3 The development of water markets

Key points

- In recent times, the market for water in the Murray-Darling Basin has developed to the point where large volumes of water are being traded. However, at a regional level, markets vary substantially and in some parts remain relatively underdeveloped.
  - Water trade is relatively more developed in the regulated systems of the southern-connected Basin, than the more hydrologically isolated systems of the north, that have relatively fewer storages.
- Water is traded primarily though buying and selling seasonal allocations and, to a lesser extent, entitlements. So far, the water market has not developed extensive use of options, leases or other derivatives.
- Water trade delivers benefits though the efficient reallocation of water among competing consumptive uses.
- Market intermediaries, including brokers and several exchanges, have emerged as the market has grown. These have helped facilitate a rise in trade volumes, and a fall in the transaction costs of trading.
- The price of seasonal allocations is influenced by the on-farm production decisions of irrigators to buy or sell an additional unit of water.
- The price of an entitlement is based on the expected value of the future seasonal allocations of water to be delivered against the entitlement.
- The fees and charges for water delivery have a strong effect on irrigators' decisions to buy or sell, and as such, influence the market price of both seasonal allocations and entitlements.

The state of water markets in the Murray-Darling Basin (the Basin) is an important consideration when reviewing the current buyback arrangements under Restoring the Balance (RTB). The Commission's terms of reference require it to consider 'the implications of a developing water market and limited price information' for government purchasing, and how the Government, as the dominant buyer, may impact upon the water market. The Commission is also asked to consider the 'potential to use existing or developing water exchanges, auction houses or on-line water trading platforms'.

This chapter provides background on the development of water markets that will be used in later chapters for assessing the efficiency and effectiveness of different market mechanisms, and for identifying impediments to recovering water.

3.1 History of water markets in the Basin

The irrigation schemes of the early twentieth century aimed to intensify agriculture and increase population in the dry hinterland of the Basin. Raising the productive capacity and population of these regions was generally supported under the banner of 'nation building' (Crase 2009). With growing capacity and little water scarcity, there was no great impetus for the creation of water markets and the institutional and legal arrangements that arose in this period were not well suited to their development. For example, water licences were attached to land title, and each jurisdiction developed different arrangements for water licensing.

From the early 1980s, water scarcity led to increasing recognition of the potential benefits of trade. Trade volumes grew steadily over time, but particularly after the 1994 Council of Australian Governments (COAG) water reforms. These reforms required, among other things:

- implementation of a comprehensive system of water entitlements and seasonal allocations, backed by the separation of water rights from land (a necessary condition for trade), with clear specification in terms of ownership, volume, reliability, transferability and, if appropriate, quality
- cross-border trade to be facilitated and trading arrangements to be consistent
- delivery pricing reform based on user pays and the principle of full cost recovery.

COAG incorporated the water reform framework into the 1995 National Competition Policy. However, it was largely left to individual jurisdictions to decide how to implement these reforms, and progress was variable.

The introduction of the Basin Cap (chapter 2) in 1995 also encouraged the growth of trade. The Cap had the effect of requiring irrigators to meet requirements for additional water through the market rather than administratively. While the Cap stimulated trade, it also resulted in the activation of previously unused or rarely used water entitlements, known as 'sleeper' or 'dozer' rights. These rights were traded and used, allowing diversions to increase in the short run and reducing the security of other users' water entitlements, by reducing subsequent seasonal allocations.

Interstate trade was made possible in 1998 when the Murray-Darling Basin Ministerial Council established a Pilot Interstate Water Trading Program.

The institutional and legal settings of the current water market

Under the National Water Initiative (NWI), Basin states agreed to facilitate the broadening and deepening of the water market by:

- removing barriers to trade in water and minimising transaction costs
- implementing nationally-compatible characteristics for secure water entitlements
- introducing water accounting to meet the information needs of different water systems including for planning, monitoring, trading, environmental management and on-farm management.

