Cap on Diversions, the Water Act 2007 and the Basin Plan 2012. In particular, the Water Act and the Basin Plan together establish the role and functions of the Commonwealth Environmental Water Holder (CEWH), and set caps on the amount of water that can be allocated within the consumptive pool that are consistent with long-term sustainability assessments. The CEWH’s role is to manage the portfolio of water rights acquired by the Commonwealth government for environmental purposes, in a way that maximises environmental outcomes. There are also other state-based environmental water holders, such as the Victorian Environmental Water Holder, and also non-government environmental water holders such as the Nature Conservancy.

While this inquiry does not extend to examining the effectiveness of water buy backs for environmental purposes, it does consider the key impacts of environmental water holders on the markets for tradeable water rights. These impacts are complex, and are examined in more detail in chapter 3.

2.11 Basin management responsibilities

The Murray–Darling Basin is a complex and dynamic environment that crosses multiple state and territory boundaries, and requires state and Australian government agencies to cooperate in its management.

The arrangements for the institutions, and the ‘governance’ or oversight, involved in water resources and water trade in the Basin are themselves complex. They differ across different catchments and they reflect complex governance and funding arrangements set out in such laws and agreements as the Basin Plan and the Murray–Darling Basin Agreement. A brief overview of Basin management responsibilities is provided below. Institutional and governance arrangements are outlined in table 2.2, and discussed further in chapter 17.

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57 Interested readers are directed to section 3.5.3 of S Wheeler and others, Water market literature review and empirical analysis, Consultant report prepared for the ACCC Murray–Darling Basin Water Market Inquiry, 2020, which provides some relevant references, and to the work of the Socio-Economic Impacts Panel (https://www.basin-socio-economic.com.au/, viewed 11 June 2020).

### Table 2.2: Key institutions in the Murray–Darling Basin governance framework

<table>
<thead>
<tr>
<th>Institution</th>
<th>Key roles and responsibilities</th>
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| **Basin State agencies** | - Basin States have historically had primary responsibility for managing the water resources in their States.  
- Basin States enter into intergovernmental agreements to co-operatively manage Basin water resources and enhance consistency between States. Basin State agencies grant water licences/entitlements under their legislation and annually allocate water to entitlement holders. Each Basin State determines annual allocations for each river catchment in its state in line with water resource plans, which must be accredited under the Basin Plan.  
- Basin States create the majority of rules governing water trade in the Basin, including intra-zone, inter-zone (or ‘inter-valley’) and interstate trading rules. These rules must be consistent with the Basin Plan. Basin States are responsible for approving trades and for compliance with and enforcement of state-based water management frameworks. Basin States administer their own water ownership registers. |
| **Murray–Darling Basin Ministerial Council** | - Ministerial Council approves infrastructure works on the River Murray (shared water resources), makes decisions on allocation of shared resources and on policy issues of common interest to Basin States and the Australian Government.  
- Ministerial Council consists of one minister from each government (the Australian Government and the Basin States). |
| **Murray–Darling Basin Authority (MDBA)** | - MDBA has responsibilities under the Murray–Darling Basin Agreement to manage the shared resources of the River Murray. It manages the storage and delivery of water in the River Murray system on behalf of the Basin governments. MDBA (in communication with Basin States) adjusts state water shares when water is traded between states (see also box 2.5).  
- The MDBA also implements and enforces the Basin Plan. This includes helping the Australian Government Minister responsible for water with the accreditation of Basin State water resource plans and assessing the consistency of Basin State trading rules with the Basin Plan. |
| **Interim Inspector General of Murray–Darling Basin Water Resources (IIG)** | - The IIG’s role is to provide independent oversight and assessment of the Australian Government and Basin State agencies responsible for implementing the Basin Plan. This includes assessing the performance of the MDBA and Basin States in carrying out their compliance functions under the Water Act and Basin Plan. In performing the role, the IIG must undertake investigations and community consultation and to refer instances of alleged non-compliance to appropriate enforcement agencies.  
- The IIG reports directly to the Commonwealth Minister and the Basin Ministerial Council.  
- The IIG is intended to be replaced by the Inspector-General of Water Compliance (IG). As at December 2020, legislation to create the IG is currently under development. |
| **Commonwealth Environmental Water Holder (CEWH)** | - CEWH’s role is to manage the large portfolio of held environmental water (entitlements with annual allocations) that have been acquired through the Australian Government’s investment in water-saving infrastructure and strategic water purchasing throughout the irrigation districts of the Basin.  
- CEWH works with environmental water holders in each of the Basin States to co-ordinate and deliver environmental watering activities. |
| **Bureau of Meteorology (BOM)** | - BOM has responsibility under the *Water Act 2007* for compiling and disseminating comprehensive water information across Australia.  
- BOM also provides a range of other information, analysis and forecasts that assist water users to make effective decisions. |

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59 The Australian Government appointed Mick Keelty AO as Interim Inspector-General of Murray–Darling Basin Water Resources (IIG) from 1 October 2019, for 12 months or until a statutory appointment is made, pending new Commonwealth legislation to create the Inspector-General of Water Compliance. Mr Keelty’s tenure as IIG ended in September 2020.

<table>
<thead>
<tr>
<th>Institution</th>
<th>Key roles and responsibilities</th>
</tr>
</thead>
</table>
| **Australian Competition and Consumer Commission (ACCC)** | ▪ Enforcing rules relating to transformation of irrigation rights, regulated charges levied by infrastructure operators, and termination fee rules, and providing advice to the Australian government on these rules\(^{61}\)  
▪ Advising the MDBA on the development of the Basin Plan water trading rules  
▪ Enforcing the Australian Consumer Law (ACL) over water market participants, including brokers, exchange platforms and IIOs |
| **Australian Securities and Investments Commission (ASIC)** | ▪ ASIC has some jurisdiction to regulate certain aspects of tradeable water rights. Chapter 7 discusses this in more detail. |

As discussed in section 2.6, some water catchments within the Basin cross state boundaries. In these cases, Basin States’ shares of shared water resources are determined under the Murray–Darling Basin Agreement (for the Southern Basin) and the Border Rivers Agreement (for the Northern Basin). The MDBA has responsibilities in administering these agreements. Box 2.5 summaries the Commonwealth, state and intergovernmental instruments that have developed for managing the Basin.

**Box 2.5: Commonwealth, state and intergovernmental instruments**

The water rights frameworks and resource management arrangements that underpin Basin water markets have historically been state-based. However, the need to coordinate policy and management arrangements for shared Basin resources has necessitated the Basin States entering into intergovernmental agreements that refer limited legislative powers to the Commonwealth to enable legislate the *Water Act* (2007) (Cth).

Building on earlier versions of the Agreement to reflect changes arising from the *Water Act*, Basin governments adopted the Murray–Darling Basin Agreement 2008\(^{62}\) to promote and coordinate effective planning and management for the equitable, efficient and sustainable use of the water and other natural resources of the Murray–Darling Basin.

The Agreement establishes the Murray–Darling Basin Ministerial Council to consider and determine outcomes and objectives on major policy issues of common interest to the Basin governments. It also establishes the Basin Officials Committee to oversee high level decision-making in relation to river operations, including setting MDBA objectives and outcomes.

The Basin Officials Committee, in turn, is advised by several technical working groups. These include the River Murray Operations Committee, the Southern Connected Basin Environmental Watering Committee, the Water Liaison Working Group and the Trade Working Group.

See figure 2.7 for a diagram outlining the river operation decision making bodies in the Murray Darling Basin.

**River operations**

The operation of the Basin is split into two regions: the Northern Basin and the Southern Connected Basin.

In the Southern Connected Basin, the MDBA works in cooperation with the Basin governments to run the River Murray. Inter-valley and interstate trade are the subject of joint management and oversight through arrangements set out in Schedule D of the Murray–Darling Basin Agreement.

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\(^{62}\) Now Schedule 1 in the *Water Act* 2007 (Cth).
As the river operator in the Southern Connected Basin, the MDBA maintains the IVT accounts and coordinates trade of water entitlements and allocations between states and valleys.

In the Northern Basin, interstate trade between Queensland and New South Wales is managed under agreements between the two states. The bulk water operations are managed via the New South Wales–Queensland Border Rivers Intergovernmental Agreement 2008 and by the Border Rivers Commission. Trade between New South Wales and Queensland is managed by the states via their water sharing plans.

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**Figure 2.7: River operation decision-making bodies for the Murray-Darling Basin**

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2.12 Why is there water trading in the Murray-Darling Basin?  

The buying and selling of water rights in the Murray-Darling Basin has been enabled for certain key reasons:

- Water is scarce; and where it is demanded or valued most changes over time. The ability to trade water helps people access water where it is wanted most – to put it to its most productive use. With water trade, irrigators produce more of the things valued most and the Australian economy benefits:
  - Irrigators are the single largest group of water users in the Basin. Water markets allow many irrigators to top up their water needs, expand production, develop new business models or free up capital to invest elsewhere in their businesses (for example, by leasing water temporarily at less cost than owning it permanently).
  - To give some concrete examples, markets for water rights can i) help some businesses emerge or expand, such as vegetable or nut growers buying water entitlements to chase new domestic and export market opportunities; ii) help others stay stable over the longer term, such as grape growers buying water allocations to keep their long-held vines alive in drought; or iii) help a farmer transition into different forms of agricultural production, by selling water rights to free up capital to invest in new production systems.

- Markets and trading give individual people and businesses more choice in, and more responsibility for, what happens to the Basin’s scarce water. With trade, individual people and businesses work out what they want and need, and then deal directly with each other in the marketplace. Without water markets, processes for changing ownership of water rights and where water can be used would be more cumbersome. In the alternatives:
  - private interests might still trade water assets, but if, for example, water is tied to land, people’s choices and actions would be more restricted and costly
  - if government decisions and processes solely and centrally determined all the detail of water use and movement, people would be confined just to dealing with and lobbying government to fulfil their needs.

- In the context of the droughts that beset the Murray-Darling Basin, trading and markets can be used as tools to make the best use of the scarce natural resource of water. When individuals trade in markets, especially markets characterised by healthy competition, experience indicates that they tend to deal with each other more efficiently and effectively than alternative systems. That is:
  - more needs and parties are satisfied and there is less waste and loss
  - there is greater pressure to drive down costs of using and transferring water between parties
  - there is innovation – new ways of doing things.

This is summed up in the first objective listed for water markets in the Water Act, which is:

to facilitate the operation of efficient water markets and the opportunities for trading, within and between Basin States.  

It is also reflected in the purposes of the Basin Plan, which include to provide for:

water to reach its most productive use through the development of an efficient water trading regime across the Murray-Darling Basin.
Box 2.6: The economics, in simple terms, of ‘efficient water markets and opportunities for trading’

The Basin water markets stem from the basic idea of managing a scarce resource through the use of a ‘cap-and-trade’ system in which:

- the cap represents the total pool of the resource available, consistent with sustainable levels of extraction
- individual users are given entitlements to a share of the total pool
- entitlement rights and the quantity of water allocated to an entitlement each season (an allocation) are tradeable, so that ownership, control and use can change over time
- the price is determined in the market by the value placed on water by many buyers and sellers.

The objective of the cap-and-trade water market approach is to facilitate the economically efficient allocation of water while improving environmental sustainability by limiting extraction of the resource. Once the cap on total consumptive water use is established, water trading is a mechanism intended to ensure that limited water resources are put to their most valuable ‘uses’ (including non-consumptive uses such as environmental watering). The idea is that water markets will promote economic efficiency by enabling water resources to be reallocated to those who value them most highly in both the long and the short terms:

- Seasonal water trading (sometimes called ‘temporary trade’) enables the water available in any given season to be reallocated across crops, locations, irrigators and other water users in response to seasonal conditions (the concept of allocative efficiency). This is particularly valuable where different users have different water demands. For example, given enough warning, rice growers can choose to reduce the areas they sow during times of low water availability. However, other farmers, such as those growing perennial horticultural crops (such as fruit trees), need water every year. Trading provides the opportunity to move water between users with different water demands.

- Water trading can facilitate investment and structural adjustment in response to changing conditions. For example, in a capped system in which no new entitlements are available, trade enables new water users, such as a new ‘greenfield’ irrigation developments, to establish and develop. The corollary is that water markets provide a mechanism for existing users to retire or move on. As a result, markets enable dynamic changes in the size and composition of water-using industries over time. This is particularly useful in a market-oriented economy such as Australia’s, in which farmers face fluctuating global market forces for the commodities they produce.

- Water trading can also promote productive efficiency. The price signal for water in the market provides an incentive for users to make efficient use of all inputs and invest in improving the efficiency of their on-farm water use.

In short, markets allow water users, rather than governments, to make these complex short-term and long-term decisions about who should use water for what. Market prices provide a signal for users to consider the opportunity costs of their water-use decisions and make decisions in their own best interests. However, for the decisions of individuals to be consistent with the broader public interest, water markets must operate within the physical and hydrological realities of surface water and groundwater systems. Therefore, to be efficient, water trading needs to be governed by rules that reflect those realities.

As illustrated above, water trading is an opportunity not just for buyers but also for sellers, who can earn an income from their water rights when they are more valuable to someone else. Markets provide the opportunity for one party that wants and needs water to find another party that is prepared to trade its water, at a price they both accept. Both sides are seeking an outcome that benefits and profits them. To repeat the example used in box 2.6, growers of annual crops, such as rice and cotton, can earn an income by trading on their water assets in years when prices for those crops are low and water is expensive.
Water rights are now significant assets for many farmers:

- The value of water entitlements on issue across Australia in 2019–20 has been estimated to be $26.3 billion. In recent years the average turnover of Basin water rights markets has been about $1.8 billion (includes both temporary and permanent trade).

- On average for the Southern Basin, water entitlements comprise around 41% of capital assets for horticulture farms, 36% for dairy farms, and 35% for rice farms, as at 2018–19 (figure 2.8). Importantly, for some farms, the value of entitlements held is equal to or even more than the value of land assets.

**Figure 2.8: Average proportion of capital assets by asset class, by farm type**

Source: ABARES irrigation survey.

Notes: Average per farm. For horticulture: average of three regions (Goulburn, Murray and Murrumbidgee); for rice: average of two regions (Murray and Murrumbidgee); for dairy: average of two regions (Murray and Goulburn-Broken). Data for rice not available for 2012–13.

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2.12.1 There are many reasons why different parties decide to trade in water

Water markets allow various parties to pursue a range of activities and execute a range of strategies and plans. Table 2.3 gives some examples. Chapter 4 provides more detail and data on the different types of traders, including discussion of traders’ ‘Water Ownership and Trading Strategies’.

Table 2.3: Examples of reasons for participating in water markets

<table>
<thead>
<tr>
<th>Tradeable water right</th>
<th>Reason for trade</th>
<th>Type of trade</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Water access entitlement and permanent irrigation right</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Adjust permanent water holdings</td>
<td>Buy or sell water access entitlement or permanent irrigation rights</td>
<td></td>
</tr>
<tr>
<td>Source additional water access entitlement or permanent irrigation right for defined period of time</td>
<td>Lease (as lessee) a water access entitlement or permanent irrigation right</td>
<td></td>
</tr>
<tr>
<td>Permanently change the location at which water can be accessed</td>
<td>Tag a water access entitlement</td>
<td></td>
</tr>
<tr>
<td>Provide an income stream for water access entitlements held</td>
<td>Lease (as lessor) a water access entitlement or permanent irrigation right</td>
<td></td>
</tr>
<tr>
<td><strong>Water allocation and temporary irrigation right</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Adjust current water holdings</td>
<td>Buy or sell water allocation or temporary irrigation rights (‘spot market’ trades)</td>
<td></td>
</tr>
<tr>
<td>Access carryover capacity</td>
<td>Carryover parking</td>
<td></td>
</tr>
<tr>
<td>Access water at a future point whole limiting expose to future price movements</td>
<td>Forward trade water allocation or temporary irrigation right</td>
<td></td>
</tr>
<tr>
<td>Change location at which currently available water may be accessed</td>
<td>Change of location trade (for example, inter-valley or inter-zone trade)</td>
<td></td>
</tr>
<tr>
<td>Provide an income stream from water allocations sold</td>
<td>Sell water allocations; enter into forward contracts</td>
<td></td>
</tr>
<tr>
<td><strong>Water delivery right</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Permanently adjust share of network capacity (and liability to pay fixed network charges)</td>
<td>Buy or sell water delivery rights</td>
<td></td>
</tr>
</tbody>
</table>

Source: ACCC analysis.
2.13 Elements of effective water markets

As discussed in section 2.12, the overall objective in creating water markets is to set up a mechanism to allocate a scarce and limited resource (water) to generate maximum public benefit.

Policymakers and economists have long recognised that markets are much better mechanisms to allocate resources in ways that maximise benefits and are responsive to changing circumstances than are governments. The extended negative legacy of government water allocation decisions in Australia and internationally over many decades provides a sharp reminder of the limitations of government allocation decisions, especially for a resource such as water.

Water markets involve a product which has unique characteristics, specifically its supply is dependent on seasonal conditions and is unresponsive to demand, and there are physical constraints which limit its storage and transportability. It also has value for non-economic purposes such as maintenance of the environment, and is essential for human and animal needs. Consequently, developing an efficient and well-functioning water market needs careful market design. This is particularly so in the Southern Basin, as it involves thousands of irrigators sourcing water from multiple waterways and storages spanning three states.

An efficient and well-functioning market is one:

- which results in prices that most closely reflect all available information (that is, there are no ‘externalities’ – which is where prices do not incorporate or reflect all the costs and benefits of the activity)
- which results in products being allocated to their most economically-valuable use (that is, allocation is efficient, including taking into account dynamic considerations)
- in which transaction costs are efficient
- which enables participants to readily access relevant and comprehensive market information.

Markets can take many different forms, ranging from the simple open-cry auction markets typically used to buy and sell real estate, to more complex electronic exchanges used to buy and sell financial derivatives or equities, or spectrum allocation auctions. However, there are several common elements that are fundamental to most markets, and which in combination contribute to their efficient and effective operation.

Table 2.4 provides a description of these common elements of efficient markets and how they apply in water markets, and shows which chapters of this report address which element(s).

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72 The concept of efficient allocation of resources among competing uses entails several concepts of efficiency. In relation to water resources, these concepts can be considered as follows:
- Allocative efficiency: water resource short-term decision making reflecting seasonal conditions is most often achieved through water allocation trade.
- Productive efficiency: water price changes offer incentives for the efficient use of water resources as either an investment or input for productive outcomes.
- Dynamic efficiency: water resource structural or long-term decision making reflecting new investment opportunities, regulatory shifts in access arrangements or personal strategic choices is achieved through water entitlement trade.


73 This principle is sometimes phrased as ‘transactions costs are minimised’. However, transactions costs are not necessarily a ‘dead-weight loss’ which reduce gains from trade; transactions costs may constitute necessary investment in services and systems for facilitating trades. Therefore, maximising gains from trade does not necessarily equate to minimising transactions costs. Therefore, we use the concept of ‘efficient transactions costs’, which refers to the level of transactions costs which maximise gains from trade.

74 The ACCC has commissioned a literature view which summarises existing assessments of water markets and describes the objectives and principles of effective water markets in more detail. See in particular chapter 4 of this report and S Wheeler and others, *Water market literature review and empirical analysis*, Consultant report prepared for the ACCC Murray–Darling Basin Water Market Inquiry, 2020.
### Table 2.4: Common elements of effective water markets, and where they are addressed in this report

<table>
<thead>
<tr>
<th>Category</th>
<th>Market element</th>
<th>How does this element apply in water markets?</th>
<th>Relevant chapters/parts</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Enabling Institutions</strong></td>
<td>Supply</td>
<td>Volume of water available to be traded. In a cap-and-trade market, this also encompasses the robust definition of the cap and specifying resource shares in perpetuity.</td>
<td>chapter 3</td>
</tr>
<tr>
<td></td>
<td>Product description</td>
<td>Details of water ‘product’ characteristics, including security level, risk level, legal protection.</td>
<td>chapter 2</td>
</tr>
<tr>
<td></td>
<td>Ownership registry</td>
<td>Record of legal ownership of water entitlements and allocations, including records of changes in ownership, on state-based registers established under water management legislation. Settlement (see below) for some trades does not take place until registration.</td>
<td>part 4</td>
</tr>
<tr>
<td></td>
<td>Trading rules</td>
<td>Rules that determine when and how trade can occur, in what water products, and special constraints applicable to certain products or transactions.</td>
<td>part 5</td>
</tr>
<tr>
<td><strong>Facilitating gains from trade</strong></td>
<td>Exchange</td>
<td>Forum(s) in which buyers and sellers are able to make and accept price offers to exchange ownership of water entitlements and allocations.</td>
<td>part 4</td>
</tr>
<tr>
<td></td>
<td>Clearance</td>
<td>Ensuring buyer and seller honour contract obligations; and assessing and approving trade applications.</td>
<td>part 4</td>
</tr>
<tr>
<td></td>
<td>Settlement</td>
<td>Facilitating the actual transfer of payment from buyers to sellers, and transfer of title from sellers to buyers and updating water accounts to reflect approved transactions.</td>
<td>part 4</td>
</tr>
<tr>
<td></td>
<td>Delivery</td>
<td>Process of physically supplying a volume of water which an owner of a water entitlement/allocation/right is legally entitled to receive.</td>
<td>part 5</td>
</tr>
<tr>
<td></td>
<td>Market information</td>
<td>Collation and dissemination of information detailing key market data such as the price of water trades that have occurred, and the description of the water product that has been transacted. Ensure the quality of data and information is appropriate for users’ needs.</td>
<td>part 4</td>
</tr>
<tr>
<td><strong>Effective monitoring, enforcement and evaluation</strong></td>
<td>Market monitoring</td>
<td>Market monitoring involves both actively examining the behaviour of market participants (including service providers such as intermediaries and trade approval authorities) and compiling and monitoring data detailing the prices, volumes and nature of products that are traded.</td>
<td>parts 3 and 4</td>
</tr>
<tr>
<td></td>
<td>Compliance and enforcement</td>
<td>Compliance and enforcement are critical in terms of market integrity and confidence. Compliance and enforcement actions apply for many of the elements listed above (for example enforcement of total supply cap; enforcement of rules governing permissible trade restrictions; enforcement of rules governing trader behaviour; compliance with rules or standards for trade processing and information flows).</td>
<td>parts 3 and 5</td>
</tr>
<tr>
<td></td>
<td>Market evaluation</td>
<td>Evaluating the outcomes arising from markets in order to assess whether markets are performing well or could be improved. This includes reviewing existing transactions costs to see whether they can be reduced, scanning for unanticipated externalities, and developing new market products in response to traders’ demands.</td>
<td>parts 5 and 6</td>
</tr>
</tbody>
</table>

Source: ACCC analysis, adapted from S Wheeler and others.\(^{75}\)

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3. Trends and drivers in water markets

Key Points

Trends in water markets since 2012–13: volumes and values

- The total value of water allocation trade in Murray–Darling Basin water markets since 2012–13 is estimated at $2.73 billion in 2019–20 constant terms (accounting for inflation), and the value of entitlement trade over the same period is estimated at $12.7 billion.

- While the volume of water allocation trade strongly depends on total water availability, the data indicates that volumes traded relative to the total water allocated to entitlement holders is growing. This indicates water markets are developing, and more water users are making use of them, over time.

- Water allocation prices were much more volatile, and generally higher, in 2018–19 and 2019–20, than in previous years. For the 2020–21 year to December, allocation prices were much lower, reflecting drought-breaking rains in much of the Basin, although 2020–21 water allocations currently remain low for some entitlement types.

- Due to expanding demand in downstream regions and other factors, inter-valley trade restrictions are becoming more binding over time, and so their impact on market outcomes is increasing.

- Significant proportions of trading activity takes place within off-river irrigation networks, such as the private irrigation infrastructure operators in New South Wales and South Australia.

Drivers of water market trends since 2012–13

- Key trends likely to have significantly driven demand for water for irrigation and irrigator participation in water markets have been:
  - substantial expansion of the almond industry in the Southern Basin: increased irrigated areas, volume applied and production of almonds, which have been concentrated on the Murray River below the Barmah Choke
  - continued significant role of irrigated cotton, rice and other broadacre annual cropping in New South Wales, and increased irrigated pasture production in Victoria
  - increased irrigated area and volume of water applied for cotton in the Murrumbidgee, although a decrease irrigated area and volume of water applied in the Lower Darling.