Many of the specific reforms are legislatively enshrined in the *Water Act 2007* (Cwlth). Schedule 3 (Clause 3), sets out the Basin water market and trading objectives, which are:

(a) to facilitate the operation of efficient water markets and the opportunities for trading, within and between Basin States, where water resources are physically shared or hydrologic connections and water supply considerations will permit water trading; and

(b) to minimise transaction cost on water trades, including through provision of good information flows in the market, and compatible entitlement, registry, regulatory and other arrangements across jurisdictions; and

(c) to enable the appropriate mix of water products to develop based on water access entitlements which can be traded either in whole or in part, and either temporarily or permanently, or through lease arrangements or other trading options that may evolve over time; and

(d) to recognise and protect the needs of the environment; and

(e) to provide appropriate protection of third-party interests.

The ACCC was assigned new functions under the Act. These include: advising the Minister for Climate Change and Water on water charging rules and water market rules; monitoring compliance with and enforcing these rules; and advising the Murray-Darling Basin Authority on water trading rules as part of the Authority's development of the Basin Plan (box 3.1).

Box 3.1 Water market, water charge and water trading rules

Water market rules

The water market rules developed by the ACCC commenced on 23 June 2009 and came into full effect on 1 January 2010. These rules allow irrigators to 'transform' water entitlements held against irrigation infrastructure operators into separately held statutory water entitlements. The water market rules ensure that irrigation operators, who hold irrigation rights collectively for a particular region (this arrangement is typical in New South Wales and South Australia), do not prevent or unreasonably delay irrigators from transforming their licence into a statutory water entitlement. Once a licence is transformed into a statutory water entitlement, it can be traded.

Water charge (termination fees) rules

The termination fee rules took effect from 23 June 2009. These rules require termination fees to more accurately reflect costs, encourage efficient service delivery and promote water trade. Unless otherwise approved by the ACCC, the maximum termination fee that can be imposed upon irrigators is 10 times the annual access fee.

Water charge (infrastructure charges) rules

The ACCC's final advice on water infrastructure charge rules was provided on 26 June 2009. It recommended that large infrastructure operators that are not owned by members, be required to seek regulatory approval for their charges. It also recommended that member-owned and smaller operators be subject to regulations that address issues such as transparency and discriminatory pricing.

Water charge (planning and management information) rules

The final advice on water charge planning and management information rules was provided on 10 July 2009. It recommended state government departments and agencies publish details of water planning and management charges. It also proposed the establishment of a voluntary reporting framework to report more broadly on water planning and water management activities, costs and charges.

Water trading rules

The ACCC provided draft advice to the Murray-Darling Basin Authority in December 2009, and will provide final advice in March 2010. The rules will guide the Authority in setting trading rules in its Basin Plan. The rules will seek to remove inappropriate barriers to trade, while providing appropriate protection for third-party interests.

The Act also gives the Bureau of Meteorology (BOM) the task of collecting and publishing water information, with the goal of increased transparency, confidence and understanding of water information. The publications will include a National Water Account, which will report on the type, volume and location of entitlement, the details of trades and of allocation announcements, and information about

on-farm storage, unregulated and groundwater licenses. Additionally, the BOM is developing the Australian Water Resource Information System, which will provide periodic reports on water resource use and availability, as well as real-time water reporting services and water availability forecasts. The BOM will also set and implement national standards for water information.

3.2 The benefits and costs of water trade

Markets promote the efficient allocation of water between irrigators, and between irrigators and other consumptive uses. However, market failures can mean that water for environmental service provision will be undersupplied by private agents (chapter 4). Those that value the water least have an incentive to sell to those that value it the most. Access to the market can help individual irrigators adapt to changing circumstances. This can lessen the impact of seasonal fluctuations in water availability, aid in adapting to climate change, or facilitate entry to, and exit from, irrigation industries.

There may, however, be some costs associated with trade (other than transaction costs). Trade in water alters the spatial characteristics of water use, storage and delivery, which can result in negative externalities such as:

- congestion (in delivery capacity), which can result in delays in delivery for other users or environmental damage due to altered flow regimes
- deterioration in the quality of water, such as increases in salinity or nutrient levels, due to altered flow regimes or return flow patterns
- changes in the condition of neighbouring land, such as water logging or salinity, due to changes in water application patterns.

Externalities can also be positive, for example, where trade between two parties ameliorates existing problems with congestion, water quality or salinity.

The magnitude of these externalities is difficult to estimate, however, and limited work has been done on quantifying these effects. Heaney et al. (2005) found the external effects to be small and localised, and concluded that they are likely to be resolvable through property rights solutions. This would enable trade to deliver the expected benefits.

The substantial net benefits from trade for irrigators, particularly in times of drought, have been demonstrated in modelling exercises by Peterson et al. (2004). This model estimated that 'moving from no trade to intra- and interregional trade together more than halves the impact of the reductions in water [by mitigating the

losses in the activities most reliant on water for production] on the gross regional product (GRP) of the southern [Murray-Darling Basin]' (Peterson et al. 2004, p. x). Similarly, the work of Mallawaarachchi and Foster (2009, p. 30) found that:

> The water trading system in the Basin enabled many irrigators to survive consecutive years of drought with varying levels of impact. The benefits of water trade into South Australia estimated in this study indicate South Australian irrigators gained around $31 million in 2007-08. In the absence of trade these irrigators, who are mainly horticulture farmers, would have been severely impacted.

Qualitative analysis by Frontier Economics (2007) on various case study regions, also found evidence that the theoretical gains from trade are confirmed by the experience of those that engage in trades. In particular:

- Without temporary trade the dairy industry would have fared much worse than it did during the past 10 years of drought.
- Even with temporary trading many dairy enterprises collapsed as a result of the extraordinarily low seasonal allocations of 2002-03 and 2006-07. Permanent trading meant that those farmers left farming with more money than they otherwise would have had.
- Without temporary trading many existing horticultural enterprises in the Goulburn system would not have survived the extraordinarily low seasonal allocations.
- Many mixed farms survived the low seasonal allocations by selling water on the temporary market, thus making more money than they would have done by growing crops. (Frontier Economics 2007, p. xiii)

3.3 Trade in entitlements and allocations

At present, water is traded mostly through buying and selling water entitlements (sometimes called permanent trade), and seasonal allocations (sometimes called temporary trade). So far, the water market has not developed extensive use of options, leases or other derivatives (chapter 7).

The system of entitlements and allocations

One of the key commitments under the NWI is to implement nationally compatible characteristics for water entitlements (referred to as water access entitlements). The consistent definition of entitlements across jurisdictions is desirable as it decreases transaction costs (for example, search costs) and broadens the water market, thereby facilitating a more efficient allocation of water across a larger group of users. Even where trade is not feasible, compatibility facilitates financial and risk comparisons and thus capital flows and optimal patterns of investment. Compatibility is also

useful if a Basin-wide approach to water management, data collection, reporting and policymaking, is sought. Although progress has been made, the National Water Commission's (NWC) latest biennial report on the progress of implementing the NWI, notes that the commitment to implement nationally compatible characteristics for water entitlements is not complete (box 3.2).

Box 3.2 **Progress in implementing a consistent system of entitlements**

The National Water Commission's (NWC) biennial report on the progress of implementing the National Water Initiative (NWI), found that while all Basin states had made significant progress in incorporating consistent water entitlement frameworks into legislation and policy, all states still have entitlements that remain embedded in pre-existing legislation, and do not meet many of the characteristics outlined in the NWI. For example, some entitlements are not unbundled from land and hence are not separately tradeable.

Most of the reforms to introduce NWI-consistent water entitlements have been implemented in the larger (by volume) regulated surface water systems. Although this covers a large proportion of water use, there are many regions where entitlements are yet to be converted. For example, research undertaken on behalf of the NWC found that while the majority of water use (by volume) in New South Wales is covered by water entitlements, 87 per cent of total water licences (by number) have not been converted. The main reason given for this slow progress is that the legislative conversion of water entitlements is strongly linked to the rollout of water plans, which have been slow to be implemented.

Source: NWC (2009b).

The definition of a water entitlement under section 4 of the *Water Act* 2007 (Cwlth) is 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'. Under the same Act, a water allocation is defined as 'the specific volume of water allocated to water access entitlements in a given water accounting period'. Water entitlements differ according to the jurisdiction concerned and whether the water supply is regulated (backed by storage) or unregulated (based on river flows).