- Government environmental water holders (EWHs) have become significant owners of water access entitlements in the Southern Basin. Acquisition of water access entitlement by EWHs have decreased the consumptive pool, reducing the supply of water access entitlements and water allocations available in water markets. The impact this has on trade is complex: while demand for water may have increased from some irrigators who sold their entitlements to the Commonwealth but continued irrigating, some have exited irrigated farming altogether, reducing water demand. EWHs are also significant traders of water allocations, although the majority of trades are transfers between different EWHs at zero price to facilitate environmental watering.

- New entrants into water markets such as institutional investors now account for significant proportions of water allocation trade in the Southern Basin.

- Substantial increased in water allocation prices during 2018–19 and 2019–20, combined with the entry of new market participants such as institutional investors, are key drivers of stakeholder concerns about market integrity and the conduct of ‘non-user’ market participants.

- From 2012–13 to 2018–19, ACCC estimates indicate trade between own accounts (where buyer and seller are the same entity) represented at least 10% of total allocation trades in the Southern Connected Basin (by number), and 12% by volume. This indicates significant volumes of recorded trades are a consequence of the Southern Connected Basin consisting of a series of interconnected but distinct systems, rather than a single system. ‘Carryover parking’ trades, which allow users to manage their water portfolios through time and across zones, likely add to this volume of trade that is related-party trade.
This chapter summarises key trends in Murray–Darling Basin water markets since 2012 and considers the drivers which interact to produce these trends. It then draws out some key implications of current trends and changes in underlying drivers over time, with an emphasis on considering whether these underlying drivers are putting pressure on current market structures which may negatively impact on efficient market functioning.

3.1 Trends in water markets since 2012

3.1.1 Water allocation markets and temporary trade of irrigation rights

Since 1 July 2012, 47,305 GL of water allocation has been traded in Southern Basin surface water systems, with an additional 3,099 GL traded in Northern Basin surface water systems, and 1,676 GL traded in Basin groundwater systems (figure 3.1).\(^76\) The total value of this trade is estimated at $2.73 billion in 2019–20 constant terms (accounting for inflation).\(^77\) As this figure shows, over this period, the most significant years in terms of value of trade were 2018-19 and 2019–20, in which high prices and relatively high trade volumes (compared to historical volumes traded) combined to produce a total value of $651 million and $708 million, respectively (in $2019–20). For the 2020-21 year to 30 December, the total value of allocation trade was $177 million.

Figure 3.1: Allocation trade volumes and total value ($2019–20 million), 2012–13 to 2020–21

Over this period, the volume of allocation traded in the Southern Basin has been increasing relative to the volume allocated annually to entitlement holders. This reflects several factors:

- More irrigators are using temporary trading as part of their farm business strategy: in 2000, only around 10% of irrigators in the Southern Basin had ever participated in temporary trade, but participation has risen sharply and by 2015, around 78% of irrigators had conducted at least one water allocation trade.\(^78\)
- The introduction of carryover has resulted in significant volumes being held over from one year to the next, some of which is then traded.

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\(^76\) ACCC analysis based on Bureau of Meteorology data. Data includes all allocation trades in the Murray-Darling Basin drainage division, from 1 July 2012 to 31 December 2020.


\(^78\) J Schirmer and D Peel, *Understanding participation in water trading by irrigators in the Murray-Darling Basin*, Consultant report prepared for the ACCC Murray-Darling Basin Water Market Inquiry, p. 35. See also chapter 4 and appendix A for a detailed analysis of irrigator participation in water markets.
There has been an increase in consumptive water users moving water allocated in one trading zone to another zone for further trade or use (extraction).  

Environmental water holders (EWH) have acquired a substantial portfolio of water access entitlements, and regularly move water allocation accruing to these entitlements between valleys and between EWH as part of environmental watering strategies.

**Water allocation price movements**

Over the period 2012–13 to 2019–20, water allocation prices have fluctuated significantly. 2018–19 and prices increased dramatically during the first half of 2019–20 as drought conditions returned to the Basin, before falling again as rains in much of the Basin increased water availability (figure 3.2). Water allocation prices on any given day show a wide range of variation; there is no single price for water allocation.

![Figure 3.2: Allocation prices for Southern Connected Basin, 2012-13 to 2020-21](image)


Notes: Zero dollar trades included. Trades with real price >$1,500/ML ($2019–20) excluded.

Water allocation prices have been particularly volatile in 2018–19 and 2019–20. Figure 3.3 below shows the relative spread of prices for each water year, in constant $2018–19 per ML. In a wet year such as 2016–17, prices are dominated by zero dollar trades conducted by environmental water holders and other parties seeking to transfer water between their own accounts, or to related parties – for example, the Commonwealth Environmental Water Holder (CEWH) transfers a significant proportion of its water allocation to the Victorian Environmental Water Holder (VEWH) for delivery, in part because the VEWH holds bulk entitlements with different and more flexible delivery arrangements (see also section 4.3.1). In contrast, in a dry year such as 2018–19, the majority of trade is undertaken by non-EWH traders, and prices fluctuate significantly and reflect the tightened supply due to low water availability, versus the increased demand from irrigators.

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


Inter-valley trade restrictions within the Southern Connected Basin cause water allocation prices to differ between zones. Figure 3.4 shows how average prices for the main trading zones in the Southern Connected Basin converge and diverge over time. Section 3.3 considers how restrictions on inter-valley trade contribute to price divergence between zones when trade limits are closed (that is, when inter-zone trade is not permitted).

Figure 3.3: Density of price per ML, by water year, Southern Connected Basin

Source: ACCC analysis based on New South Wales, South Australia and Victoria response to voluntary information request.
Notes: A density plot shows the distribution of trade prices. Higher densities mean more trades at that price. YTD = 2019–20 year to 30 November 2019.

Figure 3.4: Average prices, by selected trading zones, and average for Southern Connected Basin

Source: ACCC analysis based on New South Wales, South Australia and Victoria response to voluntary information request, Waterflow data and Australian Bureau of Statistics, Cat. No. 6401.
Notes: Basin State voluntary information request data used up until 31 October 2019 (solid lines); Waterflow data thereafter (dashed lines). Daily zone and Southern Connected Basin (all zones) price series derived using ABARES GAM methodology. Excludes zero dollar trades.
Temporary trade involving IIOs

IIOs in New South Wales and South Australia are significant holders of water access entitlement, particularly in the Southern Basin (see further discussion under section 3.1.2 below). In these states, IIOs typically hold water access entitlements on behalf of their customers, and the customers hold irrigation rights and are allocated water (‘temporary irrigation right’) by their IIO. When an IIO customer who holds irrigation rights wishes to trade with a person situated outside the IIO’s network, the IIO undertakes a water allocation trade on their customer’s behalf, and reduces or increases the customer’s internal temporary irrigation right to reflect the trade. Because of these arrangements, IIOs often appear as trading parties in Basin State registry data. In 2018–19, IIOs accounted for 8% of water allocation volumes purchased, and also 8% of water allocation sold in the Southern Connected Basin; this is lower than in earlier years, when IIOs typically accounted for around 12–17% of the volume of trade (as sellers), and 8–10% (as buyers).

Trade of temporary irrigation right within these IIO networks can also be significant. In 2018–19, 621 GL of temporary irrigation right was traded within New South Wales and South Australia IIOs in the Southern Connected Basin, in around 9,500 transactions.82 This trade is not captured in Basin State water registers, as IIOs are the approval authorities for these trades.

Allocation trade activity varies throughout the water year

Trading activity varies throughout the water year (figure 3.5). Over the period 2012–13 to 2019–20, on average, around 2% of trades (by number) occur in July – typically this is because the irrigation season has not started, and allocations may not yet have been announced, even for higher security rights.83 As the year progresses, trading activity increases, particularly over the summer months and into autumn, as the irrigation season progresses.

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82 Temporary trade volumes within IIOs covers the following IIOs: Barossa Infrastructure, Buddah Lake, Coleambally, Central Irrigation Trust, Eagle Creek Pumping Syndicate, Hay Private Irrigation District, Jemalong, Marthauguy, Murrumbidgee Irrigation, Murray Irrigation, Moira, Narrumine Irrigation Board of Management, Renmark Irrigation Trust, Tenandra, Trangie-Nevertire Irrigation Scheme, West Corurgan, Western Murray Irrigation. Temporary trade numbers covers the following IIOs: Coleambally, Central Irrigation Trust, Murrumbidgee Irrigation, Murray Irrigation, Renmark Irrigation Trust, West Corurgan and Western Murray Irrigation. Sources: ACCC analysis based on ACCC annual Water Monitoring Report IIO Requests for Information and IIO responses to voluntary information request.

Figure 3.5: Proportion of allocation trades by month and year, Southern Connected Basin, 2012–13 to 2019–20

Source: ACCC analysis based on Bureau of Meteorology data.

Notes: Month determined by date trade application was approved. Includes all approved trades, including zero-dollar trades.

Trading to access carryover

Carryover changes the dynamic of when water is available in accounts for use or trade. Users who have carried over water from the previous year will have allocation available in their accounts even before new allocations are announced for entitlement holders, at the start of a water accounting year. Carryover and trade also interact, as many users trade water after the irrigation season has finished (e.g. in June), to maximise use of carryover on their own entitlement, and potentially rent access to carryover on others’ entitlements via carryover ‘parking’ trade.

Figure 3.5 above shows that June has accounted for a significant proportion of trading activity throughout the period 2012–13 to 2019–20. Trades approved in June 2017, 2018 and 2019 each constituted more than 15% of the total number of trades for the respective water year. One reason for this significant volume of late-season trade is that users move water between their own accounts to take full advantage of their own access to carryover, and also undertake ‘carryover parking trades’ with other users, to take temporary advantage of others’ unused carryover eligibility.

While it is difficult to precisely identify trades as carryover parking trades in historical data, ACCC analysis has identified 630 trades, totalling 166 GL, over the period 2012–13 to 2018–19 that are highly likely to have been carryover parking trades. This accounts for only 0.5% of trade in this period (in terms of both number and volume of trade), but likely underestimates the magnitude of this type of trade. As detailed in Chapter 11, Basin States have recently introduced changes to data captured via allocation trade applications that should allow improved identification of carryover parking trades in future.

84 See box 15.2 in chapter 15 for ACCC methodology to identify carryover parking trade.
Trading between entity’s own accounts

Over the period 2012–13 to 2019–20, ACCC estimates indicate that trade between own accounts represented about 12% of total allocation trades (by number), and 16% by volume (figure 3.6). This is important because it highlights that significant volumes of trade are due to the fact that the Southern Connected Basin is made up of a series of interconnected but distinct systems. A user may not hold a single account for all of their trading and water use activity, but rather may hold different accounts in different states and zones, and may in some cases even hold multiple accounts in the same zone. ACCC analysis also shows that trade between users’ own accounts is much more focussed on end-of-year trade (particularly in June) than trade in general, indicating that users may be adjusting their holdings between their accounts to maximise carryover opportunities and minimise end-of-year forfeitures. This kind of reorganising of allocation volumes between an entity’s own accounts may not be captured by stricter definitions of ‘carryover parking trade’, but may be undertaken for similar reasons.

Figure 3.6: Number of allocation trades between own accounts and between different entities’ accounts, Southern Connected Basin

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

Notes: 2019–20YTD = 2019–20 year to 30 November 2019. Trade between entity’s own accounts represents trade within a ‘cluster’, as determined using clustering algorithm analysis. This methodology takes into account where the same entities appear in different Basin State datasets, and where multiple entities jointly hold allocation accounts or water access entitlements. See box A.1, Appendix A for further detail.

ACCC analysis based on New South Wales, South Australia and Victoria responses to voluntary information request. Note that individual users, particularly those who trade in multiple jurisdictions, may be identified by several similar names in registry trade data. For example, an individual might be identified in different datasets as ‘John B. Smith’, ‘J Smith’ and ‘John Smith’. Also, many accounts have joint owners, which may also be represented differently in different datasets. For example, Farm ABC and ABC Trading Company may in reality be related parties who hold water access entitlements and/or allocation accounts in common. These phenomena make precise identification of trading activity between an individual entity’s own accounts problematic. The ACCC has used an iterative clustering algorithm approach for this analysis; this methodology is summarised in box A.1, Appendix A.
3.1.2 Water entitlement markets

Permanent trade

The total value of permanent trade in the Basin since 2012–13 is estimated at $12.7 billion in 2019–20 constant terms (accounting for inflation). The total value traded each year fluctuates with changing prices and volumes traded, but averages around $1.5 billion per year.86

Over the period 2011–12 to 2015–16, the single largest reason for permanent trade was the acquisition of permanent rights by the federal government for environmental use.87 After 2015–16, acquisition by government for environmental use has declined, and trades between different classes of consumptive users – particularly different irrigated sectors – has become more significant. Changes in the relative economic returns from different agricultural commodities also drives entitlement trade. For example, high returns for almonds and cotton, combined with low interest rates, has driven expansion and entitlement acquisition in these industries.88 In addition, in some valleys, there has been significant acquisition of permanent water rights by non-users, who seek to hold permanent water rights as long-term investment assets, and who provide a range of services to water users, such as entitlement sale-and-lease-back arrangements and forward allocation contracts. On the seller side, entitlement markets have allowed sellers to free up capital and rationalise or restructure businesses. Chapter 4 provides greater detail on water market participation by different categories of traders, and appendix A provides detail on entitlement holdings and trades for irrigators, including data showing the importance of entitlements as part of farm business assets.

As with any asset, entitlement prices change over time, driven by a range of factors, including: changing profitability of productive activities using water (for example, irrigated agriculture), actual and perceived long term changes in water availability, changes in the volume of entitlements on issue, changing interest rates, changes in agricultural land values and policy impacts such as the entry of the government environmental water holders into water market and the introduction of carryover, costs of holding entitlements (for example, fees and charges) and changes in the operation of water markets themselves.89 There are also indirect links to year-to-year variability in rainfall, as market participants factor in this variability into their assessments of likely changes in long-term entitlement yields. Entitlement prices are also linked to allocation market prices, as the sale of water allocations provides a return to entitlement holders.90

Industry has developed an index of entitlement values in the Southern Basin, which is used to track changes in the estimated value of entitlements over time. Over the past six years to 2019–20, this index has observed a 7% compound annual growth rate, indicating strong growth in entitlement values.91 In the 2018–19 water year, the index rose sharply (24% increase compared to the previous year), and gained in all months except March 2019.92 In 2019–20, the index rose by 6% overall; rising in the first part of the year but then declining over February to June 2020.93 The current value for major entitlement types on issue in the Southern Basin is estimated at $26.3 billion, with approximately $6.8 billion held by the Australian Government for environmental purposes.94

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87 See chapter 4 for detailed analysis of trader categories.
94 ibid.
Permanent trade in the Southern Connected Basin

As for allocation trade, permanent trade\(^5\) is concentrated in the Southern Connected Basin. 2,866 GL of high security/high reliability right has been traded and 3,233 GL of general security and supplementary (New South Wales) and low and spill reliability (Victoria) right over the period 2011–12 to 2020–21 (figure 3.7 and figure 3.8).

Figure 3.7: Permanent trade by water resource, regulated systems, Southern Basin, high reliability/high security

![Figure 3.7: Permanent trade by water resource, regulated systems, Southern Basin, high reliability/high security](image)

Source: ACCC analysis based on Bureau of Meteorology data.

Notes: YTD = year to date (2020–21 year to 31 December 2020). Includes the following: South Australia River Murray: Class 3a, 3b, 4, 7, 8, 9 entitlements and permanent irrigation right trade; New South Wales Regulated River High Security Water Access Licences and permanent irrigation right trade for New South Wales Lower Darling, Murray and Murrumbidgee; Victoria High Reliability Water Share trade for Broken, Campaspe, Ovens, Goulburn and Loddon systems. Nominal volumes (i.e. not adjusted for long-term average annual yield).

Figure 3.8: Permanent trade by water resource, regulated systems, Southern Basin, low and spill reliability, general security

![Figure 3.8: Permanent trade by water resource, regulated systems, Southern Basin, low and spill reliability, general security](image)

Source: ACCC analysis based on Bureau of Meteorology data.

Notes: YTD = year to date (2020–21 year to 31 December 2020). Includes the following: New South Wales Regulated River General Security and Supplementary Water Access Licences and permanent irrigation right trade for New South Wales Lower Darling, Murray and Murrumbidgee; Victoria Low and Spill Reliability Water Share trade for Broken, Campaspe, Ovens, Goulburn and Loddon systems. Nominal volumes (i.e. not adjusted for long-term average annual yield).
Permanent trade of irrigation rights within New South Wales and South Australian IIOs

IIOs in New South Wales and South Australia continue to be among the largest holders of water access entitlement within the consumptive pool for the Southern Connected Basin. In 2018–19, IIOs held 72%, 22% and 25% of high security water access entitlement (WAE) on issue in Murrumbidgee, New South Wales Murray and South Australian Murray, respectively, and 50% and 67% of general security WAE on issue in Murrumbidgee and New South Wales Murray.96 However, over time, the volume of water access entitlement held by IIOs is changing, for several reasons. First, there has been an ongoing movement of irrigated agriculture to areas outside established IIO networks – that is, irrigators are increasingly private diverters rather than irrigation network customers. Second, some irrigators located within IIO networks have transformed their permanent irrigation rights into separately-held water access entitlements. These customers may still have their water delivered within an IIO network, but prefer to hold the water access entitlement themselves rather than hold a permanent irrigation right against an IIO.

Given that IIOs hold such a significant portion of water access entitlement, trade of permanent irrigation right within these IIO networks can be significant. In 2018–19, 100 GL of permanent irrigation right (nominal volume) was traded within New South Wales and South Australian IIOs in the Southern Connected Basin.97 This trade is not captured in Basin State water registers, as IIOs are the approval authorities for these trades. While current data sources do not distinguish between the reliability types of permanent irrigation right trade, what is known is that in New South Wales, the majority of IIOs’ entitlements are General Security, while in South Australia the majority of IIO entitlements are Class 3. Using the total trade volumes for these entitlement classes as a guide, internal permanent irrigation right trade within South Australian IIOs is about 15% of the volume of entitlement trade in South Australian Murray Class 3 entitlements (3.3 GL traded). For New South Wales, internal irrigation right trade within IIOs is far greater than permanent trade of water access entitlements; for Murrumbidgee IIOs, internal permanent trade volumes totalled 41.7 GL, 1.7 times higher than trade volumes for Murrumbidgee General Security water access entitlements. In New South Wales Murray, internal permanent trade volumes totalled 56 GL, 1.8 times higher than trade volumes for New South Wales Murray General Security water access entitlements.98

Another notable trend is the increasing market participation of investors such as superannuation funds. Analysis undertaken by the ACCC (presented in chapter 4) shows that institutional investors in particular now account for a significant proportion of allocation trade in the Southern Connected Basin, in terms of both the number and volume of trades.

The ACCC has heard a range of significant concerns expressed by some stakeholders about market participation by investors and non-landholders or non-water users more generally, particularly in relation to purchase of water allocations by institutional investors.99 For this reason, chapter 4 considers trading activity and entitlement ownership by this participant group in significant detail. However, despite concerns about the impact of investors on water prices, the ACCC’s analysis (see below) indicates that water allocation price movements are strongly driven by relative scarcity of water allocation. This finding aligns with previous studies, such as ABARES (2019) and Aither (2020).100

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97 Internal permanent trade volumes sourced from ACCC annual Water Monitoring Report IIO Requests for Information (RFI). This data source does not distinguish internal permanent trades by security type. Permanent trade within IIOs covers the following IIOs: Barossa Infrastructure, Buddah Lake, Coleambally, Central Irrigation Trust, Eagle Creek Pumping Syndicate, Hay Private Irrigation District, Jemalong, Marthaugy, Murrumbidgee Irrigation, Murray Irrigation, Moira, Narrumine Irrigation Board of Management, Remark Irrigation Trust, Tenandra, Trangie-Nevertire Irrigation Scheme.

98 Sources: IIO internal irrigation right trade volumes: ACCC analysis based on data sourced from Irrigation Infrastructure Operator voluntary and compulsory information requests, IIO Requests for Information (RFI) for the ACCC’s annual Water Monitoring Report; New South Wales General Security entitlement trade volumes: New South Wales Water Register.

99 Chapter 5 summarises stakeholder concerns about large investors.

3.2 Drivers of water markets trends since 2012

3.2.1 Water supply

Key factors affecting water supply in the Basin are:
- seasonal conditions
- water storage capacity
- inflows into storages and volumes held in storage
- allocations
- carryover
- trade restrictions.

These drivers are discussed in turn below.

Seasonal conditions

Seasonal conditions influence the availability of water supply available to irrigators and environmental water holders. Multiple factors combine to determine seasonal conditions, but a major factor is the volume of rainfall. This is because rainfall is a major component for the inflows into water storages, which is particularly essential for the regulated surface water in the Southern Basin.

While increased rainfall affects water supply to entitlement holders, it also affects the water market demand from irrigators, environmental water holders and other users. In the case of increased on-farm rainfall, irrigators may have sufficient water for crop growth and not need to enter the water market to purchase allocation water. In some cases, this may result in irrigators seeking to sell water allocations.

Rainfall in the Basin has varied each year, which has had a significant impact on water supply and water markets. It is important to remember that between 1997 and 2009, Australia and the Basin experienced a significant and prolonged drought. This came to be known as the Millennium Drought and had a detrimental impact on irrigators, communities and the environment across the Basin. The Millennium Drought ended with high and widespread rainfall during 2010–11.

In 2010–11, the Southern Basin received on average almost 800 mm (figure 3.9). To put this in context, between 1900–01 and 2019–20, the interquartile range of average annual rainfall for the Southern Basin was between 366 mm and 486 mm.\(^{101}\) As shown in the figure below, rainfall has fluctuated since 2011–12 but has been closer to or within the interquartile range (more in keeping with historical records), until 2017–18 and 2018–19, where there were two years in succession of low rainfall, with 2018–19 receiving the lowest average rainfall since the Millennium Drought in both Northern and Southern Basins. While there were good rainfalls in some areas in late summer and autumn 2020, total rainfall for the whole 2019–20 was still low relative to historical averages.

Rainfall in the Northern Basin is more variable than in the south, as indicated by the wider interquartile range for the Northern Basin shown in figure 3.9. Similar to the Southern Basin, drought-breaking rainfall in the north reached 763 mm in 2010–11 (area-weighted average terms), significantly higher than any other year during this period.

\(^{101}\) The interquartile range is a measure of spread and indicates that 50% of the observed values are within the specified range. In this context, 50% of average annual rainfall observed in the Southern Basin was between 366 mm and 486 mm.
While average annual rainfall is useful in understanding broad seasonal conditions, the seasonality of rainfall is of greater importance. Broadly speaking, rainfall in the Southern Basin is during the winter months is higher than during the summer months, while the opposite is true in the Northern Basin. It is also important to note that the growing periods and associated water needs of different crops vary. For example, summer annual crops such as cotton are planted between October and November, and are harvested between April and June. These crops need either water from rainfall or water allocations throughout this period. In contrast, winter cereal crops such as wheat are planted between March and June, and harvested between October and December, and require either rainfall or irrigation water during this period.

With the ending of the Millennium Drought in 2010–11, average monthly rainfall was in excess of respective interquartile ranges between August 2010 and March 2011 for the Southern Basin, and between July 2010 and December 2010 for the Northern Basin. This compares to the first half of 2019–20, widely recognised as a dry period when average monthly rainfall was lower than the respective interquartile for all months apart from November 2019, for both the northern and Southern Basin. In particular, average monthly rainfall in December 2019 was just 6 mm (for both the north and the south), as compared to the December interquartile range of 17–49mm for the south, and 34–76mm for the north.

Climate data from the Bureau of Meteorology indicates that annual rainfall has been declining since 1980, with decreases of 20–40mm per decade for much of the Basin (figure 3.10). These drier conditions significantly reduce water supply for irrigators, environmental water holders and other users. If this continues, this is likely to have major flow-on effects for water markets in the Basin.
Inflows and storage volumes

The volume of inflows into key storages is important determinant of allocations to water access entitlement holders in regulated systems, and subsequently water allocation prices. This is particularly true in the Southern Basin, which relies on large upstream storages (particularly Dartmouth, Hume, Eildon and Burrinjuck dams) to capture and retain inflows for use throughout the year. Water storages in the Southern Basin typically have a pattern of increasing volumes in storage over winter months and then decreasing volumes in storage over the spring to autumn months. Total capacity of public storages has increased only slightly in recent years (see box 3.1), and while other supply augmentation initiatives have been introduced, they have not yet become an ongoing feature of the water resource landscape, and so inflows into existing public storages remains the key driver of total resource availability.

Southern Basin

In 2010–11 there was substantial rainfall across the Southern Basin resulting in the end of the Millennium Drought. Water storage volumes in the Southern Basin over this year increased substantially from 33% to 84% of maximum capacity. Between 2010–11 and 2015–16, water held in storages in the Southern Basin broadly decreased and reached a low of 29% of capacity in May 2016. During 2016–17, water storage volumes increased following increased to a high of 86% in November 2016 following substantial rainfall between July and September. Between 2016–17 and 2019–20, water volumes in storages in the Southern Basin again declined. Importantly, water storages reached a low of 33% of capacity in May 2019, which was a similar level to that experienced before the ending of the Millennium Drought in 2010–11.

Source: Bureau of Meteorology.
These fluctuations in storage levels have been a key driver of temporary water market prices. Figure 3.11 shows the relationship between total storage percentages and average prices (in real terms) in the Southern Connected Basin, for the period 1 July 2012 to 22 May 2020. In general, higher storage levels correspond to lower prices. However, in 2018–19, prices remained high even during periods when storage levels were recovering relative to their lowest point, reflecting that:

- absolute storage levels still remained low relative to past years
- poor seasonal outlooks throughout autumn 2019 resulted for the 2019 winter/spring rainfall drove concerns about insufficient opening allocations for the 2019–20 water year (these outlooks were realised in storages peaking at only 48% full in September 2019, substantially lower than in any other year since the Millennium drought)
- increased demand for water for permanent plantings (discussed further in section 3.2.2 below).

Prices in 2019–20 remained high relative to historical levels, until late summer 2020, when widespread rain and favourable seasonal outlooks resulted in significant price declines. As at 30 October 2020, the average price for water allocation in the Southern Connected Basin had declined in real terms to $128 per ML; at this date, water storages were 72% full.

Figure 3.11: Storage levels and average water allocation prices, Southern Connected Basin, 2012–13 to 2020–21

Source: ACCC analysis based on New South Wales, South Australia and Victoria response to voluntary information request, Waterflow data, Bureau of Meteorology (for storage data) and Australian Bureau of Statistics, Cat. No. 6401.

Notes: For price series: Basin State voluntary information request data used up until 31 October 2019 (solid line); Waterflow data thereafter (dashed line). Daily Southern Connected Basin (all zones) price series derived using ABARES GAM methodology. Excludes zero dollar trades.


Northern Basin

The Northern Basin also received drought-breaking rains in 2010–11, with storage inflows increasing to 100% in the Border Rivers, Macquarie and Condamine–Balonne catchments. Refilling of storages in the Gwydir and Namoi occurred somewhat later, with storage levels reaching approximately 99% of capacity in February 2012 for Gwydir, and 94% in September 2012 for Namoi. However, storage levels declined again in northern systems over the period 2012–13 to 2015–16, and again in 2017–18 through to first half of 2019–20. Storage levels were below 20% of capacity in Namoi and Gwydir for much of 2014–15, 2015–16 and 2018–19. In November 2019, the Bureau of Meteorology released a Special Climate Update detailing the drought conditions across the Basin, observing that:

‘Records [i.e. record lows] have been set for the 34 and 22 months ending in October 2019 for the Border Rivers, Moonie, Gwydir, Namoi-Peel, Castlereagh, Macquarie-Bogan, Paroo and Lower Darling catchments, with records also set at the 22-month timescale in the Condamine-Culgoa and Lower Murray catchments’

‘...Runoff in the major storage catchments in the Gwydir (Lake Copeton), Namoi (Split Rock and Keepit Reservoir) and Macquarie (Lake Burrendong) valleys in particular have been well below average for the last two years.’

While drought conditions have eased somewhat for some parts of the Basin with good autumn rainfall in 2020, as at 18 May 2020 storages in the Macquarie system remain only 22.5% full, 14.7% in Lachlan, 12.7% in Gwydir and only 10% full in the Namoi.

105 Bureau of Meteorology storage data.
Box 3.1: Water supply augmentation initiatives

Many of the Basin’s key water storages were built decades ago, and total storage capacity in public storages such as large dams and weirs has remained relatively static for some time.\(^{108}\) As climatic shifts are reducing inflows into existing storages\(^ {109}\) and demand for water continues to grow, governments and other stakeholders are examining a range of options for augmenting water supplies. Investing in storage upgrades (‘dam building’) is one well-understood method of augmenting supply and one that is regularly raised by stakeholders, but which no longer presents an easy solution because of the absence of suitable sites for new dams, changing rainfall patterns and the need to comply with the Sustainable Diversion Limits within Basin catchments. There is an array of other supply augmentation methods, although most are quite limited. These include use of desalinated sea water or saline groundwater to augment freshwater supplies, managed aquifer recharge\(^ {110}\), recycled water, ‘produced’ water from mining and fracking operations, and investing in reducing evaporation.

Key recent government initiatives to augment Basin water supplies include:

- use of the Adelaide desalination plant under the Commonwealth ‘Water for Fodder’ program\(^ {111}\),
- storage upgrades such increasing the height of Chaffey Dam\(^ {112}\) and upgrading the Walgett and Wilcannia town water supply weirs\(^ {113}\),
- the establishment of the National Grid Authority whose mandate is to ‘work in partnership with state and territory governments to identify, plan and invest in water infrastructure projects across the country.’\(^ {114}\)

The Queensland Government has also convened a panel to ‘investigate the viability of a modern Bradfield-like scheme’, which could entail ‘projects to divert flows from the Wet Tropics to the Burdekin, across the Great Dividing Range to Queensland’s western regions’, for irrigation, hydroelectricity generation and other purposes. Until this investigation into its viability is complete, it is not possible to comment on the potential implications for the Basin.\(^ {115}\)

Private participants have also invested in storage capacity – for example, irrigators are investing in on-farm storage capacity, sometimes on their own, and sometimes as part of government-funded infrastructure upgrade programs. On-farm storage does not necessarily result in increased water take, as all users still need to comply with their water licence and dam licence conditions. On-farm storage helps irrigators manage water risk, particularly for farms downstream of significant capacity constraints, and may also be used for specific activities such as harvesting overland flows or short-term storage of water available under supplementary flow conditions.

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\(^{108}\) Bureau of Meteorology storage data.


\(^{110}\) Managed aquifer recharge (MAR) is the intentional draining or discharging of water directly or indirectly into a well (aquifer) for subsequent recovery or environmental benefit. See Government of South Australia, Managed Aquifer Recharge, [https://www.environment.sa.gov.au/topics/water/resources/stormwater/managed-aquifer-recharge](https://www.environment.sa.gov.au/topics/water/resources/stormwater/managed-aquifer-recharge), viewed 11 June 2020.


It is important to recognise that different infrastructure investments affect the total available resource and resource availability at the local level differently. For example, supply of water into the system from desalination plants constitutes an increase in total available resource, whereas building a new dam or augmenting an existing storage within the Basin may increase the volumes able to be captured and stored at a particular point or improve the ability to harvest overland flows, but may also reduce the amount of water available elsewhere in the system. Thus, supply augmentation does not necessarily directly result in additional allocations to entitlement holders, and compliance with total resource caps – Sustainable Diversion Limits – still needs to occur.

Supply augmentation initiatives impact water markets in a variety of ways. Most directly, where they translate into new water allocations, the relative increase in supply can be expected to decrease prices, all other things being equal. Augmentation may also make water resources less variable from year to year, and therefore enable a different mix of water use than before. The net impacts of these dynamic changes depend on how this changes the location and timing of supply and demand for water.

Indirectly, supply augmentation also affects water market outcomes by impacting on the costs faced by water users. For example, if a dam upgrade results in higher infrastructure charges being paid by water users in the relevant catchment, this may decrease the price they are willing to pay for water purchased in water markets.

Finally, some augmentation initiatives have come with specific, intentional price impacts. The key example is the ‘Water for Fodder’ initiative, which sold water in 50ML parcels to eligible participants at the set price of $100 per ML, at a time when temporary water market prices were between $600-$800 per ML. The program entails substituting water produced by the Adelaide desalination plant for River Murray water, and allocation trade is the mechanism used to deliver water into the accounts of eligible participants.

To date, 40GL of water allocation has been traded to 800 eligible participants; a further 60GL was potentially to have been made available in Round 2 of the program, but after a review of Round 1, the government decided not to proceed with Round 2. As shown in figure 3.4 above, average prices in South Australia Murray zone 12 dropped considerably in January 2020, down to a low of $82 per ML as these trades were approved. Prices in zone 12 have since recovered to be in line with other zones, although due to good autumn rains remain considerably below peaks observed in 2019. Some ‘Water for Fodder’ trades were also ‘back traded’ from South Australian Murray to upstream zones, which created an estimated 13.2 GL of downstream opportunity through the Barmah Choke and 14 GL of downstream opportunity from Goulburn to Murray from January 2019. These opportunities have since been captured by a variety of water market participants who may have no direct involvement in the program. This example shows how supply augmentation initiatives can produce direct and indirect price and quantity effects in water markets.

116 For example, ‘In areas where many farm dams have been constructed, impacts on downstream flows can be significant. Annually, farm dams can reduce the flow from Victorian catchments by typically up to 5%, although in some cases, annual flow reductions of over 30% have been estimated.’ Victorian Guidelines for meeting flow requirements for licensable farm dams, p. 6.


Allocations to entitlement holders

As discussed in chapter 2, most regulated systems in the Basin operate on an announced allocation system, where water allocations are announced for holders of water access entitlements on a periodic basis and up to a nominal volume. For example, for a water access entitlement of 100 ML, an announced allocation of 30% would mean that 30 ML of water allocation would be available for use.

A variety of information is used by resource managers when making allocation decisions. As noted in chapter 2, many jurisdictions have more than one class of water access entitlement. For example, water access entitlement classes in New South Wales include General Security, High Security, and Supplementary. Generally, available water is allocated first to higher reliability entitlements and then to lower reliability entitlements. As a result, higher reliability entitlements tend to receive higher allocation volumes (as a percentage of the total volume of the right) on average.

Between 2010–11 and 2019–20, higher reliability entitlements in the Southern Basin received 100% allocations by the end of the year for most years, with 2019–20 being a notable exception for Victoria (figure 3.12). In comparison, allocations to lower reliability entitlements differed between New South Wales and Victoria. For Victoria, allocations to Low Reliability water access entitlements have typically been 0% for this whole period. For New South Wales, allocations to General Security entitlements have fluctuated considerably. For example, in 2015–16, allocations to New South Wales Murray General Security (GS) entitlements were 23% of maximum allocation, then rebounded to 100% in 2016–17, a higher water availability year. With return of drought conditions to the Basin, NSW GS received 0% for 2018–19 and only 3% for 2019–20. For the 2020–21 year to November 5, allocations to NSW Murray general security totalled 36%.

Figure 3.12: End of year announced allocations for selected water systems and reliabilities in the Southern Basin, 2010–11 to 2020–21

Allocation announcements are made throughout the year (figure 3.13) in response to changing circumstances as the year progresses. For example, Murrumbidgee General Security allocations during 2016–17 were low initially but increased following rainfalls in September 2016 and increases in water storage levels. For 2018–19 and 2019–20, Murrumbidgee General Security final allocations for the year were only 7 and 11%, respectively, while allocations for High Reliability entitlements in Vic Murray reached 100% in both years. For the first half of the 2020–21 water year, General Security allocations in Murrumbidgee had reached 58% by 4 November, a marked improvement on recent years.

Figure 3.13: Progressive allocation announcements for Murrumbidgee General Security and Victoria Murray High Reliability for selected years

As expected, the volume of water from announced allocations in the Southern Basin since 2010–11 has fluctuated in line with water availability (figure 3.14). It is worth noting that the total volume of water allocations are correlated with the volume of allocations from New South Wales. For example, between 2016–17 and 2018–19, the total volume of allocations almost halved from 6,491 GL to 3,291 GL. Over this period, the volume allocated to New South Wales entitlement holders decreased 3,194 GL, while Victoria increased 278 GL and South Australia remained unchanged.

This is interesting from the perspective that New South Wales and Victoria equally share inflows into two of the largest water storages in Southern Basin, Hume Dam and Dartmouth Dam. Volumes in these water storages are therefore critical for the resource managers in determining available allocation.

In addition, it is worth noting the role the General Security allocations have in affecting the total volume of allocation water available in the Southern Basin. As an example, if New South Wales Murrumbidgee General Security allocations were 10% higher in 2018–19, then the total volume of allocations in the Southern Basin would have increased 190 GL or over 5%. This would have had a significant impact on water allocation prices but also would have affected other objectives of the resource manager.

**Carryover**

Carryover is a mechanism used in water systems which operate on an annual accounting basis. It allows unused water allocations to be transferred from one water year to the next. The specifics of the carryover policies vary by water system and are set out in individual water resources plans (see chapter 15, which discusses carryover policies in detail). Since its introduction, and particularly since 2007–08, there have been significant change in carryover policies. In particular:

- 2007–08: South Australia and Victoria introduce temporary carryover arrangements
- 2008–09: Victorian annual carryover limit increased from 30% to 50% of nominal entitlement volumes
- 2009–10: Murrumbidgee annual carryover limit increased from 15% to 30% of nominal entitlement volumes
- 2010–11: Victoria introduces permanent carryover arrangement in the form of spillable water accounts, with no limit on annual carryover volumes
- 2012–13: South Australia adopts a permanent carryover arrangement
- 2013–14: Victoria applies a 100% limit on annual carryover volumes.

Since 2000–01, the volume of carryover in the Southern Basin increased from 433 GL to a high of 4,293 GL in 2011–12 and then decreased to 1,506 GL in 2019–20 (figure 3.15). Following Victoria allowing carryover, its usage by Victoria water access entitlement holders has been substantial, accounting for 2,524 GL of carryover or 59% of the volume carried over in the Southern Basin in 2011–12. Following changes to Victoria’s carryover policies, New South Wales and Victoria carried over roughly the same volumes between 2016–17 and 2018–19. In 2019–20, volumes carried over...
against NSW general security entitlements fell, reflecting continued low allocations to general security entitlements in NSW Murray and Murrumbidgee, and relatively low levels of trade into general security accounts to be carried over.

**Figure 3.15: Carryover volumes and share of water available in the Southern Basin by state, 2000–01 to 2019–20**

![Carryover volumes and share of water available in the Southern Basin by state, 2000–01 to 2019–20](image)

**Source:** ABARES data.
**Notes:** Carryover share of water available calculated as current year carryover as proportion of carryover from previous year plus current year allocation.

Together, allocations to water access entitlements and carryover from the previous year combine to determine the total volume of water available within a year in the Southern Basin (figure 3.16). The relative share of allocations and carryover varies from year to year. Over the long term the share of carryover has increased from around 5% in 2000–01 to 38% in 2019–20. In 2018–19, the share of total water availability sourced from carryover from the previous year rose to 42%, as water availability from new allocations fell to a low of 3,574 GL, but water users retained allocations from previous years.

**Figure 3.16: Water availability from allocations and carryover for Southern Basin, 2000–01 to 2019–20**

![Water availability from allocations and carryover for Southern Basin, 2000–01 to 2019–20](image)

**Source:** ABARES data.
**Note:** Carryover share of water available calculated as current year carryover as proportion of carryover from previous year plus current year allocation. Allocation includes uncontrolled flows and has within year forfeits removed.
With increased volumes of water held by environmental water holders (EWHs), the proportion of allocation and carryover held by EWHs has increased. Between 2010–11 and 2018–19, ABARES estimates that the share of environmental allocations in total water supply has increased from 11% to almost 19%.\(^{121}\)

Restrictions placed on the trade of water access entitlements and water allocations affect where water can be moved using trading mechanisms. These restrictions affect both supply and demand in different zones, and causes prices in different zones to diverge. Broadly, unless water systems are connected, water access entitlement and water allocation trade is restricted to within an individual water system. In Southern Connected Basin, water allocation trade is permitted both within and between the zones making up this system, but inter-zone trade is subject to a number of additional restrictions. The four major water allocation trade restrictions operating in the Southern Connected Basin are:

- Murrumbidgee inter-valley trade limit
- Goulburn to Murray trade limit
- New South Wales to Victoria spill risk trade limit
- Barmah Choke trade limit.

Data on the operation of these trade limits is presented below, together with a brief discussion of their impacts on prices. Trade restrictions are discussed in more detail in section 14.1 in chapter 14.

The **Murrumbidgee inter-valley trade limit** is implemented by the New South Wales Government. It reflects the net balance of surface water allocations traded or tagged traded out of the Murrumbidgee. Trade is permissible within the bounds of a lower limit of 0 GL and an upper limit of 100 GL. If the balance reaches 0 GL, trade into the Murrumbidgee is closed and cannot open until the balance reaches 15 GL. If the balance reaches 100 GL, trade out of the Murrumbidgee is closed and cannot open until the balance reaches 85 GL.\(^{122}\) The reason for these ‘shoulder’ operational limits (i.e. trade opening again after 15GL of trade opportunity has accumulated) is to prevent trade openings and closures in rapid succession; although in recent times, this has proved insufficient, and openings for trade out of Murrumbidgee often close within a matter of hours.\(^{123}\)

Since 2011–12, the Murrumbidgee inter-valley trade balance has switched regularly between being opened and closed (figure 3.17). During 2016–17, there were regular closures of the Murrumbidgee inter-valley trade, and there were also long periods of closure in 2018–19.

The **Goulburn-to-Murray trade limit** is operated by the Victorian Government. It does not allow trade from the Goulburn, Campaspe, Broken and Loddon systems to the Victorian Murray, New South Wales Murray and South Australian Murray if more than 200 GL of water is owed to the Murray at any one time. If the 200 GL is exceeded, trade out of the Goulburn system is closed and cannot open again until the Goulburn IVT account balance falls below 200 GL (generally as a result of trade from the Murray back into the Goulburn system).\(^{124}\)

Since 2012–13, there have been extended periods when the Goulburn-to-Murray trade limit was closed (figure 3.17). The longest period where trade was open was between October 2014 and October 2016. In contrast, more recently, trade has been closed more often than not. Importantly, trade has been closed for almost the entirety of 2019–20. It is worth noting that on 5 March 2020, the Victorian Government commenced a public consultation on proposed changes to the Goulburn-to-Murray trade limit.\(^{125}\)

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121 ABARES, 2020, Murray–Darling Basin water markets Trends and drivers 2002–03 to 2018–19, [https://daff.ent.sirsidynix.net.au/client/en_AU/search/asset/1029942/0](https://daff.ent.sirsidynix.net.au/client/en_AU/search/asset/1029942/0), accessed 15 February 2021. Note: ABARES defines ‘environmental allocations’ as ‘water allocations against entitlements owned by the Commonwealth Environmental Water Holder (from purchases and on-farm infrastructure). Therefore, these estimates underestimate the share of total water supply held by environmental water holders (EWH), as allocations made to entitlements held by other EWHs (e.g. VEWH) are omitted, and these estimates do not account for carryover by EWHs.


The **New South Wales-to-Victoria spill risk trade limit** is implemented by the Victorian Government. It limits allocation trade from New South Wales to Victoria to the lesser of a net annual volume of 200 GL or a volume that keeps the risk of spill in Victoria’s share of the Murray system below 50%.

Since 2012–11, the New South Wales-to-Victoria spill risk trade limit mostly did not apply (see figure 3.17 above). However, during late 2015–16 and early 2016–17, there were significant periods when the trade limit applied and so allocation trade from New South Wales to Victoria was not allowed.

The **Barmah Choke trade limit** is implemented by the MDBA and reflects a physical constraint on the Murray River running through the Barmah–Millewa Forest. The Barmah Choke restricts the flow of the Murray River to 7000 ML per day.

Broadly, the trade limit ensures that water allocation trade downstream through the Barmah Choke can only occur when there is sufficient matching trade upstream. Each 1 July the Barmah Choke trade balance is reset. A positive balance indicates the volume of water allocation that can be traded from upstream to downstream. A Barmah Choke balance less than 0.1 GL indicates there is no opportunity to trade downstream, and trade downstream can only occur again following water allocation trade from downstream to upstream.

Since 2014–15, the Barmah Choke trade balance has varied between a low of -18 GL at the start of July 2018 to a high of 199 GL in November 2015. During 2015–16, the Barmah Choke trade balance was over 150 GL for a majority of the year. This indicates that for this period there was an ability for over 150 GL of water allocation to be traded from upstream to downstream. More recently during 2019–20, the Barmah Choke trade balance has been generally 0 GL with small periods when water allocation trade

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downstream could occur. It is important to note that the Barmah Choke trade limit in its current form has been operating since 28 October 2014. Prior to 28 October 2014, there were less restrictions on water allocation trade across the Barmah Choke.\textsuperscript{128}

### 3.2.2 Water demand

There are many types of users of water in the Basin, each with different incentives. Chapter 4 of this report provides a detailed examination of how these different consumers participate in water markets. For the purpose of this chapter, two major uses of water in the Southern Basin are for irrigated agriculture and achieving environmental objectives by environmental water holders.

Water users obtain water from a range of sources. For irrigated agriculture, this can include on-farm rainfall, announced allocations for holders of water access entitlements – which could be surface water or groundwater – and purchasing water in water allocation markets. There is a degree of substitutability between different sources of water, such that higher than expected rainfall may reduce the need to use announced allocations or to purchase water in water allocation markets. This means that water demanded by end users is not the same as demand \textit{in water markets}. Also some demand in water market comes from participants who are not in themselves water users. For example, investors who may purchase water allocation at one point in time in order to fulfil a forward contract at a later point in time. This section considers some of the main drivers of demand in water markets.

**Irrigated agriculture**

Across the Southern Basin, producers of many agricultural commodities require irrigation water to operate their businesses. In 2017–18, total Gross Value of Irrigated Agricultural Production (GVIAP) in the Southern Basin was over $5.7 billion (figure 3.18), with the most valuable commodities produced being grapes ($1,037 million), dairy ($964 million), fruit ($895 million), vegetables ($804 million) and pastures ($771 million).

In the Northern Basin, irrigated agricultural production is dominated by cotton, although other irrigated commodities produced include vegetables and irrigated pasture. In 2017–18, the total GVIAP in the Northern Basin was around $1.6 billion in real terms (figure 3.19).

Figure 3.18: Gross value of irrigated production for Southern Basin, by commodity

<table>
<thead>
<tr>
<th>Year</th>
<th>Grapevines</th>
<th>Dairy</th>
<th>Fruit</th>
<th>Vegetables</th>
<th>Pastures</th>
<th>Almonds</th>
<th>Rice</th>
<th>Cotton</th>
<th>Other</th>
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</thead>
<tbody>
<tr>
<td>2010-11</td>
<td>3,000</td>
<td>400</td>
<td>200</td>
<td>1,500</td>
<td>1,000</td>
<td>500</td>
<td>100</td>
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<tr>
<td>2011-12</td>
<td>3,000</td>
<td>400</td>
<td>200</td>
<td>1,500</td>
<td>1,000</td>
<td>500</td>
<td>100</td>
<td>100</td>
<td>500</td>
</tr>
<tr>
<td>2012-13</td>
<td>3,000</td>
<td>400</td>
<td>200</td>
<td>1,500</td>
<td>1,000</td>
<td>500</td>
<td>100</td>
<td>100</td>
<td>500</td>
</tr>
<tr>
<td>2013-14</td>
<td>3,000</td>
<td>400</td>
<td>200</td>
<td>1,500</td>
<td>1,000</td>
<td>500</td>
<td>100</td>
<td>100</td>
<td>500</td>
</tr>
<tr>
<td>2014-15</td>
<td>3,000</td>
<td>400</td>
<td>200</td>
<td>1,500</td>
<td>1,000</td>
<td>500</td>
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<td>500</td>
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<tr>
<td>2015-16</td>
<td>3,000</td>
<td>400</td>
<td>200</td>
<td>1,500</td>
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</tr>
<tr>
<td>2016-17</td>
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<td>1,000</td>
<td>500</td>
<td>100</td>
<td>100</td>
<td>500</td>
</tr>
<tr>
<td>2017-18</td>
<td>3,000</td>
<td>400</td>
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<td>1,500</td>
<td>1,000</td>
<td>500</td>
<td>100</td>
<td>100</td>
<td>500</td>
</tr>
</tbody>
</table>

Source: ABARES, MDB water market dataset - demand.