In regulated systems, entitlements are associated with one or more water storage facilities, and within operational constraints, irrigators can determine when water is released and the nature of its use. Seasonal allocations in these systems are made available through regular allocation announcements from the relevant authority. The volume of the allocation depends on:

- current and expected water availability
- storage level

- the amount of entitlements issued (and their reliability)
- other water commitments and management decisions.

The rules for determining an allocation are often contained in the relevant water plan.

Entitlements in regulated systems are distinguished by the degree of reliability attached to them. However, the degree of reliability attached to similarly-named entitlements can vary across catchments. Generally speaking, high reliability entitlements had, in the past, been expected to yield 100 per cent of their nominal volume in seasonal allocations 90 per cent of the time or more. Further, they receive seasonal allocations before any water is delivered against lower reliability entitlements. There are differences in the terminology used across states, as well as the types of entitlement reliability (table 3.1). At the Basin level, the majority of water entitlements (and the greatest quantity of entitlements by megalitre (ML)) are general or low reliability entitlements.

Table 3.1 **Terminology and reliability types of entitlements**
Regulated systems of the Murray-Darling Basin

Jurisdiction	*Name of water entitlement*	*Name of water allocation*	*Reliability types*
New South Wales	Water access licence	Water allocation	High security, general security and supplementary
Victoria	Water share	Water allocation	High reliability and low reliability
Queensland	Water allocation	Seasonal water assignment	High security, medium security and low security
South Australia	Water access entitlement	Water allocation	High security

Source: NWC (2009b).

In contrast to regulated systems, entitlements not backed by storages yield water based solely on intra-seasonal conditions. Water can only be accessed once pre-determined flow conditions are met. The ability to take water from an unregulated source is generally subject to a number of restrictions on extraction. Examples include:

- restrictions on the timing of extractions, whereby the entitlement allows water to be taken in a specific season or time period. For example, winterfill licences, which allow diversions from May to November
- minimum passing flow (or cease to pump) rules, where users are prohibited from extracting when the river falls below a certain level

- maximum allowable daily extraction rate
- maximum extraction volume.

The trading process

Unlike many commodity markets, the water market requires that trade be approved before the transaction can proceed. This process requires intermediary parties such as regulators, registries and conveyancers. Each Basin state administers its own trading rules and administrative processes for the trade of water within their state (box 3.3). However, a trade generally requires two parties (or an intermediary acting on their behalf) to apply to the relevant approval authorities, whereupon a decision is made on whether the trade can occur based on the relevant trading rules.

Interstate trade requires the approval of the relevant authorities in each state. After the trade is approved by each jurisdiction, the parties are notified. Trade in seasonal allocations is able to take effect once the purchaser's account is credited. Trade in entitlements is mainly facilitated through tagged trading arrangements. Tagged trading means that the entitlement is 'tagged' to its source and receives seasonal allocations based upon the water available and the conditions at that source. The source of the entitlement is unchanged by subsequent trades.

Trades in seasonal allocations are simpler to process and require fewer approvals than the trades of entitlements. A change in ownership of an entitlement requires the additional administrative process of settlement, whereby each party and any financial institutions involved will check the title (often done by an appointed solicitor) of the asset before exchange. Where there is a mortgage or other encumbrance on the title, this would need to be discharged, and correspondingly where the purchaser is entering into a mortgage, this would need to be registered on the title. Furthermore, once any trade in entitlement is approved, the transaction would need to be recorded on the relevant state registry.

Extent of water trade

The volumes of trade in entitlements and seasonal allocations suggest an active market for water in the Basin (figure 3.1). Basin-wide trade figures for 2008-09 are not available (the Murray Darling Basin Authority will release its Water Audit Monitoring report for 2008-09 mid-year). However, the NWC reports trade figures (including groundwater and intra-system trades in NSW) for the southern connected Basin, and reports 1080 gigalitres (GL) of trade in entitlements of varying reliability and 1739 GL of allocation trade in 2008-09. While DEWHA projected 772 GL of

purchases for 2008-09, a total of only 64 GL of the entitlement trade in that year can be attributed to the RTB (and 24 GL of those purchases were transactions that carried over from 2007-08). This represents 3.9 per cent of the total entitlement trade in the Basin (NWC 2009b).