\textsuperscript{128} Source: MDBA response to voluntary information request.
Since 2010–11, the GVIAP in the Southern Basin increased on average 2.3% per year in real terms. However, there has not been a uniform increase, with GVIAP decreasing in some years. For example, GVIAP for the Southern Basin decreased in 2015–16 by 6.5% and again in 2016–17 by 5.2%. Importantly, almond GVIAP increased on average 13.9% per year from $164 million in 2010–11 to $407 million in 2017–18, with GVIAP peaking in $702 million in 2015–16. This overall growth in GVIAP has occurred in the context of a significant reduction in the consumptive pool, as recovery of water for the environment has removed up to 30% of the total volume of entitlement on issue in some catchments (see discussion on environmental water holders below).

The location of irrigated production differs for each commodity type (figure 3.20). For the Southern Basin in 2017-18:

- dairy production is primarily located in northern Victoria, mostly in the Goulburn-Broken water system
- fruit and vegetable production is primarily located in South Australia
- almond production is mostly in Victoria (but has also been increasing elsewhere) and is concentrated in the Victorian Murray below the Barmah Choke
- rice and cotton production is primarily located in New South Wales.

For the Northern Basin:

- cotton dominates irrigated production for the whole region, and is mostly grown in northern New South Wales
- vegetables and pastures are also important commodities, with vegetables being particularly important in the Queensland Border Rivers.
Between 2010–11 and 2017–18, there have been significant changes in the location of irrigated production across the Southern Basin:

- almond production increased in Victoria, South Australia and New South Wales by $205 million, $29 million and $7 million respectively
- fruit production in Victoria decreased by $656 million while it increased in South Australia by $258 million
- pasture production in South Australia decreased by $19 million while it increased in Victoria by $208 million.

These changes in GVIAP reflect the changes in the volumes applied and area irrigate by horticultural and broadacre industries in the Southern Basin (figure 3.21 and figure 3.22).
For the Southern Basin, between 2010–11 and 2018–19, the area of almonds under irrigation and the volume of water applied to them increased by almost 25,000 hectares (an 89% increase over the period as a whole) and 302 GL (an 157% increase over the period). This growth has been concentrated in the Victoria Murray below Barmah Choke, New South Wales Murray below Barmah Choke and South Australian Murray. By comparison, the area of irrigation and volume of water applied to rice peaked in 2012–13 at 113,000 hectares and 1,434 GL and reached a low in 2018–19 of 6,558 hectares and 67 GL, with these changes occurring in the New South Wales Murray below Barmah Choke, New South Wales Murray above Barmah Choke and Murrumbidgee zones. Over the same period, the area of irrigated cotton and volume of irrigation water applied to that crop increased by 23,000 hectares and 255 GL, with most of this increase occurring in the Murrumbidgee in contrast to reductions which occurred in the Lower Darling.

Changes in input and output prices and other factors faced by irrigators affect the profitability of irrigation activities, demand for water and the participation of irrigators in water markets. Over the long run, changes in expectations of the profitability of irrigation activities drive changes in investment patterns and shifts in irrigated land and water use.

Prices for major irrigated commodities in the Southern Basin have varied considerably since 2010–11 (figure 3.23). In real terms:

- almond prices have increased by around 27% between 2010–11 and 2017–18 overall, doubling between 2010–11 and 2015–16, before decreasing by 37% to 2017–18
- rice prices have increased by almost 30% between 2010–11 and 2017–18
- cotton prices have decreased by over 14% between 2010–11 and 2017–18.
In the Southern Basin, ABARES farm survey results show that the horticulture industry achieved a substantially higher real gross unit return per megalitre of water applied compared to rice (figure 3.24). Between 2010–11 and 2019–20, real gross unit returns for the horticulture industry (encompassing pome fruit, citrus, stone fruit, grapes and other tree crops) averaged $2,013 per ML applied. Over the same period, the rice industry averaged $425 per ML applied.

While these differences are significant and may lead to the conclusion that more water will or should be diverted from rice production to horticulture, it is important to recognise that horticultural production requires a reliable volume of water to be available every year, whereas farmers producing an annual crop such as rice can make annual decisions about how much crop to plant, based on rainfall and irrigated water availability. Annual crops are therefore much more suited to locations or irrigation water entitlements with lower annual reliability.

Source: ABARES, MDB water market dataset - demand.
Notes: 2010–11 = 1. Index based on prices in real terms ($2019–20). Note that while 2017-18 is the most recent year for which this dataset is available, there have been further changes in commodity prices since 2017-18.

In the Southern Basin, ABARES farm survey results show that the horticulture industry achieved a substantially higher real gross unit return per megalitre of water applied compared to rice (figure 3.24). Between 2010–11 and 2019–20, real gross unit returns for the horticulture industry (encompassing pome fruit, citrus, stone fruit, grapes and other tree crops) averaged $2,013 per ML applied. Over the same period, the rice industry averaged $425 per ML applied.

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In the Murray regions downstream of the Barmah Choke, for some time agricultural production has been dominated by permanent plantings, both in terms of the value of production, and in volumes of water applied. Within this segment, almond and fruit production have grown, and are replacing grapevine production to some degree (figure 3.25). Permanent plantings (almonds, grapevines and fruit trees) are quite dominant in this region, accounting for 64% of water volumes applied in 2017–18.

Figure 3.25: Gross value of irrigated agricultural production by commodity in River Murray regions downstream of Barmah Choke

Stakeholders have raised concerns about the resilience of the agriculture sector in these regions as production is dependent on a few high value permanent crops. Several issues have been raised. These include:

- There is concern there will not be sufficient reliable water to sustain permanent plantings and agriculture more generally through a prolonged drought, or under an increasingly dry or variable climate due to climate change.
- Many of the permanent plantings are new, and so the historical data underestimates their share of water demand. Questions arise about the implications of growth in permanent plantings, and their demand for water as these crops mature, especially for growers of other commodities who may be less able to compete for water in scarce periods.

Source: ABARES, MDB water market dataset – demand.
Notes: Permanent crops share of volume applied is shown on the right axis, and comprises Almonds, Fruit and Grapevines. Includes New South Wales Murray downstream of Barmah Choke; Victoria Murray downstream of Barmah Choke, and South Australian Murray. 2017–18 latest year available. Gross value of irrigated agricultural production in $2019–20 million.

129 For example, Almond Board of Australia, Submission to the Murray–Darling Basin Water Markets inquiry issues paper, March 2020, pp. 3–4, 6–7. Leeton Shire Council submitted that ‘Diversity of crop type has been the strength of the MIA for over one hundred years and has increased our resilience. Without that diversity our established industries that have built up over many decades will be threatened, impacting local jobs, our local economy and our local community. Further losses in agricultural diversity also poses a serious threat to national food security and will drive up food prices for Australians.’ Leeton Shire Council Submission to the Murray–Darling Basin Water Markets inquiry issues paper, March 2020, p. 2.

130 For example, the National Irrigators Council (NIC) submitted that ‘The current severe drought is the key factor in high prices, and clearly over coming years the predicted reductions in run off, as a result of climate change, will have real negative impacts on irrigation water availability.’ NIC Submission to the Murray–Darling Basin Water Markets inquiry issues paper, March 2020, p. 2.

Some irrigators are more vulnerable to low water availability as they own low or no volumes of permanent entitlements and rely on temporary water markets to source the water they need each year. This is particularly concerning in relation to permanent plantings.\textsuperscript{132}

Resolving these issues involves making a range of assumptions about commodity prices and water availability in the future. The ACCC has not undertaken its own scenario modelling to assess these questions, but there are several recent efforts undertaken by others to assess the implications of these changes for water markets and agricultural sectors. In particular, ABARES modelled a range of scenarios to assist the work for the Socio-Economic panel in 2019–20. While there are acknowledged limitations of this work\textsuperscript{133}, the key projections arising from this study include:

- ‘Growth in water demand in the lower Murray due to maturing almond trees (particularly in New South Wales and South Australian Murray), leads to greater pressure for inter-regional water trade, more frequently binding trade limits and large differences in prices between regions. Particularly in dry years, trade limits lead to significantly higher prices in the Murray below Barmah region (between $955/ML and $1,075/ML) compared to the Murrumbidgee (between $665/ML and $712/ML).’

- ‘While water supply (including both surface water and other sources such as groundwater) is sufficient to meet estimated demand from horticultural plantings (fruits, nuts and grapevines) in all scenarios, in practice there remains some risk of supply shortfalls within each water year, particularly if future conditions are drier than modelled or trade constraints are tightened. Horticultural plantings are estimated to use around 1,276 GL on average each year in the ‘future scenarios’.

- GVIAP is also projected to decrease for some agricultural commodities (chiefly dairy and rice) but increase for almond, although the modelling does not account for commodity or input price shifts as prices are fixed to observed values in 2018–19.\textsuperscript{134}

ABARES survey data also shows that dairy farmers are most reliant on temporary water markets to source the water they use. Figure 3.26 shows that in 2018–19, the average dairy farm purchased 41% of volumes of water used. Similarly, horticulture farms’ temporary water purchase amounted to 39% of use in 2018–19, but this was significantly higher than in previous years. In contrast, temporary purchases by rice farms averaged 23%, fairly consistent with previous years.

\textsuperscript{132} For example, NSW Farmers submitted that ‘Supply and reliability issues experienced by upstream farmers because of the current drought are being exacerbated because many of the new permanent plantings in the recently expanded irrigation areas do not have high security water entitlements and rely upon general security and temporary water entitlements’. NSW Farmers, Submission to the Murray–Darling Basin Water Markets inquiry issues paper, March 2020, p. 6. This issue is also considered further in chapter 4.

\textsuperscript{133} ABARES notes that there are several key caveats to their scenario results: ‘Firstly, the climate sequence used (2006 to 2019) is particularly dry in the context of the longer historical record and may differ from average future climate conditions. Secondly, these scenarios are based on current farms using current capital and technology, and do not allow for long-term adaptation (innovation/technological change) or structural adjustment (changes in capital investment). Commodity prices are also fixed to observed values in 2018–19. Prices higher or lower than assumed will alter the demand for water from farms producing that commodity, and hence their overall water use and production.’ ABARES, Future scenarios for the southern Murray–Darling Basin: Report to the Independent Assessment of Social and Economic Conditions in the Basin, https://www.agriculture.gov.au/abares/research-topics/water/future-scenarios-smdb-independent-assessment-social-economic-conditions, viewed 22 June 2020.

\textsuperscript{134} ibid.
Key findings on irrigated agriculture water demand factors

Putting all of the above together, the ACCC’s view is that key trends in the irrigated agriculture sector of the Basin which are likely to have significantly affected demand for water for irrigation (and irrigator participation in water markets) have been:

- a substantial expansion of the almond industry: increased irrigated areas, volume of water applied and production of almonds, which have been concentrated on the Murray River below the Barmah Choke
- increased pasture production in Victoria: used in dairy and other livestock industries, although average area of irrigated pasture per farm declined in 2018-19, reflecting drought conditions in that year
- a continued significant role of cotton, rice and other broadacre annual cropping in New South Wale
- increased irrigated area and volume of water applied for cotton production in the Murrumbidgee, while there has been a decrease in irrigated area and volume of water applied for cotton production in the Lower Darling.

Source: ABARES irrigation farm surveys.
Notes: Horticulture: average of 3 regions (Goulburn, Murray, Murrumbidgee); Rice: average of 2 regions (Murray and Murrumbidgee), no data for 2012-13; Dairy: average of 2 regions (Murray and Goulburn).
Environmental water holders

The Australian and state governments have progressively recovered water for the environment and become significant owners of water access entitlements in the Basin. As such, they have an important impact on water demand. The government environmental water holders (EWH) include:

- Commonwealth Environmental Water Holder (CEWH)
- Victorian Environmental Water Holder (VEWH)
- New South Wales Office of Environment and Heritage (OEH)
- South Australian Minister for Environment and Water
- Murray Darling Basin Authority (MDBA).

It is important to note that recovery of water for the environment began in the 2000s, prior to the implementation of the Basin Plan 2012 (Cth). Programs for recovering water for the environment have included:

- Water for Rivers
- Living Murray Initiative
- various New South Wales, Victoria and South Australian Government initiatives.

Associated with the Basin Plan 2012 (Cth), Australian Government programs aimed at recovering water for the environment have included:

- Sustainable Rural Water Use and Infrastructure Program, comprising:
  - irrigation infrastructure projects
  - water purchase mechanisms (also known as the Restoring the Balance program)
  - supply measures
- Private Irrigation Infrastructure Program for New South Wales
- Private Irrigation Infrastructure Program for South Australia
- On-Farm Irrigation Efficiency Program
- Commonwealth On-Farm Further Irrigation Efficiency Program.

In addition, there have been several programs and initiatives by state governments which have recovered water for the environment.

As at 30 June 2018, 2,938 GL of water had been recovered for the environment and held by government environmental water holders across the Basin (figure 3.27). Between 30 June 2012 and 30 June 2018, the total volume of water access entitlement held increased by 1,057 GL, with Queensland, New South Wales, Australian Capital Territory, Victorian and South Australia water systems accounting for 89GL, 580GL, 324GL, 60GL and 5GL, respectively, of this increase.

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Figure 3.27: Water access entitlement volumes (GL) held by EWHs, by state and Basin region

![Figure 3.27](image)

Source: MDBA, Transitional SDL water take reports (multiple years).

Notes: Volumes are expressed in Long Term Average Annual Yield (LTAAY) terms. New South Wales updated their LTDLE factors (‘Cap factors’ – see box 3.2) in 2018; the volumes for New South Wales as at 30 June 2018 incorporate these updated factors. nMDB = Northern Basin, scMDB = Southern Connected Basin, sMDB = Southern Basin.

Within the Southern Basin, the Murrumbidgee, New South Wales Murray, Victoria Murray, Goulburn and South Australian Murray water systems accounted for a substantial share of water access entitlements held by EWH on 30 June 2018 (figure 3.28). In addition, almost half of water access entitlements held by EWH in the Southern Basin are higher reliability (in LTAAY terms; see box 3.2).

Figure 3.28: Volume of water access entitlements (GL) held by EWHs in the Southern Basin, by reliability, 30 June 2018

![Figure 3.28](image)

Source: MDBA, Transitional SDL water take reports (multiple years).

Notes: Volumes are expressed in LTAAY terms. High reliability includes High Security water access entitlements in New South Wales, High Reliability water access entitlements in Victoria, all water access entitlements in South Australia.

A small volume of water access entitlements are held by EWH in the Southern Basin but are not part of the connected systems (not shown in figure 3.28). As at 30 June 2018, this accounted for around 66 ML (LTAAY terms) or over 2.6% of the total volume of water access entitlements held in the Southern Basin.
In the Northern Basin, the majority of environmental water holdings as at 30 June 2018 were held in the New South Wales catchments of Macquarie-Castlereagh, Gwydir and Lachlan, mostly in the form of general security entitlements, and the Queensland catchment of Condamine-Balonne, as unregulated (unsupplemented\textsuperscript{137}) entitlements (figure 3.29).

**Figure 3.29:** Volume of water access entitlements (GL) held by EWHs in the Northern Basin, by reliability, 30 June 2018

Box 3.2: Water access entitlement units: nominal versus Long-Term Average Annual Yield

The ‘nominal’ or ‘face value’ of a water access entitlement is usually specified as a specific volumetric amount, usually denominated in megalitres. Water allocated to, and used by, the various classes of entitlement across the Basin varies according to the irrigation crops and practices in each valley, local climate, and water management rules. Long Term Diversion Limit Equivalence (LTDLE) factors provide a conversion between the size of a water entitlement and the long-term average use of that entitlement over the reference period used to develop the Basin Plan (1895–2009). LTDLE factors are specific for an entitlement class within each valley for which water resource plans are being prepared under the Basin Plan. In order to be able to compare across entitlement types in a consistent or ‘like-for-like’ way, the nominal or face value of an entitlement needs to be converted into a unit that takes into account differences in reliability. This unit is called ‘Long-term average annual yield’, and is calculated by multiplying the nominal or face value of an entitlement by its corresponding LTDLE factor, also known as a ‘Cap factor’.


Notes: Volumes are expressed in Long Term Average Annual Yield (LTAAY) terms. High reliability includes High Security water access entitlements in New South Wales, High Reliability water access entitlements in Victoria, all water access entitlements in South Australia.

\textsuperscript{137} ‘Unsupplemented’ is Queensland terminology and corresponds to ‘unregulated’ in the Water Act 2007 (Cth) terminology.
3.3 Implications of trends and drivers for market outcomes

3.3.1 Carryover and trade interact to allow concentration of water use in particular places, at particular times, for particular uses

In the past, water users were not able to carry over water allocations across multiple years, and opportunities to relocate water use across zones (or even outside of IIO networks) were limited. As trade restrictions have been removed and carryover and other policies have allowed water users to individually plan their water use across multiple seasons more directly, the relationship between water allocations in a given zone and season and water use has become less direct. However, this has occurred more in some zones than others.

The figures below compare water accounting data for New South Wales Murray Below Choke (zone 11) and Murrumbidgee (zone 13). Figure 3.30 shows proportions of account credits, comprising water allocated to entitlement holders via Available Water Determinations (AWD), carryover from the previous year, and trade into the zone. Figure 3.31 shows proportions of account debits, comprising water account usage (excluding uncontrolled flow usage), trade into the zone, forfeits and carryover into the following year.

Figure 3.30: Proportion of water account credits by type, Murrumbidgee and New South Wales Murray below Barmah Choke

Source: ACCC analysis based on NSW General Purpose Water Accounting Reports and NSW Government response to voluntary information request.

Notes: AWD = Proportion of water account credits sourced from Available Water Determinations (AWD) in the current water year. Excludes uncontrolled flow usage for all accounts, and all supplementary Water Access Licence accounts.
Comparison of these figures shows that:

- In zone 13 (Murrumbidgee), Available Water Determinations remain the primary source of credits to users’ accounts, accounting for over 80% of credits in each water year since 2012–13. This contrasts with zone 11 (NSW Murray below Barmah Choke), where allocations to entitlement holders represent a much smaller, and on average declining share of account credits. In 2018–19, allocations to entitlements accounted for only 52% of account credits, with users relying roughly equally on carrying over water in zone 11 and trading in water from outside this zone to source water. In fact, New South Wales Murray general security (GS) entitlement holders received zero allocations in 2018–19, which means users who held only GS entitlements had no alternative but to use carryover or trade to source water if they wished to use water in that water year.

- In zone 11 (NSW Murray below Barmah Choke), usage within a given water year accounts for at most 50% of account debits in most years, meaning that considerable volumes each year are traded out to other zones. In contrast, water use generally accounts for around 70% of debits account in zone 13 (Murrumbidgee).

Figure 3.32 shows that actual volumes used in Murrumbidgee have fluctuated markedly over time, while volumes used in New South Wales Murray below choke have remained relatively steady despite significantly lower allocations. However, in both zones, usage relative to allocations to entitlement holders has increased significantly in recent years, even exceeding 100% in 2018–19. Thus, despite New South Wales Murray GS water entitlements receiving no allocation and Murrumbidgee GS allocations only reaching 11% in 2018–19, water users were still able to use a mix of carryover and trade to source water.

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138 Note: Figures 3.31 and 3.32 have been updated since the interim report to exclude Supplementary Water Access Licence accounts, based on feedback from stakeholders who noted that including forfeiture of Supplementary water gives a misleading impression, since Supplementary water does not operate on the same announced allocation system as other licence types, and forfeiture of Supplementary water does not result in water returned to the consumptive pool for reallocation in the following year.

139 Note that trade into zone 11 includes carryover parking trades from other zones.
3.3.2 Greater use of markets means that trading is pushing up against the limits of the system more often

Overall, the ACCC’s analysis to date shows that inter-valley trade restrictions are becoming more binding (restrictive) over time. Figure 3.33 shows the impacts of binding inter-valley trade limits on average prices in key zones. Where the price series are close to 100%, this means that the average price in that zone is very close to the average price prevailing across the Southern Connected Basin as a whole. Significant divergences away from the 100% line mean that prices in a particular zone are significantly higher or lower than the average price. The figure shows that earlier in the period, price differentials were mainly observed at the end of the water year – this in part can be explained by different states having had different timings for closing trading at the end of the water year (which all states historically have done, at least briefly, to allow for end-of-year accounting processes). However, in more recent years prices have diverged more often within the water year, particularly during 2016–17, 2017–18 and for much of 2019–20, when many trade restrictions were binding for significant periods of time (refer to figure 3.17 above). In particular, Greater Goulburn (zone 1a) and Murrumbidgee (zone 13) have seen prolonged periods of significant divergences from Southern Connected Basin average prices in recent years, and prices for zones below the Barmah Choke (zones 7, 11 and 12) show have been significantly above the average across all zones for much of 2020.

140 Note: Figure 3.33 has been updated since the interim report to exclude Supplementary Water Access Licence accounts, based on feedback from stakeholders who noted that including forfeiture of Supplementary water gives a misleading impression, since Supplementary water does not operate on the same announced allocation system as other licence types.
**Figure 3.33** Average daily price differentials, selected zones compared to average for Southern Connected Basin

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

Notes: Daily zone and Southern Connected Basin (all zones) price series derived using ABARES GAM methodology.\(^{141}\) Excludes zero dollar trades. Price differentials of <0.2 and >1.8 are excluded. This figure shows price differentials for each zone as a percentage of the Southern Connected Basin (all zones) average price. For example, on 4 November 2017, average prices in zone 1A Greater Goulburn were 83% of the Southern Connected Basin (all zone average price). Data covers the period 5 July 2012 to 30 October 2020.

While the overall objective of water markets is not to achieve a single price across the whole Southern Connected Basin, sustained pricing differentials between zones, combined with data on the volume of inter-zone trades that are refused, indicate that there is more demand for inter-valley trade than is able to be met under current inter-valley trade arrangements. This gives rise to the question of whether current settings governing inter-valley trade are optimised. This includes several questions:

- Could there be scope to allow more inter-valley trade, while still appropriately limiting the potential for negative impacts on other water users and the environment?
- Are there costs to inter-valley trade which are not reflected in current prices? If such costs were factored into prices, would demand for inter-valley trade correspondingly reduce (other things being equal)?

These considerations are examined in further detail in part 5 of this report.

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4. **Buyers and sellers: who trades, what and why**

**Key points**

**Water ownership**

ACCC analysis of the available data indicates that:

- Entitlement ownership by different participant groups varies widely across Victorian zones, with ownership by agricultural consumptive users (irrigators and agribusiness groups) typically lowest in zones where there are higher levels of ownership by environmental water holders (EWHs) and institutional investors.

- Irrigation infrastructure operators (IIOs) own the vast majority of entitlements in NSW Southern Basin zones. Most water users in these zones do not hold their own entitlement, and instead hold non-statutory irrigation rights against an IIO. This emphasises the important role IIOs have in approving irrigation right trade within, into and out of their irrigation networks.

- Agricultural consumptive users (irrigators and South Australian IIOs) and EWHs hold the vast majority of tradeable entitlements in the South Australian Murray, while institutional investor ownership is relatively minor.

- First Nation and Traditional Owner groups own a very small proportion (less than 0.1%) of entitlements across the Southern Basin.

**Allocation trade by participant group**

When considering total allocation trade data for the Southern Connected Basin (*including zero dollar trades*), environmental water holders typically trade the largest proportion of allocation volumes in a given year, mostly as a small number of non-commercial (zero dollar) trades. These trades are generally transfers between different environmental accounts, conducted for operational reasons. While Irrigators make the majority of the number of allocation trades each year in the Southern Basin, this accounts for a minority of the volumes traded.

ACCC analysis of Basin State allocation trade data for the Southern Connected Basin *excluding zero dollar trades* – as a proxy for ‘commercial’ or ‘arms-length’ trade – indicates that:

- Irrigators are the largest single trading group in allocation markets by number and volume of trade in the Southern Basin, although their share of total allocation trade has declined somewhat over the last eight years as other participant groups enter water allocation markets.

- Institutional investors’ activity in Southern Connected Basin allocation markets has increased significantly in the last four years.

- Retired irrigators account for a small but not insignificant proportion of allocations *sold* in the Southern Connected Basin each year.

- Agribusinesses account for a significant share of the number and volume of allocations *purchased* in the Southern Connected Basin each year.

- Environmental water holders trade a relatively small proportion of allocation volumes in the Southern Connected Basin in a given year.

- First Nation and Traditional Owner groups typically make almost no allocation purchases in the Southern Connected Basin in a given year, but consistently account for a very small volume of allocation sales each year.

- Water market participation by different groups differs substantially across zones.
The ACCC also drew on irrigator surveys to better understand irrigator engagement with water markets. The most recently available survey data indicates that:

- While half or more of irrigators in the Southern Basin report having used allocation and entitlement markets at least once, approximately 25% have never traded an allocation and 50% have never traded a water entitlement.
- Less than 7% of irrigators across the Basin use entitlement leases to source water for their farms, and an even smaller proportion of irrigators use newer water products such as carry over parking or forward contracts.

### Evidence on participation in water markets

Irrigator survey data provides evidence on irrigator trading experiences and attitudes towards water markets:

- While many irrigators have engaged in allocation and, to a lesser extent, entitlement trade, large proportions of irrigators report having limited or no engagement with water markets; 25% have never traded an allocation, and 50% have never traded an entitlement. To date, there is also limited uptake of leases and newer water products such as carry over parking and forward contracts, although trade of these products is growing.
- A significant number of irrigators, particularly those involved in dairy, appear to have adopted water ownership and trading strategies that rely principally on sourcing water in allocation spot markets to manage their water supply risks.
- Some irrigators express a lack confidence in various aspects of water markets and water policy and some evidence indicates that this lack of confidence may impact irrigators’ use of water trading. On average, irrigators appear to be becoming increasingly negative about the idea of water trading over time.
- Large proportions of irrigators have expressed opposition to non-farm entities (investors) being allowed to buy water (up to 85%), and retired irrigators being allowed to retain and trade their permanent water rights (up to 48%).
- While most irrigators express positive views on the ease of making temporary and permanent trades, being able to access the information needed to trade, feeling confident in trading water, and in the security of their permanent water rights, a minority express opposing views on each of these issues.
- A third or less of irrigators express confidence in the fairness of water markets, water market rules, and the equal treatment of government owned water entitlements.
- Few First Nation and Traditional Owner groups use water markets. As a participant group, they own a very small proportion of the permanent water rights on issue and account for a very small proportion of water trade.

The ACCC anticipates that recommendations presented in Parts III to VI of this report will help address irrigator concerns about water markets identified in this Chapter, and deliver markets that they can participate in more effectively.

This chapter describes the different groups that participate in water markets, the relative size of their water ownership and trading behaviours, and identifies possible barriers some groups may face in more effectively engaging in water markets. The chapter provides an evidence base on the water ownership and trading behaviours used by different participant groups, and considers what barriers may be preventing certain participant groups from better using water markets to meet their water needs.

### 4.1 Who are the key participant groups in water markets?

There is increasing diversity in who owns, buys and sells water in the Basin. This section identifies key groups of water market participants, and discusses how they are using Basin water markets and why.
Water market participant groups that are referred to throughout the rest of this report are summarised in table 4.1.

<table>
<thead>
<tr>
<th>Party</th>
<th>Role</th>
<th>Examples</th>
</tr>
</thead>
<tbody>
<tr>
<td>irrigators and agribusiness</td>
<td>The group that uses the most water in the Basin. Production ranges from broadacre cropping, such as rice, through dairy, to horticulture, such as nuts, fruits and vegetables. Irrigators are buyers of water but also significant holders and sellers of water access rights. For the purposes of this report, ‘irrigators’ are distinguished from ‘agribusiness’. Agribusinesses are also irrigators, but are large corporate entities, often operating in multiple locations, and have been identified as a separate category in part due to stakeholder feedback which raised concern about large agribusinesses as distinct from irrigators more generally.</td>
<td>Ranging from family farms to large agribusinesses such as Webster/PSP Investments¹⁴²</td>
</tr>
<tr>
<td>irrigation infrastructure operators (IIOs)</td>
<td>Own and operate infrastructure for the main purpose of servicing the water needs of their irrigators. These may also be called off-river infrastructure providers, as they manage assets situated off the rivers such as irrigation networks consisting of channels, pipes and pumps. IIOs are often holders, for their members but in their own right, of significant water access rights, as explained in section 2.3.</td>
<td>Murray Irrigation Limited Renmark Irrigation Trust Goulburn-Murray Water Mallawa Irrigation</td>
</tr>
<tr>
<td>infrastructure operator</td>
<td>State-owned entities that own and operate the largest facilities for storing and delivering water. These may also be called on-river infrastructure providers, as they manage assets situated on the rivers such as large dams and weirs.</td>
<td>WaterNSW Goulburn-Murray Water Lower Murray Water Sunwater</td>
</tr>
<tr>
<td>investors</td>
<td>Parties holding, trading and/or managing water assets for the purpose of financial gain that is unrelated to productive use. Investors as a broad group includes large ‘institutional investors’, and ‘non-institutional’ investors such as retired irrigators who have retained their permanent water rights, including through a self-managed superannuation fund</td>
<td>Argyle Group Aware Water Duxton Water Ltd Kilter Rural</td>
</tr>
<tr>
<td>water market intermediaries</td>
<td>Brokers and exchange platforms</td>
<td>H2Ox, Waterexchange, Waterfind, Wilks Water</td>
</tr>
<tr>
<td>environmental water holders</td>
<td>Hold and deliver water to achieve environmental outcomes.</td>
<td>Commonwealth Environmental Water Holder (CEWH) Victorian Environmental Water Holder (VEWH) NSW Office of Environment and Heritage (OEH)</td>
</tr>
</tbody>
</table>

**First Nation and Traditional Owner groups**  
Need water for cultural and economic needs.  
Many nations, including the Barkandji, Gomeroi, Kamilaroi, Wiradjuri and Yorta Yorta. Includes Land Councils, Indigenous Corporations and other traditional owner groups.

**Urban, industrial and recreational users**  
Need water for critical human needs, urban, industrial and recreational uses.  
Basin towns and cities; Mining, electricity generators, transport, heavy industry, fishers, boating groups, racecourses, golf courses, etc.

**Other non-water users**  
Other non-water users, which includes other participants not included in the above categories that buy and sell water but do not use water for a consumptive purpose.

Participants in each of these groups have been active at different levels in Murray-Darling Basin water markets in recent years. Participants within a particular group typically share similar reasons for owning and trading water, as well as a range of personal, business and/or locational characteristics. A short description of each participant group is provided below.

Note, however, that in reality, these groups are not necessarily mutually exclusive: some individual water market participants may meet the definition of more than one participant group – for example, some irrigators also undertake environmental watering activities on their farm, and so may share characteristics with the ‘environmental water holder’ group. However, our analysis allocates water right owners and traders to one group only, and uses these categories to examine the range of ways in which different stakeholders use water markets.

### 4.1.1 Irrigators

Irrigators are the most numerous and diverse group of Basin water market participants. In 2017–18 (the latest year for which ABS data is available), it is estimated there were just under 10,000 agricultural businesses irrigating land across the Basin.¹⁴³

Irrigators predominantly own and use water to produce agricultural products. As a group, they are one of the largest owners of permanent water rights, and one of the biggest participants in entitlement and allocation markets (section 4.2). Historically, the typical irrigator has owned sufficient permanent water rights to meet their on-farm water needs and traded temporary water to ‘top up’ water supplies in drier years or sell ‘surplus’ water in wetter years or when not irrigating. However, in recent years, with ongoing reforms to water ownership and trading rules and changes in external market trends and drivers (particularly agricultural input and output markets), the irrigation sector has been undergoing significant structural adjustment and irrigator strategies associated with owning, using and trading water have become increasingly diversified (section 4.2).

Appendix A to this chapter provides a detailed description of how irrigators are engaging with water markets across the Basin.¹⁴⁴

### 4.1.2 Agribusinesses

Agribusinesses are larger agricultural corporations that engage in irrigated farming. As a group, agribusinesses hold large volumes of entitlements and engage extensively with water markets to undertake a mixture of operations in the Southern and Northern Basin.

Chapter 7 discusses the strategies and trading activities of agribusinesses in more detail.

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¹⁴³ ACCC estimates based on ABS 4618.0 – Water Use on Australian Farms, 2017–18.
¹⁴⁴ The appendix includes a snapshot of irrigator numbers across the Basin, the type and level of irrigator engagement with different types of water markets, including water allocation and entitlement markets, leases and newer water products such as carry over parking and forward contracts, and summarises the available data on irrigators’ attitudes to water trading and water markets.
4.1.3 Irrigation Infrastructure Operators

An irrigation infrastructure operator (IIO) owns and/or operates water service infrastructure primarily for the purpose of delivering water to irrigated farms. While the majority of the volume of water delivered typically goes to irrigated farms, many IIO customers also use small quantities of water (a few ML) for stock and domestic use.

There are 21 medium to large IIOs in the Basin, and a number of smaller IIOs such as New South Wales private irrigation trusts and districts. IIOs in New South Wales and South Australia are among the largest holders of water access entitlements within the consumptive pool for the Southern Connected Basin. In 2018–19, IIOs held 72%, 22% and 25% of high security water access entitlements (WAEs) on issue in Murrumbidgee, New South Wales Murray and South Australian Murray, respectively, and 50% and 67% of general security WAE on issue in Murrumbidgee and New South Wales Murray (section 4.2). These permanent water rights were typically granted to the IIOs by state governments when they were corporatized.

IIOs participate in the trade of permanent and temporary water into and out of their irrigation networks, typically at the request of irrigators within the irrigation district. IIOs also act as trade approval authorities for trades within their networks. Some IIOs also operate exchanges or offer brokerage services to help their customers to trade. Chapter 3 includes more information on IIOs.

4.1.4 Investors, including institutional investors and retired irrigators

Investors refers to parties holding, trading and/or managing water assets for the purpose of future financial gain that is unrelated to its use as an input in agricultural, industrial or other production. Over the last ten years, there has been increased participation by investors (section 4.2) in water markets in the Basin (particularly Victoria and southern New South Wales). In particular, ‘unbundling’ reforms and removal of ownership restrictions based on purpose of water use have allowed parties who do not directly use water to buy permanent water rights in the Basin.

There are various types of investors currently operating in Basin water markets, including:

- **Institutional investors**, which include investment fund managers (corporate superannuation and other fund types), and small investors, either individuals or small firms. Some institutional investors own a water entitlement portfolio and sell water products such as leases, forward contracts, carryover parking and spot allocation sales to irrigators. Others focus on buying and selling water on the spot allocation market.
- **Non-Institutional investors**, predominantly retired irrigators who also may be owners of self-managed superannuation funds who retain ownership of their permanent water rights and supply water products to water markets.

Chapters 5 and 6 discuss issues related to investors in more detail.

4.1.5 Water market intermediaries

A water broker, for the purposes of this inquiry, is a water market intermediary who, for a commission or fee or other form of remuneration or payment, offers one or more of the following services:

- trading tradeable water rights on behalf of another person

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146 ACCC based on South Australia and Victoria response to voluntary information request and New South Wales Water Register data.
148 The category of institutional investors include the four large investors and four small investors examined in chapter 5.
149 Other organisations which also act as water market intermediaries include exchanges and online trading platforms. While brokers investigate trading options for their clients, water exchanges operate as a trading platform matching buyers and sellers through an automated process or bulletin board. Water exchanges may also offer similar services to brokers such as organising and submitting the necessary paperwork to the relevant trade approval authority. In some cases, an entity may offer both brokering and exchange services (see chapters 8 and 9).
investigating tradeable water right trading possibilities on behalf of another person

preparing and submitting documents necessary for the trade of a tradeable water right on behalf of another person.

The ACCC has identified approximately 80 broker firms that operate in the Basin with some firms having multiple employees and/or contractors engaged in brokering. Available data indicates that the use of intermediaries across the Southern Basin is widespread. Brokers can also own and trade water in their own right.

Chapter 8 address water broker roles, practices and conduct in detail.

4.1.6 Environmental water holders

A range of government and non-government environmental water holders (EWHs) have been active in permanent and temporary water markets in recent years, with government EWHs being the dominant participants in this group. As noted in chapter 3, the key government EWHs include the:

- Commonwealth Environmental Water Holder (CEWH)
- Victorian Environmental Water Holder (VEWH)
- New South Wales Department of Planning, Industry and Environment
- South Australian Minister for Environment and Water
- Murray-Darling Basin Authority (MDBA).

Governments have been accumulating large portfolios of permanent water rights over recent years through various means, including direct purchases of entitlements from irrigators and various infrastructure programmes. However, they are currently not active buyers of entitlements in Basin water markets.

EWHs typically transfer water allocated to their permanent rights to environmentally significant locations across the Basin to generate environmental benefits. These transfers of water are typically registered on state water registers as zero dollar water allocation trades. Under certain circumstances, EWHs also engage in commercial trade by buying or selling water on allocation markets. These trades, undertaken at prevailing market prices, are also recorded on state water registers.

Section 4.2 includes data on EWH water ownership and allocation trade.

4.1.7 First Nations and Traditional Owner groups

There are more than 40 First Nations in the Basin. First Nations and Traditional Owners (Traditional Owner groups), which primarily consist of Land Councils, Indigenous Corporations and other traditional owner organisations, use water in the Basin to generate a range of cultural, environmental and economic benefits. However, they have submitted to the ACCC that Traditional Owner groups own few permanent water rights and are largely absent from water markets.

Section 4.2 includes data on Traditional Owner groups’ water ownership and water trading behaviours and section 4.3 discusses possible barriers to this participant group more effectively engaging with water markets.

4.1.8 Urban, Industrial and Recreation users

This participant group includes other consumptive water users not included in the above categories, and includes other government (non-EWH) participants, mining companies, power stations, commercial recreational users such as golf courses, and urban, rural and regional water authorities.

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150 See chapters 8 and 9.
153 ibid.
Within this category, regional water authorities and town councils are the most active traders and hold the largest volume of entitlement.

4.1.9 Other non-water users (non-traders)

This participant group is a residual category and includes those non-water users not allocated to any category above. This category could include, for example, persons who hold ‘sleeper’ water rights, to which water is allocated each year but not used or traded.

4.2 Water ownership of participant groups

Currently, there is no consolidated Basin-wide data that shows the type and volume of permanent water rights owned by the key participant groups described in section 4.1. The ACCC has undertaken an analysis of water trade, ownership and accounts data provided by the Basin States to construct a dataset on water ownership by each participant group in the different water sources which comprise the Southern Connected Basin (box A.1 in Appendix A provides an overview of the ACCC’s methodology). The following sections present the key results of this analysis; further detail is provided in Appendix A.

4.2.1 Water ownership by participant groups in Victorian MDB water sources

Figure 4.1 shows the volume of high and low reliability water shares in the different Victorian MDB water sources owned by the different participant groups identified in section 4.1.

The ACCC estimates that irrigators generally own 40–70% of the high reliability water shares in each of the Victorian MDB water sources. Across the different sources, irrigators own the lowest proportions of high reliability entitlements in Campaspe (38%), Vic Murray (42%), Goulbourn (48%) and Loddon (65%) water sources and the highest proportion in Bullarook (70%). Irrigators also own an estimated two thirds or more of the low reliability water entitlements in each water source, apart from Campaspe where they are estimated to hold 21%.

Agribusinesses are estimated to own relatively small volumes of Victorian high and low reliability entitlements, except for Vic Murray, where agribusinesses are estimated to own 11% of high reliability entitlements.

The brokers and exchange platforms group holds negligible volumes of entitlement in Victoria.

Infrastructure operators own approximately 20% of high reliability entitlements in Campaspe and 11% in Broken, but smaller proportions in Vic Murray and Goulburn (2% and 4%, respectively).154

The Environmental Water Holder (EWH) group, which primarily includes government-owned environmental water holders, holds significant proportions of the high reliability water entitlements in Goulburn (31%), Vic Murray (30%), Campaspe (28%) and Loddon (18%), with a smaller proportion owned in Broken (4%). Environmental water holders also own significant proportions of low reliability entitlements in Murray and Campaspe (13% each) and Loddon (7%).

ACCC estimates indicate Institutional Investors own significant proportions of high reliability water entitlements in Vic Murray (8%) and Goulburn (6%), and similar proportions of low reliability entitlements in these water sources (10% and 6%, respectively).155

The Non-Institutional Investor group, which predominately includes retired irrigators who have retained ownership of permanent water rights, own small to moderate proportions of the high and low reliability entitlements in Victorian water sources generally, being 5–6% Broken, and 3% or less of either type of water entitlement in the other Victorian water sources.

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154 This estimate is based on high and low reliability water share ownership only. It is important to note that Victorian Water Corporations such as Goulburn–Murray Water and Lower Murray Water (which are ‘infrastructure operators’) also hold significant bulk entitlements, which they use to provide water to water share owners within their areas of operations.

155 See additional analysis in chapter 5, which analyses entitlement volumes for four large institutional investors.
The Other Non-Water Users group, which includes non-water users other than those already identified in another group, holds small proportions of high and low reliability water entitlements in the smaller Victorian MDB water sources. Of high reliability entitlements, this includes Loddon (11%), Broken (8%), and Campaspe (6%). Of low reliability water entitlements, this includes Loddon (10%) and Broken (9%). Given the small size of these water sources in terms of volume of entitlement on issue, overall this group owns only a small proportion of entitlements on issue in the Victorian Murray-Darling Basin.

Traditional Owners groups own a very small proportion of the high reliability entitlements in Goulburn and Vic Murray (less than 1% in each), and an equally low proportion of the low reliability entitlements in these sources.

Overall, this analysis finds that, as at November 2019, water ownership by different participant groups varies widely across Victorian water sources. Water ownership by agricultural consumptive users (that is, irrigators and agribusiness) is typically lowest in sources where there are higher levels of ownership by EWHs and institutional investors. Traditional Owners groups own a very small proportion of Victorian entitlements.

Figure 4.1: Victorian high and low reliability water share ownership, by participant type, 30 November 2019

![Graph showing water ownership by participant type in Victorian high and low reliability water sources.]

Source: ACCC analysis based on Victoria Government response to voluntary information request.
Notes: Other* = Government (non-EWH), Industrial, Recreation, Urban.

4.2.2 Water ownership in NSW Murray and Murrumbidgee by participant group

Figure 4.2 shows the volume of NSW Water Access Licence (WAL) ownership by WAL class in Murrumbidgee (zone 13), NSW Murray upstream of Barmah Choke (zone 10) and NSW Murray downstream of Barmah Choke (zone 11).156

156 The ACCC partitioned the NSW Murray Water Source into zones 10 and 11 using data provided by NSW LRS and WaterNSW on the water management zones to which the WALs are linked. This information is currently not publicly available.
This figure shows that the volume of water entitlement in the NSW Southern Basin held directly by irrigators is very small and that the vast majority of entitlement in all reliability classes except Supplementary is held by NSW IIOs. The ACCC estimates that IIOs hold 79% of high security and 50% of general security WAL volumes in Murrumbidgee; 83% of general security in zone 10 (NSW Murray upstream of Barmah Choke), and 80% and 93%, respectively, of conveyance WAL volumes in zones 13 and 10. This emphasises that most water users hold their permanent rights in the form of non-statutory rights, held against IIOs, as do non-users such as investors.

The second largest category of holder is Environmental Water Holders (EHWs), who hold more entitlement in Murrumbidgee than in NSW Murray zones. For example, EWHs are estimated to hold 310 GL of general security WALs in zone 13, compared 65 GL in zone 11 and 111 GL in zone 10. EWHs also hold an estimated 584 GL of supplementary WALs in zone 13.

This data also shows the split of NSW Murray entitlement held above and below the Barmah Choke (trading zones 10 and 11, respectively). 75% of NSW Murray General Security entitlement is held above the Barmah Choke. This has significant implications for trade, as downstream movement of water allocated to zone 10 entitlements is constrained by the Barmah Choke trade restriction. However, this zone-based presentation of entitlement volumes is not readily available from public data sources, making it difficult for market participants to gauge volumes of water allocation available in zones 10 and 11.

**Figure 4.2:** NSW water access licence ownership, by participant type, selected zones, July 2020

4.2.3 Water ownership in the South Australian Murray by participant groups

The South Australian Murray has a range of different entitlement classes, several of which are defined by the purpose for which water available under the entitlement may be used. Figure 4.3 shows the volume of South Australian River Murray entitlement ownership by class and participant group.

Class 3 (Irrigation, Recreation and Environment) is the largest class in terms of volume of entitlement on issue, and accounts for 74% of the total entitlement on issue in the South Australian Murray water source. Figure 4.3 shows that an estimated 35% of Class 3 entitlements are held by EWHs, 25% by South Australian IIOs (whose entitlements are mostly used for irrigation), and a further 20% by the Irrigator group (mostly private diverters). Non-institutional investor ownership of South Australian Murray entitlements is relatively minor (around 4% of Class 3 water rights). Irrigators also own an estimated 44% of Class 1, 41% of Class 5 and 84% of Class 8 entitlements, although the total volume of entitlement on issue in these classes is much smaller than for Class 3. In addition to holding some Class 3 entitlements, EWHs also hold the majority of Class 9 (wetland) entitlements.

Classes 2 and 6 are both reserved for urban water use: as figure 4.3 reflects, Class 2 and 6 entitlements are held exclusively by the South Australian Water Corporation (allocated to the residual “Other” group, which includes Urban, Industrial and Recreation users), but Class 6 entitlements are not tradeable.158

Class 5 (industrial and industrial dairy) is the only category where a significant proportion of the entitlement class is held by the Other-non-water user group. However, given Class 5 represents in total only 1% of the total volume of South Australian Murray entitlement on issue, this means that in reality this class holds only a very small volume of entitlement.

Traditional Owners Groups are not visible in figure 4.3, as the ACCC’s analysis indicates that this group holds only 31ML of Class 1 entitlement, 503ML of Class 3 and 305ML of Class 5 (together comprising around 0.1% of South Australian Murray entitlements on issue).

Overall, this analysis shows that, as at November 2019, agricultural consumptive water users (such as irrigators and South Australian IIOs) and EWH users hold the vast majority of tradeable entitlements in the South Australian Murray, while institutional investor ownership is relatively minor. As with Victorian entitlements, Traditional Owners groups own a very small proportion of permanent water rights in South Australia.

4.3 Allocation trade by participant groups

Currently, there is also no consolidated Basin-wide data that shows the type and volume of trading of different water products (such as entitlements, allocations, leases, carry-over parking and forward contracts) by the participant groups described in section 4.1. As with water ownership data, the ACCC has undertaken an analysis of water trade data from state registers to estimate allocation trading by each participant group in the Southern Connected Basin from 2012–13 to the 2019–20 year to date. Box A.1 in Appendix A provides an overview of the ACCC’s methodology.

This section presents this analysis and discusses the key trends observed in the Southern Connected Basin, by trading zone and over time. Note that this analysis excludes temporary trade of irrigation right within IIO networks, as this data is not available from State registers.159

4.3.1 Water allocation trade in the Southern Connected Basin, by participant groups, including zero dollar trades

State water register trade data records allocation trades that result from commercial water trades undertaken between two parties at the prevailing market price, as well as movements in water allocation between trading zones (whether or not an ownership change has also occurred – such trades are sometimes referred to as ‘transfers’ by water market participants). These movements of water,

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159 The ACCC did seek trade data from large IIOs in the Basin, and attempted to join this to Basin State registry data. However, due to data quality issues outlined in Part IV and Appendix G, the ACCC was unable to join these different datasets with a high degree of accuracy or completeness. For this reason, IIO trade registry data is not included in the analysis presented in this section.
which are typically recorded in the state registers as ‘zero dollar trades’, occur for various reasons, including to account for:

- the transfer of environmental water between EWH accounts
- the delivery of water previously contracted under a lease or other water product
- the transfer of water between accounts owned by the same person
- the movement of water allocation through a series of water accounts, in order to give effect to an underlying contract between two parties (for example, where a contract between buyer and seller takes effect via the trade of water allocation from the seller to an intermediary, and then from the intermediary to the buyer – in such cases one of these trades may be reported as zero dollar with the intention of avoiding ‘double counting’).

Consequently, raw allocation ‘trade’ data (including commercial trades and zero dollar trades) is indicative of all allocation water trades made in a given year by different groups for whatever reason. Issues concerning the difficulties of distinguishing between different types of trade are discussed further in chapter 8 and chapter 11.

The analysis below first presents the raw allocation trade data inclusive of zero dollar trades that reflects transfers of water allocations (that is, trades resulting from commercial transactions and other water movements). It then presents allocation trade data exclusive of zero dollar trades, which provides a better proxy for commercial allocation trades undertaken at prevailing market prices.

Figure 4.4 shows the proportion of the total number of allocation trades undertaken each water year in the Southern Connected Basin, from 2012–13 to 2019–20, by each participant group, including zero dollar trades. The left-hand side of the chart shows the trader classification from the perspective of the ‘transferee’ or ‘buyer’, while the right-hand side shows the classification from the perspective of the ‘transferor’ or ‘seller’. For a trade which does not involve a change of ownership (for example, an inter-zone movement of water allocation between one person’s own accounts), the trader classification for the ‘transferor’ and ‘transferee’ is the same.

Figure 4.5 shows the proportion of the total volume of allocation trades in a given year in the Southern Connected Basin, from 2012–13 to 2019–20 by key participant groups. As for figure 4.4, this figure includes zero dollar trades.

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160 Zero dollar trades can also be commercial trades made at prevailing market prices but then inaccurately recorded on state registers at zero dollar for various reasons.
Figure 4.4: Proportion of total number of allocation trades (transferee and transferor), by key participant groups, Southern Connected Basin

Source: ACCC analysis based on South Australian, Victorian and NSW Governments responses to voluntary information request.

Notes: Other = Government (non-EWH), Industrial, Recreation, Urban. The ‘Transferee’ side of the chart presents trader classification for the buyer or ‘transferee’ side of the transaction. The ‘Transferor’ side of the chart presents trader classification for the seller or ‘transferor’ side of the transaction. Includes zero dollar trades.
ACCC analysis indicates that irrigators are responsible for the largest proportion of the number of allocation trades each year in the Southern Connected Basin (figure 4.4). However, these trades account for a much smaller proportion of the volume (ML) traded each year (figure 4.5). In 2018–19, for example, irrigators were the transferees/buyers for 55% of allocation trades and were the transferors/sellers for 64% of trades. However, these transactions accounted for only 20% of the total volume of water allocations transferred (from the transferee perspective), or 18% of volumes (from the transferor perspective). This indicates that, on average, irrigators tend to engage in a relatively high number of smaller volume allocation trades.

The Environmental Water Holder (EWH) group, which includes government and non-government environmental water holders, undertakes only a very small proportion of the number of allocation trades each year in the Southern Connected Basin (figure 4.4). These trades include non-commercial movements of environmental water that has accrued to WAEs held by EWHs as well as commercial trades made by EWHs. However, EWHs account for the largest proportion of volumes traded in a given year by any participant group (figure 4.5). In 2018–19, for example, the EWH group made up just 1% of the total number of transferees/buyers and 1% of the total number of transferors/sellers. However, these trades accounted for 32% of the volume of trades (from the transferee perspective) and 42% of volumes traded (from the transferor perspective). This indicates that EWHs take part in a relatively small number of higher volume transfers.

Overall, this analysis indicates that, while irrigators account for the largest proportion of the total number of allocation trades each year in the Southern Connected Basin, they account for a much smaller proportion of volumes traded. In contrast, EWHs account for the largest proportion of volumes traded in any given year, but the majority of this volume is traded in a small number of non-commercial transactions between EWH accounts (that is, zero dollar trades).
To obtain a more accurate picture of ‘commercial’ allocation trades made by different participant groups, we turn to figure 4.6 and figure 4.7, which report adjusted state register allocation trade data by excluding non-commercial, zero dollar trades.

### 4.3.2 Commercial allocation trade in the Southern Connected Basin by participant groups (excluding zero dollar ‘trades’)

Figure 4.6 shows the proportion of the total number of ‘commercial’ allocation trades (excluding zero dollar trades) in a given year, by key participant groups in the Southern Connected Basin from 2012–13 to 2019–20. Figure 4.7 shows the proportion of total volume of these trades in a given year, by key participant groups in the Southern Connected Basin from 2012–13 to 2019–20, also excluding zero dollar trades.

As noted above, although imperfect, allocation trade data from state registers that excludes zero dollar trades is a better indicator of the number and the volume of commercial allocation trades, and the resultant price information is also expected to be more reflective of commercial outcomes. For simplicity, and to distinguish this analysis from the analysis above which included zero dollar trades, this section refers to ‘buyers’ and ‘sellers’ rather than ‘transferees’ and ‘transferors’. This analysis also uses the term ‘commercial allocation trades’ to reference the set of trades which have a non-zero price. It is important to recognise that this is an imperfect measure, because some trades which are actually commercial in nature may have been incorrectly reported as a zero dollar trade, or vice-versa. Issues with price reporting are discussed in chapter 11 of this report.

**Figure 4.6:** Proportion of total number of allocation trades (buy and sell) by key participant groups, Southern Connected Basin

Source: ACCC analysis based on South Australian, Victorian and NSW Governments responses to voluntary information request.

Notes: Other = Government (non-EWH), Industrial, Recreation, Urban. Excludes zero dollar trades.
ACCC analysis indicates that irrigators are the largest single group trading in allocation markets in the Southern Connected Basin. Irrigators are estimated to have purchased outright a total of 4339GL of water allocations over the period 2012–13 to 2018–19, and sold an estimated 3298GL. Note, however, that this is an underestimate of the total volume of temporary purchases by irrigators, because the majority of volumes bought and sold by NSW and SA IIOs are traded on behalf of their irrigator customers. Irrigators made up the majority of the allocation ‘commercial’ trades in each year over this period (figure 4.6). They were also the largest single group of allocation buyers and sellers by volume in any given year in the Southern Connected Basin (figure 4.7). In 2018–19, for example, irrigators made an estimated 52% of all ‘commercial’ allocation purchases and 64% of all ‘commercial’ allocation sales in the Southern Connected Basin. These trades accounted for 37% of allocation volumes bought commercially that year, and 34% of allocation volumes sold.

However, the estimated proportion of commercial allocation trade undertaken by irrigators has been declining over the last eight years:

- Between 2012–13 and 2018–19, the proportion of the number of allocation purchases made by the irrigators decreased from 68% of total trades to 52%.

- Over the same period, the proportion of allocation volumes purchased by irrigators decreased from 45% of total volumes to 37%, while the proportion of volumes sold decreased from 40% to 34% annually.

161 The proportion of the number of allocation sales made by irrigators does not exhibit a similar downward trend, fluctuating between 55% and 65% a year between 2012–13 and 2018–19.
The presence of Institutional Investors in Southern Connected Basin allocations markets has increased significantly in recent years. As a group, they typically sell more water than they buy in any given year:

- In terms of numbers of trades, it is estimated institutional investor purchases increased from less than 1% of all purchases in 2012-13 to 15% in 2018-19. Institutional Investor sales increased from 1% in 2012-13 to 5% in 2018-19.

- In terms of volumes traded, institutional investor trade activity has also increased over the period. In 2012–13, institutional investors are estimated to have bought less than 1% of total allocation volumes and sold 2%. By 2018–19, this increased to 11% and 21%, respectively.

Retired irrigators (as proxied by the Non-Institutional Investors group), who have exited irrigated farming but retain ownership of permanent water rights, are theorised to participate in water markets predominately by selling water allocations made against their entitlements. While the data presented does not allow analysis of the employment status of traders (for example, to assess whether a trader is in fact a retired irrigator), the non-Institutional Investor group, comprised of superannuation funds that are not identified as Institutional Investors, is used as a proxy for retired irrigators. ACCC analysis indicates that this group sells a greater volume of water allocations than it buys, accounting for 3 to 6% of volumes purchased, and 2 to 4% of volumes sold.

Agribusinesses are estimated to have accounted for a significant share of commercial allocation purchases over the last eight years but a much smaller proportion of sales. Agribusinesses typically buy more water by volume in a given year than they sell, and the total annual volume of water allocation purchased by this group appears to be increasing over time:

- Between 2012–13 and 2018–19, agribusinesses made between 8% and 12% of the number of commercial allocation purchases in a year, and approximately 3 to 6% of commercial sales in the Southern Connected Basin.

- By volume over the same period, agribusinesses accounted for between 20% and 27% of all allocations purchased commercially in any given year, and between 5% and 14% of all allocations sold commercially.

The ‘Other’ group, which includes non-EWH government, recreation, industrial and urban participants, is a significant seller in Southern Connected Basin allocations markets. Participants in this group typically buy little water in a given year but consistently sell large volumes of allocations each year, although their share of the allocation sales has been gradually decreasing over time:

- Between 2012–13 and 2018–19, this group made less than 2% of the number of commercial allocation purchases in a given year, but between 3% and 5% of all sales in the market in a year.

- By volume over the same period, this group generally bought less than 1% of water allocation in any given year but sold between 4% and 7% of allocation volumes.

Brokers and exchange platforms participate in water markets both as service providers and, at times, as trading principals. Our estimates show that as a group, brokers and exchange platforms have accounted for a significant but variable share of allocation buy and sell trade over the last eight years (as trading principals). On average, brokers and exchange platforms sell a higher proportion of allocation water in a given year than they buy:

- Between 2012–13 and 2018–19, brokers and exchange platforms’ share of the number of commercial allocation purchases and sales in a given year fluctuated between 5% and 11% of all trades.

- Over the same period, brokers and exchange platforms’ share of allocation volumes bought commercially in a given year fluctuated between 8% and 10%, while their share of allocation volumes sold commercially fluctuated between 8% and 13%.

Irrigation Infrastructure Operators (IIOs) have also accounted for a significant but variable share of allocation buy and sell trade over the last eight years, selling an estimated 1,390 GL in the period 2012–13 to 2018–19, and purchasing an estimated 1,095 GL:

162 Such traders predominantly appear in the data as a family superannuation fund – e.g. a trader name such as ‘John and Mary Smith Superannuation Fund’.
IIOs consistently made up an estimated 4% to 9% of the number of annual purchases and sales in any given year over the 2012–13 and 2018–19 period, and between 7% and 21% of the volume of allocations bought and sold in any given year.

The majority of allocation trades by IIOs are performed on behalf of their customers; see section 3.1.1 for further detail.

*Environmental water holders*, which primarily constitutes government EWHs, engage in irregular and relatively small commercial trades in the Southern Connected Basin:

- Between 2012–13 and 2018–19, the EWH group made between 0 and 2% of the total number of allocation purchases and sales in any given year.
- Over the same period, EWHs purchased between 0 and 4% of allocation volumes, and more regularly sold between 1% and 3% of allocation water traded in a given year.

*Traditional Owner* groups have made almost no allocation purchases over the 2012–13 to 2018–19 period in the Southern Connected Basin, but have consistently made a very small number of allocation sales each year; the total volumes sold accounted for less than 1% in any year.

The *Other Non-Water User* group, which includes non-water using participants not included in other categories, consistently accounted for a significant share of allocation buy and sell trade over the last eight years. As a group, they typically sell more water than they buy in a given year, selling an estimated 624GL over the period 2012–13 to 2018–10, and purchasing an estimated 265GL.

- Between 2012–13 and 2018–19, this group made up 3 to 5% of the number of allocation purchases in any given year, and 8 to 10% of all annual sales in the Southern Connected Basin.
- By volume over the same period, this group accounted for between 2% and 3% of allocation volumes purchased in a given year, and between 6% and 8% allocation volumes sold on the market in any given year.

Overall, this analysis of overall participation in water allocation markets in the Southern Connected Basin indicates that:

- Irrigators are the largest single trading group in allocation markets in the Southern Connected Basin. However, their proportion of total allocation trade has been declining over the last eight years.
- The presence of institutional investors in Southern Connected Basin allocations markets as as either buyers or sellers was is significant and has increased substantially in the last four years.
- Retired irrigators account for a small but not insignificant proportion of allocations sold in the Southern Connected Basin each year.
- Agribusinesses have been buying a significant and increasing share of allocation volumes over the last eight years in the Southern Connected Basin.
- IIOs and IOs account for a significant and variable share of allocation buy and sell trade in the Southern Connected Basin.
- Environmental water holders, including government environmental water owners, make irregular and relatively small commercial allocation trades in the Southern Connected Basin.
- Traditional Owner groups made almost no allocation purchases over the 2012–13 and 2018–19 period, but consistently make a very small number of allocation sales each year.
4.3.3 Commercial allocation trade by participant groups across Southern Connected Basin trading zones

While irrigators are typically the largest single trading group in allocation markets in the Southern Connected Basin, the size of their market share varies significantly across trading zones. Of the larger trading zones in the Southern Connected Basin in terms of water allocated or volumes traded, irrigators typically have the largest allocation market share in zones 6 and 1A. In zone 6, for example, in 2018–19 irrigators are estimate to have bought 75% and sold 58% of commercial allocation volumes traded, while in zone 1A, they bought 43% and sold 49% of commercial allocation volumes traded that year.

Of the larger trading zones, irrigators typically have their smallest allocation market share in zones 10 and 13, where New South Wales IIOs have large market shares. In zone 10, in 2018–19 irrigators bought only 1% and sold 10% of commercial allocation volumes traded, while in zone 13, they bought 23% and sold 10% of allocation volumes traded that year.

Over recent years, irrigators' share of allocation trade has declined most in the trading zones that have seen the largest growth in institutional investor trade, particularly in zones 11, 13 and 7. In zone 7, for example, irrigators' share of allocation volumes bought and sold has decreased from 42% and 47% respectively in 2012–13, to 29% and 30% in 2018–19.

While Institutional Investors have some level of market share in most trading zones of the Southern Connected Basin, of the larger trading zones their highest market shares of allocation trade by volume have been in zones 7, 11 and 1A in recent years. Institutional investors are typically least active in zone 10, where they bought and sold less than 1% of allocation volumes in this zone in 2018–19. As noted above, institutional investors' share of allocation buy and sell trade by volume has increased most in zones that have experienced the largest decrease in irrigator allocation trade.

Retired irrigators (proxied by the Non-Institutional Investor group) predominantly sell water allocations in any given year. In the larger trading zones, they typically have their highest allocation market share in zones 7 and 12. In 2018–19, for example, this group is estimated to have sold 5% of commercial allocation volumes in zone 7 and 4% of allocations volumes in zone 12.

Irrigation Infrastructure Operators (IIOs) as a group have their highest allocation market shares in the larger zones of 10, 11, 12 and 13, with their highest share in zone 10. In 2018–19, for example, this group bought 98% and sold 73% of water allocations volumes traded commercially in that zone.

Brokers and exchange platforms buy and sell significant proportions of water allocation volumes in all of the larger trading zones of the Southern Connected Basin, except for zones 10 and 12, and their market shares can fluctuate significantly across water years. Brokers appear to have a significantly stronger presence in New South Wales trading zones compared to Victorian and South Australian zones. For the period 2012–13 to 2018–20 (year to 30 November 2019), Brokers accounted for over 17% of allocation volumes sold (excluding zero dollar transactions) in New South Wales trading zones, and 13% of allocations purchased, compared to 7% of both purchases and sales in South Australian and Victorian zones. Chapter 9 considers the relationships between broker participation as market principals and the underlying Basin State water access entitlement frameworks and trading processes in more detail.

The Agribusiness group, which typically buys significant volumes of water allocation, has a higher market share in the larger trading zones of 7, 12, 13 and 11. In 2018–19, Agribusinesses purchased 34%, 28%, 19% and 14% respectively of commercial allocation volumes in these zones.

163 Larger zones in terms of water allocated or volumes traded include zones 10, 11, 12, 13, 1A, 6 and 7.
The Environmental Water Holders (EWH) group, which irregularly buys and sells allocations on spot markets, has made the largest purchases of water allocations (as a proportion of zone volumes) in recent years in the larger trading zones of:

- Zone 12 in 2012-13 and 2013-14, where EWHs purchased 12% and 10% of allocation volumes in the zone in those years
- Zone 11 in 2014-15, where they purchased 7% of allocation volumes in the zone that year
- Zone 13 in 2016-17, where they purchased 6% of allocation volumes in the zone that year.

The EWH group’s largest sales have occurred in zone 1 in 2015-16, 2016-17 and 2018-19, where EWHs sold 8%, 6% and 6%, respectively of commercial allocations volumes sold in that zone in those years.

As noted above, Traditional Owner groups, while trading allocations in very small numbers, typically sell more water than they buy. Traditional Owner groups have been most active in zone 14, irregularly selling a significant proportion of the total volume of allocations sold in this zone in a given year. In the larger trading zones of 11, 12 and 3, Traditional Owner groups have sold smaller proportions of water (typically between 0% and 3% of total volumes sold in the zone in a given year).

The Other group (comprising Urban, Industrial, non-environmental water holder government entities and Recreation), which typically sell significant volumes of water allocations each year, has its highest allocation market shares in the larger zones of 1A and 6.

Overall, this analysis indicates that participation by different groups in water allocation markets in the Southern Connected Basin varies substantially across zones:

- Irrigators typically account for the largest allocation market share in zones 6 and 1A.
- Institutional investors account for the largest allocation market share in zones 7, 11 and 1A.
- Irrigators’ share of allocation trade has declined most in trading zones that have seen the largest growth in institutional investor trade, particularly in zones 11, 13, 1A and 7.
- Retired irrigators typically have their largest allocation market share as sellers in zones 7 and 12.
- Agribusinesses are most active as buyers in zones 7, 12, 13 and 11.
- EWHs, over the last eight years, have made irregular but significant commercial allocation purchases in zones 11, 12 and 13 and commercial sales in zone 1.
- Traditional Owner groups have been most active as sellers in zone 14.
4.4 Water ownership and trading strategies used by participant groups

Sections 4.2 and 4.3 above each summarise data on water ownership and allocation trade by different participant groups in the Southern Basin. However, a participant’s decisions on what permanent water rights to own and what type of water trade to engage do not occur in isolation. Water trading is typically undertaken as part of a wider water ownership and trading strategy that is designed to ensure a participant can reliably secure enough water to achieve their water use needs, whether commercial, environmental or cultural.

A water ownership and trading strategy (or ‘water strategy’) can be defined as the integrated approach to water ownership (including water entitlements, shares etc.) and water trading (including of entitlements, allocations, leases, carry over parking and forward contracts) a market participant uses to secure the water they need. An irrigator’s water strategy, for example, may be to secure the water they typically need for a growing season by holding one or two types of water entitlements within their catchment to supply most of their water needs, and to only buy temporary water when needed to supplement what they receive from their permanent water rights. An investor’s strategy, alternatively, may be to hold a diverse portfolio of water entitlements across a number of catchments or zones to ensure they can reliably meet the water supply obligations of their contracted customers.

To better understand the relationship between the ownership of permanent water rights and water trading behaviours, the ACCC has developed a framework detailed in table 4.2 below that describes the most common water strategies used by different types of participant groups in the Basin. The ACCC has used this framework along with available data on water ownership and trading to analyse water strategies used by different market participants. This analysis provides new evidence on which water strategies are currently in use and by who, how frequently they are used, and the reasons why a participant chooses a particular strategy (that is, the strategy drivers).

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164 Recent research has considered possible frameworks for describing in an integrated way how different water market participants own and trade water. Seidl et al 2020, for example, analysed water market participants’ reasons for owning and trading water, the type of permanent water rights they owned and the water trading they engaged in. The participant groups studied included irrigators, agribusinesses (‘agri-corporates’), investors (‘financial investors’, ‘entrepreneurs’ and ‘speculators’) and EWHs. Seidl et al identified various ‘water user types’ that corresponded to different levels of sophistication in terms of: the type of permanent water rights owned (ranging from owning no permanent water, to a limited portfolio of one or two entitlement types in one zone, to a diversified portfolio of entitlements of differing levels of reliability in more than one zone), and the type of water trading they used (ranging from no trade at all, to allocation and/or entitlement only trade, to increasingly frequent and sophisticated trade using leases carry over parking and multi-year forwards).
Table 4.2: Key water ownership and trading strategies identified by the ACCC

<table>
<thead>
<tr>
<th>Market participant type</th>
<th>Water ownership &amp; trading strategies</th>
<th>Aim of strategy</th>
<th>How common is the strategy?</th>
</tr>
</thead>
<tbody>
<tr>
<td>Traditional non-trading irrigator, agri-business and EWHs</td>
<td>Owns limited portfolio of entitlements(^{165}), no allocation or entitlement trade, may use carry over</td>
<td>Owns all the water they use, uses carryover but does not trade to meet water needs</td>
<td>In 2018, around 66% of irrigators used only water allocated to entitlements they owned.(^ {166})</td>
</tr>
<tr>
<td>Traditional trading irrigator or agri-business</td>
<td>Owns limited portfolio of entitlements, trades allocations only, may use carry over</td>
<td>Mostly owns the water they use, buys allocations to supplement water supply, or sells surplus water to earn income</td>
<td>In 2018, 26% of irrigators used water from their own entitlements and supplemented this with water purchased on the temporary market.(^ {167})</td>
</tr>
<tr>
<td>Diversified trading irrigator or agri-business</td>
<td>Owns diverse portfolio of entitlements(^ {168}), trades allocations, may use carry over</td>
<td>Mostly owns the water they use, buys allocations to supplement water supply, or sells surplus water to earn income</td>
<td>()</td>
</tr>
<tr>
<td>Diversified trading irrigator or agri-business, using new water products</td>
<td>Owns diverse portfolio of entitlements, trades entitlements and allocations, uses leases or a newer water product, may use carry over</td>
<td>Owns some of the water they use, trades entitlements to diversify supply risk, secures temporary water through allocations, leases or other water products</td>
<td>()</td>
</tr>
<tr>
<td>No portfolio trading irrigator or agri-business</td>
<td>Owns no entitlements, trades allocations leases and other water products, may use carry over</td>
<td>Owns none of the water they need, sources water through allocation trade, leases and newer water products</td>
<td>In 2018, only 3% of irrigators used no water from their own entitlements and relied solely on water either purchased on the temporary market or from a leased entitlement.(^ {169})</td>
</tr>
<tr>
<td>Traditional investor or agribusiness</td>
<td>Owns diverse portfolio of entitlements, trades allocations and entitlements, uses carry over</td>
<td>Mostly owns the water they need, but also buys allocations to supplement supply to meet obligations to market for long-term leases and forward contracts</td>
<td>()</td>
</tr>
<tr>
<td>Diversified investor</td>
<td>Owns diverse portfolio of entitlements, trades allocations and entitlements, uses carry over</td>
<td>Mostly owns the water they need, but also buys allocations to supplement supply to meet obligations to market for long-term leases and forward contracts, also trades allocations for profit</td>
<td>()</td>
</tr>
</tbody>
</table>

\(^{165}\) Holds entitlement in one valley of at most two classes (e.g. high and low reliability) sufficient for supplying, or exceeding, their own on-farm water needs in a year with average water availability.


\(^{167}\) ibid.

\(^{168}\) Holds at least two entitlements of different security and/or across different catchments, at most two classes (e.g. high and low reliability) sufficient for supplying, or exceeding, their own on-farm water needs in a year with average water availability.

4.5 Barriers to more effective water market engagement

There are many factors that feed into a decision to use or not to use a given water product, and non-use of a particular product or not using water markets at all are not, by themselves, evidence of a problem or barrier to trade.

Submissions to this inquiry have highlighted the significant benefits that water markets are providing to irrigators and other water users across the Basin. Data indicates that most irrigators have used allocation markets, and to a lesser extent entitlement markets at some level, and that the proportion of irrigators trading in these markets has been increasing over time. However, evidence available to this inquiry and summarised below also shows that certain groups of participants, in particular some irrigators and Traditional Owner groups, rarely or never engage in allocation or entitlement trade. The evidence also indicates that only a small proportion of irrigators as a whole use other types of water products such as leases, and an even smaller proportion use carryover parking or forward contracts.

This section summarises the available evidence on the level of irrigator and Traditional Owner group engagement with each type of water market product (including for allocations, entitlements, leases, carryover parking and forward contracts), and the possible barriers that may prevent use of these water products barriers.

4.5.1 Irrigator engagement with water markets

Submissions to this inquiry have stated that while many irrigators are using and benefiting from water trading, some irrigators are experiencing difficulties in effectively engaging with water markets and are suffering negative impacts as a result.

Many factors can drive an irrigator’s decision whether to engage or not engage with a particular water market. Key categories of these drivers include:

- **market-based drivers:** including current and future trends or changes in commodity prices, demand for agricultural products, seasonal weather or longer term climate conditions etc. that can impact water use and water availability (demand and supply) and so drive a decision to buy and sell a water product at a given time
- **institutional and infrastructure drivers:** including trading and operational rules and physical constraints that can impact if, when and how an irrigator can buy or sell water

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171 Appendix A, figure A.2.

172 Effective engagement with a water market typically requires that a buyer or seller has ready access to enough market information on the price and characteristics of the water products being traded to allow them to make an informed trading choice that best match their individual water use needs.


government policy drivers: including policies governing access to carryover and interventions such as water buybacks or irrigation infrastructure subsidies that can alter the incentives for an irrigator to engage in certain types of water ownership and trade

an irrigator’s individual circumstances and characteristics: including the characteristics of the irrigator’s business (that is, their farm type, size, location, profitability, debt levels, access to capital etc.), the types of risks they face and their attitudes to managing risk, their access to and use of government programmes, and characteristics of the irrigator themselves, which can include:
- their ability to collect, process and use market related information (for example, do they have the experience, skills and knowledge to trade, the time and money to commit to the information and transaction costs of trading, or access to a water market intermediary to advise or act on their behalf?)
- their future plans (do they intend to expand, adjust or exit their business?)
- their attitudes to and confidence in water markets and trading (do they have confidence in water markets and the security of their water rights, or are they uncertain or expect the rules to change?).

The ACCC has focussed on irrigator participation in water markets as irrigators are the largest group of water market participants. In comparison to other participant groups (such as EWHs, institutional investors, agribusinesses, IIOs and WMIs) irrigators, particularly smaller, family owned farmers, may be more susceptible to certain barriers that limit their ability to effectively engage with different kinds of water markets. This may result in these irrigators producing less, earning lower profits, being more likely to go out of business and less likely to make structural adjustments as market conditions change.

To better understand the potential magnitude and scope of any barriers to trade that irrigators may be experiencing, the ACCC, with the help of two external consultants (box 4.1), has undertaken analysis of how many irrigators are using and not using each type of water product, the individual circumstances and characteristics of irrigators who trade and don’t trade these products, and their attitudes to trading and water markets. Appendix A summarises key results and findings of this analysis. The consultants’ reports are available on the inquiry webpage.

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**Box 4.1: Water inquiry consultancies on irrigator engagement with water markets**

The ACCC commissioned two consultants to perform and report on analysis of data collected in surveys of Basin irrigators undertaken between 1998 and 2018. The aim of the work was to gain a clearer and more representative understanding of irrigators’ water ownership and trading behaviours, and their attitudes to water trading and water markets.

The Centre for Global Food and Resources at the University of Adelaide has conducted various surveys of irrigators across the Basin from 1998 to 2015. These surveys, amongst other things, asked irrigators about their water ownership, water trading and farm management behaviours, and included a number of attitudinal questions.

The Health Research Institute at the University of Canberra undertakes an annual survey – the Regional Wellbeing Survey – of people in Australian regional areas. The 2015 and 2016 surveys, amongst other things, asked Basin irrigators about their water use, water ownership, water trading and farm management behaviours. They also asked irrigators to indicate to what degree they agreed or disagreed with various statements related to the process of trading water, their confidence in water markets and water market rules, and the security of their permanent water rights.

The ACCC has incorporated relevant data and analysis from the consultants’ reports into this report. The full consultant reports are available from the ACCC’s website ([https://www.accc.gov.au/](https://www.accc.gov.au/)).
This section draws on the available evidence on irrigators’ use of water markets, including from submissions, the academic literature and our consultants’ reports, to identify key issues related to irrigator engagement and non-engagement with water markets.

**Issue 1: Some irrigators appear to have limited engagement with water markets, particularly leases and newer water products**

Submissions to the inquiry have highlighted that some irrigators, particularly smaller, family owned operators, find it difficult to effectively engage with water markets and these submissions identify some causes of the difficulties.\(^\text{175}\)

Central Irrigation Trust noted the complexity of the information needed to forecast water availability and market conditions:\(^\text{176}\)

‘…water is very complex, some of which is caused by history and the resulting development of irrigation across the Murray Darling Basin; some of which results from the jurisdictional control over water; and some which results from the delivery of that water through a complex hydrological system of rivers, creeks, dams, lakes and streams. Compounding this complexity is the variable nature of the key ingredient rainfall and runoff. It is not hard to see that there are very few people that have sufficient information or understanding to be considered informed on the water resource and markets.’

NSW Farmers highlighted the lack of availability of key types of information:\(^\text{177}\)

‘NSW Farmers believes improvements in the transparency of water trade are urgently required. Readily available information including price, location and volume, provide market participants with the information required to make informed decisions. Without transparency and improved functional capacity, trust in the water market and wider water reforms is being eroded, and the ability of the water market to deliver the social, economic and environmental objectives of the Murray–Darling Basin Plan is greatly diminished.’

Australian Grape and Wine Incorporated emphasised the limitations smaller irrigators face relative to larger operators when trying to access and analyse market information:\(^\text{178}\)

‘…there is a large range across wine grape growers’ ability and capacity to engage with the water market which leads to problems associated with information asymmetry. Some vineyard owners and operators are large wine companies, or corporate style winegrowing entities with dedicated technical staff with the capacity and resources to engage with the water markets on a continuous basis. Other growers are small family or sole – trader entities, and engagement with the complex rules and regulations that are associated with the water markets is daunting for them.’

Select Harvest noted that the combination of a lack of readily available data and differences in market participant resources puts smaller players at a commercial disadvantage when trading: \(^\text{179}\)

‘A lack of consolidated, accurate, comprehensive and timely data on water rights trading activity gives a significant informational advantage to large, well-resourced and connected Sophisticated Investors and large scale irrigators (like Select Harvests) over smaller market participants.”

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Finally, AJ and MH Spiers stated that while new and useful water products are becoming available in water markets, some irrigators had not considered them or could not afford to use them: 180

‘The number of products available to irrigators (long term and short term leases) has given irrigators who sold their permanent water shares some years ago, a greater amount of flexibility and security going forward. I do not think the majority of irrigators have explored these options OR if they have they may not be able to afford to purchase water at the current prices in 2019.’

Irrigator engagement with allocation markets

Available data indicates that as of 2016 approximately 75% of irrigators in the Southern Basin reported having traded (bought or sold) an allocation at least once, and that irrigator use of allocation trade measured in this way has been increasing over time.181 However, it also shows that in 2016 a quarter of irrigators (approximately 25%) reported having never traded (bought or sold) an allocation, and only a small proportion of irrigators (less than 15%) report having both bought and sold an allocation over a five year period prior to 2016.182 Appendix A includes more detailed data on irrigator engagement with allocation markets.

This data indicates that while the majority of irrigators report having used allocation markets at least once, a significant minority are not engaging with allocation markets at all, and a larger proportion of irrigators only trade allocations infrequently.

An irrigator’s use of allocation trade, as noted above, will vary depending on a range of market-based, institutional, government policy and individual drivers, amongst others. To better understand the extent to which the observed non-engagement with allocation trade by some irrigators was an informed choice or evidence of some barrier to trade, the ACCC commissioned analysis of irrigator engagement with water markets (box 4.1) and compared the individual characteristics of irrigators engaging and not-engaging in allocation trade, including the characteristics of an irrigator’s business, the irrigators themselves and their attitudes to water trade and water policy generally (appendix A).

Initial analysis of individual irrigator characteristics (summarised below) found a number of significant differences between irrigators who traded water allocations in a given year and irrigators that did not trade allocations in the same year.183

In terms of business characteristics, water allocation traders in the Southern Basin, on average, were found to have higher net farm incomes (on average 15% higher) than non-traders. This difference may be because allocation traders earned additional income from selling their allocations while non-traders did not. Alternatively, it may suggest some positive association between higher access to capital or cash flow and the likelihood of an irrigator engaging in allocation trade.

Allocation trade also varies significantly with the type of farm commodity production. In 2018, 38% of grain growing irrigators and 40% of dairy irrigators did not engage in any type of trading in the water market. In comparison, in the same year, the percentage of fruit/nut growing irrigators and wine grape growing irrigators that did not engage in any trade in the water market was 67%.184

Allocation traders were also found to have carried over a higher volume of water than non-traders (on average 72% more water in the year of trading). These differences may suggest that traders usually managed a larger water volume than non-traders, which offers them greater flexibility to trade water allocations.

181 Appendix A, figure A.2.
182 Appendix A, figure A.3.
183 The comparison was for allocation trade in 2015 across the Southern Basin. We note that these differences are indicative of statistically significant associations (between a characteristics and trade behaviour) rather than causation and may or may not be associated to a driver of trading or not trading. The full analysis can be found in S Wheeler and others, Water market literature review and empirical analysis. Consultant report prepared for the ACCC Murray–Darling Basin Water Market Inquiry, 2020, table 6.5, and pp.118–119.
There were a range of significant differences in the personal characteristics of irrigators who traded and did not trade allocations. Allocation traders compared with non-traders:

- were three years younger (traders were on average aged 57.5 years compared to 60.5 for non-traders)
- had four years less farming experience (traders had on average 35.3 years of experience compared to non-traders who had on average 39.6 years)
- had higher post-secondary education attainment (traders were more likely to have gone to TAFE or University than non-traders).

These differences may suggest that irrigators who were younger, had worked in the industry for less time, and had a higher level of educational attainment found it easier to navigate the information and administrative requirements to engage in allocation trade.

Allocation traders were also found to be more likely to have a whole farm plan, and to be planning for climate change. These differences may indicate that irrigators who are willing or able to engage in a higher level of forward looking farm management practices are also more willing or able to navigate the information and process requirements to engage in allocation trade.

There were also a range of significant differences in the attitudes of irrigators who traded and did not trade allocations:

- Allocation traders on average reported a more positive attitude to water trading. They also had a more positive attitude to investors. These differences may suggest that irrigators who were more open to the idea of trading water in principle were more willing to use water trading in practice.
- Allocation traders expressed less ‘traditional’ attitudes to farming than non-traders. They also had a more positive attitude to environmental water recovery. These attitudinal differences may suggest that irrigators who hold more traditional attitudes to farming may be less willing to use allocation trade as a farm management tool.
- Allocation traders were significantly more likely to find it easy to trade both temporary water and entitlements, to feel confident to use water trading, and to feel able to access information, than those who did not trade allocation.

Attitudes relating to the fairness of the water trade market, the stability of water market rules, and whether entitlements held by the government were subject to the same rules and charges as other water market participants, did not differ between irrigators who traded allocation and irrigators that did not.

These findings suggest that irrigators’ propensity to trade is associated with finding it easy to trade, confidence in being able to use water trading, and confidence in being able to access information about water trading. The propensity of an irrigator to trade is less associated with views about the fairness or stability of the water market.

The University of Canberra’s Regional Wellbeing Survey indicates that in 2016, 11.8% of irrigators fell into a class of irrigators that lacked confidence in both their own ability to access information about water trade and the settings of water trading systems (Class 1). In the same year, 20.1% of irrigators fell into a class of irrigators that had moderate confidence in being able to trade, and some confidence that the water trade systems are fair for all water market users, however felt the water market is somewhat unfair and were only slightly confident in their ability to access information about the market and trade.

185 Allocation traders agreed more than non-traders with statements ‘I believe water trading has been a good thing for farming’.
186 Allocation traders agreed more than non-traders with the statements ‘Retired irrigators no longer farming should be allowed to retain and trade water’ and ‘Corporate non-farm entities should be allowed to invest in water’.
187 Allocation traders agreed less than non-traders with the statements ‘Farming is the only occupation I want to do’ and ‘I could never imagine living anywhere other than this area’.
188 Allocation traders agreed less that ‘The Commonwealth Environmental Water Holder belongs in the agriculture not the environment department’ and ‘I believe the Basin Plan should be suspended’.
190 Ibid.
water (Class 2). Class 1 irrigators were significantly less likely to trade allocation than Basin irrigators as a whole.191

**Irrigator engagement with entitlement markets**

Available data indicates that as of 2016 approximately 50% of irrigators in the Southern Basin reported having traded (bought or sold) an *entitlement* at least once, and that irrigator use of entitlement trade measured in this way has been increasing over time.192 However, it also shows that in 2016 around half of all irrigators (approximately 50%) reported having never traded (bought or sold) an entitlement. In addition, only a small proportion of irrigators (less than 10%) reported having both bought and sold an entitlement over the five year period prior to 2016.193 Appendix A includes more detailed data on irrigator engagement with entitlement markets.

This indicates that while around half of irrigators report having used entitlement markets at least once, 50% of irrigators in the Southern Basin have never bought or sold water entitlement.

An irrigator’s use of entitlement trade, as noted above, will vary depending on a range of market-based, institutional, government policy and individual drivers. To better understand the extent to which the observed non-engagement with entitlement trade by some irrigators was the result of an informed choice or some barrier to trade, the ACCC commissioned analysis of irrigator engagement with water markets (box 4.1) and compared the individual characteristics of irrigators engaging and not-engaging in entitlement trade, including the characteristics of an irrigator’s business, the irrigators themselves and their attitudes to water trade and water policy generally (appendix A). Initial analysis of individual irrigator characteristics summarised below, found a number of significant differences between irrigators who traded water entitlements in a given year and irrigators who did not trade entitlements in the same year.194

In terms of farm characteristics, water entitlement traders in the Southern Basin, on average:

- held greater volumes of entitlements (high security entitlements, low security entitlement in Victoria and general security entitlements in New South Wales)
- irrigated a significantly larger area of land than non-traders (on average 78% more)
- carried over more water into the season they traded in.

These differences are suggestive of a number of possible causal relationships between farm characteristics and engaging in entitlement trade, particularly entitlement sales, including:

- Irrigators holding greater volumes of entitlements can more easily sell some to raise funds while maintaining farming operations compared to farms with smaller entitlement holdings.
- Irrigators with more land may have greater flexibility to move to non-irrigated land uses than irrigators with smaller farms and so can more easily sell some of their permanent water rights.
- Irrigators who use larger volumes of carry over may have greater flexibility to sell entitlements and rely more on carry over to manage water supply risk.

Water entitlement traders in the Southern Basin also, on average, were more likely to have received an irrigation infrastructure grant than for non-traders, and were more likely to be in the horticultural industry. There is a direct causal relationship between an irrigator accepting a government irrigation infrastructure grant and selling water entitlements to the government. The association of entitlement trade with irrigators in the horticultural industry may reflect the rapid growth of this sector and these types of farms trading a larger numbers of entitlements.

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191 ibid, pp. 58–60.
192 Appendix A, figure A.2.
193 Appendix A, figure A.3.
194 The comparison was for entitlement trade in 2015 across the Southern Basin. These differences are indicative of statistically significant associations (between a characteristics and trade behaviour) rather than causation and may or may not be associated to a driver of trading or not trading. The full analysis can be found in S Wheeler and others, Water market literature review and empirical analysis, Consultant report prepared for the ACCC Murray-Darling Basin Water Market Inquiry, 2020, table 6.7, pp. 123-124.
None of the personal characteristics of irrigators (such as age, years in the industry or educational attainment) that were found to be significantly different between allocation traders and non-traders above, were significant for entitlement trade. However, entitlement traders were found to engage in certain farm management behaviours at significantly higher rates than non-traders of entitlements. Entitlement traders were also found to be more likely to have planned for climate change on farm, bought income protection insurance and bought crop insurance. These differences may indicate that irrigators who are willing or able to engage in a higher level of forward looking farm management practices are also more willing or able to navigate the information and process requirements to engage in entitlement trade.

There were also a range of significant differences in the attitudes held by irrigators who traded and did not trade entitlements:

- Entitlement traders, like allocation traders, on average reported a more positive attitude to water trading. They also had a more positive attitude to investors. These difference may suggest that irrigators who were more open to the idea of trading water in principle were more willing to use water trading in practice. \footnote{Entitlement traders agreed more than non-traders with statements ‘I believe water trading has been a good thing for farming’ and also agreed more than non-traders with the statement ‘Corporate non-farm entities should be allowed to invest in water’.}

- Entitlement traders were also more positively disposed to environmental water recovery and the Basin Plan. \footnote{Entitlement traders agreed more than non-traders with the statements ‘Most irrigators think increasing environmental water flows is a good thing’, ‘It is essential to make allocations to the environment otherwise irrigation will not be long-term sustainable’, ‘The Murray–Darling Basin Authority is serious about helping our community to solve our own environmental flow problems’ and ‘More money should be spent on water buybacks by the Commonwealth’, and they agreed less with the statement ‘The Commonwealth Environmental Water Holder belongs in the agriculture not the environment department’ and ‘I believe the Basin Plan should be suspended’.}

Beyond the two differences in attitudes above, the views of those who trade entitlements typically do not differ significantly to those who do not trade entitlements. \footnote{J Schirmer and D Peel, Understanding participation in water trading by irrigators in the Murray–Darling Basin, Consultant report prepared for the ACCC Murray–Darling Basin Water Market Inquiry, p. 47.}

**Irrigator use of leases and newer water products**

As with allocation and entitlement trade, an irrigator’s use of newer water products (for example, single and multi-year leases, carry over parking and single and multi-year forward contracts) should vary depending on a range of market-based, institutional, government policy and individual drivers. However, analysis indicates that only a relatively small proportion of irrigators use leases and an even smaller proportion use carry over parking and forward contracts. This analysis is detailed below.

**Leases**

Analysis of irrigator survey data from 2018 found that approximately 6.7% of irrigators across the whole Basin reported using water that, in part, was sourced from leased entitlements. \footnote{The question did not differentiate between single and multi-year leases. ibid., table 8, p. 13. Basin irrigators using surface water (excludes those who rely solely on groundwater).} Of all irrigators surveyed across the whole Basin in 2018 on how they secured water for their farms:

- 1.4% reported using water from their own entitlements and from entitlements they leased from others
- 3.6% reported using water from their own entitlements, leased entitlements, and allocations purchased on the temporary market
- 3.2% reported using no water from their own entitlements (all water used was from purchases on temporary market and/or leased entitlements). \footnote{ibid., table 8, p. 13. Basin irrigators using surface water (excludes those who rely solely on groundwater).}
Information on irrigators’ use of leases also comes from semi-structured qualitative interviews undertaken in 2018 with water trading stakeholders in the Basin, which similarly found that most irrigators and many agribusinesses did not use leases.\textsuperscript{200}

Information on irrigators’ use of leases from semi-structured qualitative interviews undertaken in 2018 also found that use of leases was strongly associated with the amount of water owned; smaller irrigators with smaller holdings of permanent water ownership were less likely to use leases than irrigators and agribusinesses with larger water holdings.\textsuperscript{201}

However, the research found that smaller irrigators that did use a lease, tended to lease water from friends and relatives, from their own self-managed supper account, or from other irrigators, while larger irrigators and agribusinesses that used leases, tended to use longer-term leases sourced from commercial operators, either as part of leasing land, or as a stand-alone water lease from non-landholder investors.\textsuperscript{202}

**Newer water products**

There is little data available on the number of irrigators using newer water products such as carry over parking and forward contracts. Analysis of this limited data indicates that while relatively significant volumes of water are being transferred under carryover parking and forward contracts, the number of irrigators using these water products is likely to be very small.

ACCC analysis of trading activity undertaken by investors in Victoria in 2018–19 shows that these investors took in approximately 17GL of water from irrigators under carryover parking contracts and returned approximately 10 GL to irrigators that year. The same analysis showed that these investors provided just over 50 GL of water under forward contracts in Victoria in 2018–19.\textsuperscript{203}

Other analysis undertaken by the ACCC’s consultants of a sample of a large Southern Basin water intermediary’s trade data\textsuperscript{204} found that over the three years from 2016–17 to 2018–19, this particular intermediary mediated only 40 carryover parking contracts and 48 forward contracts between irrigators and various counter parties, including other irrigators, investors, IIOs and other (unidentified) parties.\textsuperscript{205}

**Submissions in response to the Interim Report**

Submissions received in response to the Interim Report in relation to the engagement of irrigators with the water market varied greatly. Some submissions suggested that engagement was high and irrigators were generally satisfied with the operation of water markets, while others raised significant concerns.

Cotton Australia submitted that most irrigated cotton producers would have engaged in the water market at some point in time.\textsuperscript{206} Waterexchange submitted that consultation to date may have only captured the views of a narrow subset of stakeholders, and that the majority of irrigators are satisfied with the current operation of the water markets.\textsuperscript{207} Renmark Irrigation submitted that there are no specific barriers to engagement with the market, other than cost, and that information on water market products is readily available.\textsuperscript{208}

The Sunrice Group and the Ricegrowers’ Association of Australia (the RGA) submitted a survey of its members that provides a number of data points:


\textsuperscript{201} ibid.

\textsuperscript{202} ibid, p. 143.

\textsuperscript{203} Chapter 5, figure 5.13.

\textsuperscript{204} The broker was responsible for approximately 11% of all non-zero dollar Basin allocation trade volumes in 2018–19.


\textsuperscript{206} Cotton Australia Submission to Murray–Darling Basin water inquiry interim report, 13 November 2020, p. 3.


\textsuperscript{208} Renmark Irrigation Trust Submission to Murray–Darling Basin water inquiry interim report, 13 November 2020, p. 4.
50 of 56 respondents to the survey stated that they actively engage in the water market
17 of 53 respondents\textsuperscript{209} to the survey utilised carryover parking products
8 of 53 respondents to the survey utilised lease products
7 of 53 respondents utilised forward contracts
8 of 20 respondents said that water price was the reason that they did not engage in the water market, 1 additional respondent said that it was a combination of price and lack of knowledge of the water market.\textsuperscript{210}

A submission from the Australian Dairy Industry Council (the ADIC) referenced an October 2020 survey of dairy irrigators in the MDB commissioned by Dairy Australia. The survey received almost 100 responses from dairy irrigators across the MDB, and found, among other things:

- dairy irrigators are highly engaged in the water market, buying and selling a wide range of water products
- price was the number one barrier to irrigators using different water products, followed by cash-flow and exposure to allocation risk.\textsuperscript{211}

Citrus Australia also undertook a survey of its members, with little response. Citrus Australia submitted that the limited response is an indication that growers are not familiar with, or do not regularly utilise, the practices being questioned.\textsuperscript{212} Citrus Australia submitted that there is limited uptake of newer water market products due to a general mistrust in the system.\textsuperscript{211}

Submissions from Cotton Australia, the RGA, the ADIC and Citrus Australia indicate that engagement with the water market is not consistent across all irrigators but varies depending on the type of farm and agricultural product that an irrigator produces.

The Victorian Farmers Federation (the VFF) submitted that the biggest barrier to water trading in Victoria is farmers being priced out of the market due to increasing water prices, particularly in low allocation years. The VFF submitted that increasing water prices has strongly influenced attitudes toward the water market.\textsuperscript{214} The VFF submitted that irrigator attitudes toward the market also depend on how their trade decisions turn out. The VFF submitted that inherent risks such as water supply and price are priced into new water market products such as leases and forward contracts, making such products less attractive to many irrigators.\textsuperscript{215}

Coleambally Irrigation Co-operative Limited (CICL) submitted that, based on its observations, irrigator knowledge of the different water market products and the allocation system combined with mistrust of brokers may impact their participation in the water market.\textsuperscript{216}

The National Farmers Federation (the NFF) submitted that a lack of confidence caused by distrust in third parties is a barrier to participation in the market.\textsuperscript{217}

Select Harvests submitted that consumptive users of water are faced with barriers preventing them from engaging in the market, including but not limited to the tradability of water, deliverability, and the reliability of the entitlement class.\textsuperscript{218}

\begin{itemize}
\item Respondents to the survey had the option to skip questions, as a result, the number of respondents is different for each question.
\item Sunrice Growers and RGA submission, appendix 1 (from p. 37).
\item Citrus Australia Submission to Murray–Darling Basin water inquiry interim report, 13 November 2020, p. 4.
\item ibid. p. 3.
\item Victorian Farmers Federation, Submission to Murray–Darling Basin water inquiry interim report, 13 November 2020, p. 5
\item ibid. p. 6.
\end{itemize}
It is evident that irrigator engagement with the water market has a strong correlation to the attitudes held towards the market generally, which vary significantly between irrigators. For example, a number of irrigators hold strong views that carryover should be abolished.\textsuperscript{219} The correlation between attitude and engagement with the market would suggest that irrigators that hold negative attitudes towards carryover rules would not engage with newer water market products such as carryover parking. In contrast, some irrigators submit that the trading of carryover parking products is a critical risk management tool and allows water holders to make commercial decisions about their risk exposure.\textsuperscript{220} Others submit that changes should not be made to carryover arrangements.\textsuperscript{221} The submissions received in response to the Interim Report indicate that irrigator engagement with, and attitudes toward, water markets vary significantly across the MDB.

**Issue 2: Some irrigators appear to have adopted riskier water ownership and trading strategies that rely principally on sourcing water in allocation spot markets to manage their water supply risks**

A number of submissions raised issues of irrigators not being able to access enough water or having to pay high water prices because they do not hold enough water entitlements to meet their typical water needs and are required to source water from the allocation markets. In these cases, the irrigator typically does not appear to have taken action to mitigate water supply and price risk by using water products (such as single- or multi-year leases or forward contracts) that would allow them to ‘lock in’ future water supplies at a fixed price.

The Australian Dairy Industry Council (ADIC) submission noted that many dairy farmers sold water entitlements during the previous drought and their businesses are now not profitable due to the amount that allocation prices have risen:\textsuperscript{222}

> ‘We know during the millennium drought that dairy farmers disproportionately sold permanent entitlements, and now require 60% more water than they own, increasing business risk by requiring the purchase of this water on the market...dairy farmers are [now] ‘facing a perfect storm of low milk prices, dry conditions, and high water prices, which is threatening viability across the Basin, and putting at risk 20 percent of Australia’s milk supply.’

Jeremy Rourke highlighted the case of farmers who chose to sell entitlements to investment in infrastructure but now regret the decision as they are unable to afford water in the temporary market:\textsuperscript{223}

> ‘Without having the ability to see ‘the bigger picture’, many farmers thought that it was a good idea to trade their water asset for a more efficient and state of the art farm irrigation system and rely more heavily on a temporary water market where water could be sustainably accessed until further farming profitability would allow them to once again purchase permanent water rights. How disastrously wrong those decisions have turned out to be! Many farmers now find themselves with expensive irrigation infrastructure without the ability to utilize it due to the high price of water therefore having no way of running a viable farming business.’

Murray Valley Wine Growers noted that they have observed an increase in permanent planting in the Sunraysia region without sufficient holdings of permanent water rights to secure water supply for these

\textsuperscript{219} See, for example, Gavin Dehne Submission to Murray–Darling Basin water inquiry interim report, 13 November 2020, Robert Caldwell Submission to Murray–Darling Basin water inquiry interim report, 13 November 2020, and John Brian Submission to Murray–Darling Basin water inquiry interim report, 13 November 2020, suggest that carryover should be removed from the market.


\textsuperscript{221} NSW Irrigators Council, Submission to Murray–Darling Basin water inquiry interim report, 13 November 2020, p. 6.


Citrus Australia highlighted the issue of irrigators buying farms without permanent water rights and being exposed to supply and price risks in water allocation markets.225

While many submissions pointed to the benefits to irrigators of leases and forward contracts226, others expressed a view that many irrigators are not considering using these products, or have chosen not to because of cost.227

The evidence available to the ACCC supports the view expressed in these submissions, that there are a number of irrigators who, for various reasons, have and continue to adopt water ownership and trading strategies based principally on sourcing water needs from water allocation ‘spot’ markets to manage their water supply risks.

In particular, data available to this inquiry indicates that a higher proportion of irrigators have sold entitlements in recent years than purchased entitlements228, with a higher proportion of irrigators of some farm commodities selling water entitlements relative to others (such as dairy and horticulture).229 This has likely increased their reliance on purchasing water on temporary markets.230 At the same time as this change has been occurring, our analysis of data and anecdotal evidence above also indicates that only a relatively small proportion of irrigators across the Basin are using alternative water products such as leases or forward contracts to source their water.231 This is supported by recent research in this area.232

The University of Canberra’s report indicates that attitudes toward farm planning varied only slightly between irrigators who trade on the water market and those who don’t. The only significant difference identified was that diverse traders were significantly more likely to report having a written farm plan.233 This may indicate that those irrigators that rely more on water allocation purchases are required, due to their risker water management strategies, to develop farm plans.

**Submissions in response to the Interim Report**

Submissions in response to the Interim Report relating to the adoption of riskier water ownership and trading strategies were limited.

CICL submitted that the volume of entitlements that have left CICL’s licence since separation from government represents a 26% reduction in the volume of general security entitlements available for irrigated agriculture in their footprint. CICL submitted that this reduction is not matched by a change in the irrigation footprint. CICL submitted that the Basin Plan sustainable diversion limit is 30% less than the long-term average water use under the basin Plan cap on diversion (1993–94 levels of development), and this change is a key driver of concerns with the water market.234

Renmark Irrigation (RI) submitted that only a small number of irrigators in their area rely on the allocation market for their water needs. RI submitted that these irrigators sold their entitlements toward

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230 Appendix A.
233 J Schirmer and D Peel, Understanding participation in water trading by irrigators in the Murray–Darling Basin, Consultant report prepared for the ACCC Murray–Darling Basin Water Market inquiry, p. 64. In 2016, 54.3% irrigators that engaged in trading reported having a farm plan compared to 42.9% of all irrigators.
the end of the millennium drought when the water market was immature and allocations were cheap, assuming allocation prices would stay low. In addition, the VFF submitted that many irrigators in Northern Victoria had little choice but to sell entitlements and increase reliance on allocation markets in response to the financial hardship caused by the millennium drought.

**Issue 3: Some irrigators express a lack of confidence in various aspects of water markets and water policy**

Stakeholders at public forums and in submissions have expressed a range of positive and negative views on issues directly and indirectly related to water markets and water trading.

To gain a clearer and representative understanding of what views irrigators hold of water markets and trading, the ACCC has commissioned analysis of data collected in a number of surveys undertaken across the Basin between 1998 and 2016.

Researchers from the Centre for Global Food and Resources at the University of Adelaide asked irrigators in various areas of the Basin about their views on the benefits of water trading in 1999, in 2010 and in 2016:

- Almost three quarters of irrigators surveyed (73%) in the GMID in 1999 agreed (agreed or strongly agreed) with the statement that ‘water trading was a good idea’, while only 14% disagreed (disagree or strongly disagree). This contrasts with results in 2010, where less than half of irrigators surveyed (46%) in the Southern Basin agreed with the statement that ‘water trading had been good for farming’ while 41% disagreed. By 2016, the positive attitude to water trading declined further with only 28% of irrigators in the Southern Basin agreeing that ‘water trading had been good for farming’ while a majority (56%) disagreed with that statement.
- Irrigators in the same survey also expressed negative attitudes toward investors in water markets. A large majority of irrigators surveyed (85%) in the Southern Basin in 2016 disagreed with the idea of non-farm entities being allowed to buy water, while almost half (48%) disagreed with the idea that retired farmers should be being allowed to retain and trade water.

In the 2015 and 2016 Regional Wellbeing Surveys, researchers at the Health Research Institute at the University of Canberra, asked irrigators across the Basin to what degree they agreed or disagreed with statements related to the process of trading water, and their confidence in water markets and market rules and regulations. The results are summarized below.

More than half of the irrigators surveyed in 2015 and 2016 expressed positive views on the ease of making temporary and permanent trades, and expressed confidence on being able to access the information they needed to trade. In both cases a relatively small minority of irrigator expressed the opposite view:

- A majority of irrigators across the Basin in 2015 and 2016 (65 to 71%) agreed that trading temporary water was easy. A slightly smaller majority (57 to 63%) also agreed that trading permanent water was easy. However, a minority of irrigators (between 12 and 18%) disagreed with the idea that trading temporary or permanent water was easy.
- A majority of irrigators across the Basin in 2015 and 2016 (53 to 64%) also agreed that the information needed to trade water was easy to access. However, a minority of irrigators in both years (17 to 19%) did not agree with this view.

237 Submissions and summary notes of public forums can be found on the ACCC’s water inquiry webpage at: https://www.accc.gov.au/focus-areas/inquiries-ongoing/murray-darling-basin-water-markets-inquiry/submissions.
238 The surveys were undertaken by researchers at the Centre for Global Food and Resources at the University of Adelaide, and the Health Research Institute at the University of Canberra over a number of years. More details on the surveys, the analysis the ACCC commissioned and the results can be found in Appendix A, box A.1.
Approximately half of irrigators surveyed also expressed confidence in being able to trade water as a tool to manage their farms. However, on this question a significant minority of irrigators did not express confidence in their abilities to trade water. Around half of irrigators in 2015 and 2016 (48 to 53%) agreed that they felt confident in trading water as part of their farm management, while a quarter or more of irrigators (25 to 28%) did not agree that they felt confident in using water trading.

However, when researchers asked about attitudes to water markets and water market rules, less than a third of irrigators across the Basin in 2015 and 2016 expressed confidence in the fairness of water markets or in water market rules, while up to half of irrigators expressed a lack of confidence:

- Only 23% and 32% of irrigators in 2015 and 2016 respectively, agreed that the water market was fair for all users, while 48% and 37% of irrigators in 2015 and 2016 respectively, did not.
- 16% and 26% of irrigators in 2015 and 2016 respectively, agreed that market rules were stable, while 49% and 43% of irrigators in 2015 and 2016 respectively, did not.
- 22% of irrigators in 2015 agreed that recent changes to rules had increased their confidence in water markets, while 48% in 2015 did not.

Researchers also asked irrigators about their attitudes to the security of their permanent water rights. While a majority of irrigators expressed confidence in the security of their permanent water access rights, between a quarter and a third or irrigators did not. 54% and 60% of irrigators in 2015 and 2016 respectively, agreed that their rights to access water were secure, while 33% and 24% of irrigators in 2015 and 2016 respectively, did not.

Moreover, when researchers asked irrigators whether they agreed that all entitlements were subject to the same rules, a quarter or less irrigators agreed that entitlements held by the government were subject to the same rules and charges as other participants’ entitlements. Only 17% and 26% of irrigators in 2015 and 2016 respectively, agreed that entitlements held by the government were subject to the same rules and charges as other participants’ entitlements, while 44% and 41% of irrigators in 2015 and 2016 respectively, did not agree that government and non-government held entitlements received equal treatment.

The University of Canberra’s report concluded that their findings suggest that:

‘rapid change to rules and regulations governing trade can reduce perceptions of fairness of the market: stability of market rules is important to building confidence in the market. Also important is addressing concerns about whether the market involves a ‘level playing field’ between irrigators and other water market participants, and ensuring that irrigators can trade easily. With multiple irrigators highlighting that challenges to trade include issues such as high transaction costs, and rapid fluctuation in prices, as well as delays in processing of trades for some, investing in improving ability to trade easily and rapidly is likely to be an important part of building confidence in the water market.’

Submissions in response to the Interim Report

Submissions in response to the Interim Report cited various factors that have contributed to the lack of confidence in the market.

The VFF submitted that a lack of confidence in the fairness of water markets may be driven by increased prices, and concerns that net trades out of districts has damaged those local communities. The VFF submitted that irrigators consider it unfair that they must compete against the Commonwealth on the market following changes to water trading rules to accommodation Commonwealth water purchases. In addition, the VFF submitted that automation of the Victorian Water Register has improved confidence in the market.

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241 This question was not asked in 2016.
Citrus Australia submitted that most of the distrust that has built up in the market is due to not knowing the depth of the market, the value and volume of trades, so as to make informed business choices.\textsuperscript{244}

The New South Wales Irrigators Council (the NSWIC) submitted that information accessibility and confidence in reported spot market prices is a core issue.\textsuperscript{245}

The Murray Darling Association (the MDA) submitted that improvements must be made to trade information to enhance access to and the quality of core market data if confidence in the market is to be restored.\textsuperscript{246} The MDA submitted that the number and diversity of agencies tasked with delivering the objectives of the Basin Plan has resulted in an overly complex and unwieldy sector, undermining confidence in reporting and data.\textsuperscript{247} The MDA suggested that combining state databases into a single database that is easy to use, adheres to relevant standards and ensures privacy and security of data will drive confidence in the market.\textsuperscript{248}

CICL submitted that its members actively sell or buy annual allocation based on commercial returns and are confident participants in the annual allocation water market.\textsuperscript{249}

The NIC submitted that clearer, simpler, more timely and more transparent market information is required to build confidence in the market.\textsuperscript{250} The NIC also agree that water metering compliance is a key factor in market confidence as in building community trust around water users.\textsuperscript{251} In addition, the NIC agreed with the ACCC’s analysis that transparent communication of allocation decisions to stakeholders is critical in maintaining market confidence.\textsuperscript{252} Murray Irrigation also submitted that compliant and accurate metering systems and the streamlined data from these systems will be important to ensure that users are confident of the integrity of the water market.\textsuperscript{253}

The NFF submitted that lack of regulation had undermined trust and confidence in the market.\textsuperscript{254} In addition, the NFF submitted that the information asymmetry between water brokers and market participants forces participants to rely on brokers, facilitating broader scepticism about the integrity of the market.\textsuperscript{255} The NFF submitted that an independent regulator would provide visibility and allow participants to have greater confidence in the water market, however, recognises that this would be the most expensive option. Both a cost-benefit analysis and the ACCC’s investigation will inform an appropriate solution in this regard.\textsuperscript{256}

Boundary Bend (BB) submitted that improvements in market transparency are necessary, however they need to be combined with structural changes ensuring allocation water can only be purchased by consumptive users. BB submit that this will dramatically improve the trust and confidence that irrigators have in their business and the market.\textsuperscript{257}

GoFARM submitted that improved clarity and predictability around of allocation announcements through open and transparent processes would significantly enhance market confidence, particularly in New South Wales.\textsuperscript{258} In addition, GoFARM suggests that ongoing regulatory uncertainty about how groundwater over extraction will be addressed, particularly in the Lachlan and Murrumbidgee valleys, undermines the confidence of irrigators to make long-term investment decisions.\textsuperscript{259}

\textsuperscript{244} Citrus Australia Submission to Murray–Darling Basin water inquiry interim report, 13 November 2020, p. 5.
\textsuperscript{245} NSW Irrigators Council, Submission to Murray–Darling Basin water inquiry interim report, 13 November 2020, p. 23.
\textsuperscript{247} ibid., p. 6.
\textsuperscript{248} ibid., p. 8.
\textsuperscript{249} Coleambally Irrigation Co-operative Limited Submission to Murray–Darling Basin water inquiry interim report, 13 November 2020, p. 5.
\textsuperscript{251} ibid., p. 30.
\textsuperscript{254} National Farmers Federation, Submission to Murray–Darling Basin water inquiry interim report, 13 November 2020, p. 7.
\textsuperscript{255} ibid., p. 12.
\textsuperscript{256} ibid., p. 13.
\textsuperscript{257} Boundary Bend, Submission to Murray–Darling Basin water inquiry interim report, 13 November 2020, p. 7.
\textsuperscript{258} GoFARM, Submission to Murray–Darling Basin water inquiry interim report, 13 November 2020, p. 3.
\textsuperscript{259} ibid., p. 4.
Murray Valley Private Diveters (MVPD) submit that transparency is essential to ensure public confidence in the market.

The Murrumbidgee Valley Food and Fibre Association (the MVFFA) submit that overlapping governance arrangements resulting in regulatory fragmentation lead to market participants believing that key institutions are not fair or working to the benefit of all water users, and that these attitudes further impede informed and confident trading.\textsuperscript{260}

Renmark Irrigation submitted that large investors entering the market and driving up prices, as well as investors access to better quality market information, has reduced market confidence since 2015.\textsuperscript{261}

\subsection*{4.5.2 First Nation and Traditional Owner groups}

Traditional Owner organisations have submitted to the ACCC that, as a participant group, they own few water rights in the Basin, are largely absent from water markets, and face historic and contemporary barriers to owning and accessing water through water markets:

‘Australia’s colonial history and the exclusion of Aboriginal peoples from holding land when water entitlements were distributed prior to the capping of water extraction and the separation of land and water means that Aboriginal peoples are largely excluded from holding water today (McAvoy 2006). Indeed, Traditional Owner-specific water rights are reported to be less than 0.01% of water use rights in Australia (Jackson and Langton, 2012). Given the unaddressed injustices of the dispossession and associated ongoing legacies raised here, many Traditional Owners – and supporters – object to the notion that Aboriginal peoples should have to buy back these rights. Adding to this, historical and structural inequities mean Aboriginal peoples are often without access to financial resources to buy water in this way.’ \textsuperscript{262}

Traditional Owner organisations have expressed an aspiration to increase their access to water to allow them to generate cultural, environmental and economic benefits for their communities and organisations:

‘There is an urgent need to re-allocate water to Traditional Owners. This historic (and ongoing) lack of access to water rights not only deprives Traditional Owners of the means by which to care for Country and support economic development, but it also precludes them from participating in the water market itself (O’Donnell and Garrick, 2019; McAvoy 2006).’ \textsuperscript{263}

Traditional Owner organisations have noted that while treating water as a property right\textsuperscript{264} which can be traded is at odds with many Traditional Owner beliefs, water markets are seen by some participants as a pathway to increasing access to water.

‘For many First Nations peoples, the separation of water from land, the formulation of water ‘products’ as commodities that can be held and traded for private profit and the disembodiment of water from its sacred and spiritual contexts are fundamentally at odds with deeply enshrined water values and custodial responsibilities.’ \textsuperscript{265}

\begin{footnotesize}
\begin{itemize}
\item \textsuperscript{260} Murray Valley Food and Fibre Association, Submission to Murray-Darling Basin water inquiry interim report, 13 November 2020, p. 2.
\item \textsuperscript{261} Renmark Irrigation Trust, Submission to Murray-Darling Basin water inquiry interim report, 13 November 2020, p. 4.
\item \textsuperscript{262} Murray Lower Darling Rivers Aboriginal Nations, Submission to Murray-Darling Basin water inquiry issues paper, February 2020.
\item \textsuperscript{263} ibid.
\item \textsuperscript{264} Note that the ACCC refers to property rights throughout this report with reference to their definition in economic theory, which is that a property right implies ‘the powers to consume, obtain income from, and alienate ... assets’. Economic theory commonly notes characteristics of property rights as excludable, enforceable and transferrable and can include ‘incomplete’ property rights. Barzel Y, 1997, \textit{Economic analysis of property rights 2nd edition}, Cambridge University Press, p. 64.
\item \textsuperscript{265} Murray Lower Darling Rivers Aboriginal Nations, Submission to Murray-Darling Basin water inquiry issues paper, February 2020.
\end{itemize}
\end{footnotesize}
These stakeholders consider that, under current governance arrangements, the most viable, immediate pathway for Traditional Owners in the Basin to access water is via entering the water market. Commonwealth and state governments have responded to such concerns in recent years by taking several actions to increase Aboriginal peoples and Traditional Owner groups’ access to water in the Basin (box 4.2).

### Box 4.2: Recent government initiatives to increase Aboriginal peoples and Traditional Owner groups’ access to water

Commonwealth and state governments have initiatives to improve Aboriginal peoples’ access to water in the Basin include:

- State and Commonwealth government and non-government environmental water holders have entered into partnerships with Aboriginal peoples in areas across the Basin to use environmental water in ways that support both environmental objectives and generate cultural flows.267
- First Nations in the Basin have entered into partnership agreements with the MDBA to jointly undertake water research, planning and management in the Basin, and to develop a framework for planning, delivering, and assessing cultural water flows.268
- The Australian Government has committed $40 million in funding to establish a water investment program that supports Aboriginal communities to plan for and acquire cultural and economic water entitlements.269
- The Victorian Government, through the Aboriginal Water Program, has committed to increasing Aboriginal participation in water resource management by supporting the use of water to meet cultural values, and identifying how to transfer water rights to Aboriginal groups to support economic development.270

As part of the first stage of the Victorian Government’s Aboriginal Water Program, the University of Melbourne published a discussion paper which outlines Aboriginal peoples’ aspirations on water access and use in the Basin, and the options and barriers to expanding access to water.271 The paper emphasised a range of financial barriers to Traditional Owner groups buying and holding permanent water rights and accessing water allocations to those rights, including funding to acquire water, to pay ongoing fees and charges and for building and maintaining infrastructure to deliver water.272

The Murray Lower Darling Rivers Indigenous Nations (MLDRIN) noted in their submission to the ACCC that while there has been some recent policy and funding commitments by Commonwealth and state governments, these have not yet resulted in any reallocation of water to Aboriginal peoples in the Basin.273 Further, MLDRIN urged the ACCC to consider water market outcomes as part of the inquiry, including the historic exclusion of Aboriginal peoples from basin water markets.274 They submitted that changes to water markets to increase Aboriginal peoples’ participation should include:

- ‘lowering barriers to entry for Aboriginal participants, such as time-limited exemptions to [water] fees and charges, purchasing and reallocating of water entitlements, and other barriers

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266 ibid.
269 ibid.
271 Water Access for Aboriginal Economic Development Stage 1: Discussion Paper, 2019. The discussion paper is part of the first stage of work in Program 1, but intersects significantly with Program 2 (the individual business concepts developed by Traditional Owners) and Program 3 (which includes much of the evaluation and oversight components of the work). This paper has been prepared by Erin O’Donnell at Melbourne Law School. I gratefully acknowledge the feedback from Murray and Lower Darling Rivers Indigenous Nations (MLDRIN) and the Federation of Victorian Traditional Owner Corporations (FVTOC).
274 ibid.
ensuring any adjustment to water market operations needs to strengthen the capacity for water markets to enable re-allocation of water to Aboriginal people in future.

taking into account findings from significant state-level projects which are currently underway, including the Water Access for Economic Development project in Victoria.\textsuperscript{275}

The ACCC’s analysis of ownership of permanent water rights in the Victorian and South Australian Basin indicates that Traditional Owner groups own a very small proportion of the permanent water rights on issue in the Basin (see figures 4.1 to 4.3 above). Similarly, analysis of allocation trade data in the Southern Connected Basin over the 2012–13 and 2018–19 period indicate that Traditional Owner groups very rarely purchase allocations, but do consistently make a very small number of allocation sales each year (see figures 4.4 to 4.7 above).

\subsection*{4.5.3 An education program is needed for water market participants}

The ACCC anticipates that recommendations presented in Parts III to VI of this report will help address irrigator concerns about water markets identified in this Chapter, and deliver markets that they can participate in more effectively.

In addition to improving the way markets function, the ACCC also considers a water market education program would assist in improving understanding of, and confidence in, water markets, leading to greater engagement by irrigators and other water users. Education and information accessibility and transparency will assist in addressing the key barriers to market participation examined in this Chapter. For example, education on what water market products are available and how they meet irrigators’ needs will assist in facilitating access to newer water market products and lead to improved water risk management strategies. In addition, more effective education and communication of water market products and allocation announcements will assist in increasing confidence in water markets.

The New South Wales Irrigators Council (the NSWIC) submitted that the largest impediment to market participation is access to information.\textsuperscript{276} The VFF submitted that more information on newer water products, such as leases, forwards and carryover parking, is required to ensure improved transparency and understanding.\textsuperscript{277} The National Irrigators Council (the NIC), in its submission, agreed with the Interim Inspector-General’s recommendation of increased education for people entering farming, and suggested that it be combined with removing barriers (real and perceived) and costs to improve market participation.\textsuperscript{278} GoFARM submitted that education and training has an important role in ensuring all market participants understand factors influencing water markets and how to access information that will assist them to make informed trading decisions.\textsuperscript{279} The MDA welcomed the development of more communication and educational content to support higher levels of water literacy and increased understanding and awareness of the role and operation of the water market.\textsuperscript{280}

In April 2020, the Interim Inspector General of Water Compliance (the IIG) released a report on the impact of lower inflows on state shares under the Murray–Darling Basin Agreement. As part of this report, the IIG recommended that:

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

\begin{itemize}
\item \textsuperscript{275} ibid.
\item \textsuperscript{276} NSW Irrigators Council, Submission to Murray–Darling Basin water inquiry interim report, 13 November 2020, p. 16.
\item \textsuperscript{277} Victorian Farmers Federation, Submission to Murray–Darling Basin water inquiry interim report, 13 November 2020, p. 4.
\item \textsuperscript{278} National Irrigators Council, Submission to Murray–Darling Basin water inquiry interim report, 13 November 2020, p. 9.
\item \textsuperscript{279} GoFARM, Submission to Murray–Darling Basin water inquiry interim report, 13 November 2020, p. 2.
\item \textsuperscript{280} Murray–Darling Association, Submission to Murray–Darling Basin water inquiry interim report, 13 November 2020, p. 12.
\end{itemize}
The ACCC endorses the IIG’s recommendation of increased education in high school and higher education curriculums in regional areas, but considers a more targeted Water Market Education Program is needed specifically for current and prospective water market participants. Information accessibility and transparency is addressed further in Part IV of this report, however data collected and submissions received over the course of the inquiry indicate that there may be gaps in education of market participants that need to be addressed. In combination with increased information accessibility transparency, market participants will be able to more effectively engage with water markets. Discussion of the ACCC’s recommendations in this space are presented in chapter 12, which presents the ACCC’s recommendation package to improve water market information and transparency more generally.