Of Australia's 32 051 trades in seasonal allocations and entitlements in 2008-09, trade in the southern connected Basin accounted for 60 per cent of entitlement trade and 81 per cent of seasonal allocation trade (by volume in GL) (NWC 2009b). The gross value of nationwide trade in 2008-09 was $2.2 billion in entitlements and $606 million in seasonal allocations (NWC 2008).

Although current market arrangements have permitted significant water trading activity, a number of constraints result in thin, underdeveloped markets in some regions. Chapter 10 discusses some of the administrative and institutional constraints that persist, despite continuing reform. In addition, constraints may be due to hydrology or lack of infrastructure.

Box 3.3 **Basin state approval processes**

New South Wales

All trades in seasonal allocations are processed by State Water. Trade in entitlements within a water source does not require regulatory approval. Transactions involving a change in location need to be approved by the Department of Water and Energy.

Victoria

Trade in seasonal allocations within the service boundary of an authorised Victorian water authority does not require regulator approval. Trade in allocations between regions governed by different authorities, and any trade in entitlements, must be approved by the relevant authorised Victorian water authorities. The authorities notify each other once the trade is approved, and then notify the parties involved.

Queensland

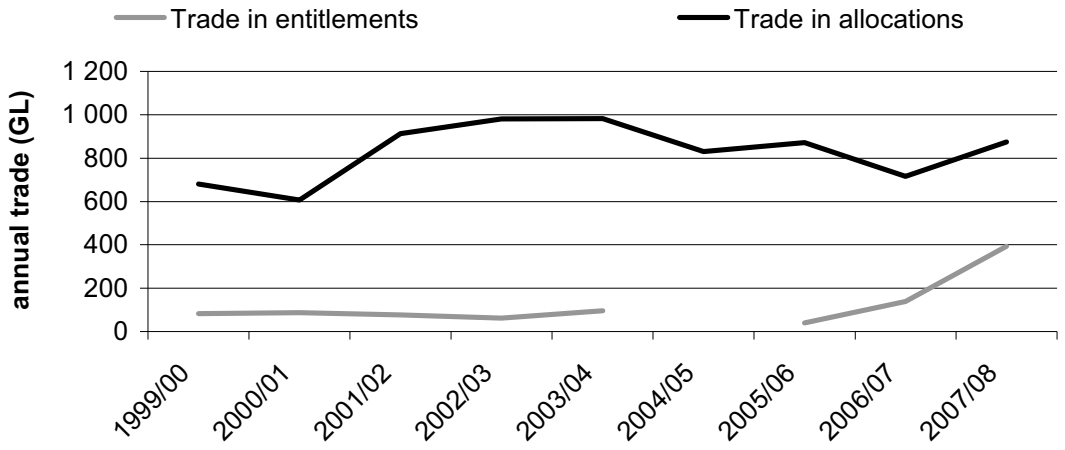
All trade in seasonal allocations are processed by SunWater. Trade in entitlements for regulated sources must be approved by the Department of Environment and Resource Management (DERM). In unregulated systems, if an entitlement is to be transferred, DERM must be notified, upon which a certificate acknowledging the proposed trade will be issued.

South Australia

All trade in seasonal allocations and entitlements must be approved by the Department of Water, Land and Biodiversity Conservation.

Source: ACCC (2009c).

Figure 3.1 **Basin-wide trade in entitlements and allocations**[a, b, c]



[a] No figures available for trade in entitlements in year 2004-05. [b] Does not include ground water trade or intra-system trades in NSW. [c] Entitlement trade does not include the 24 GL purchased under RTB, since these trades were not finalised until 2008-09.

Sources: MDBC (2001–2005; 2006b; 2007c; 2008d); MDBA (2009n).

Connectivity and trade

The ability to trade is limited by the hydrological connectivity between the buyer and the seller. For a trade to occur consideration must be given to:

- the ability to deliver water from the storage or to adjust water accounts to facilitate trade (for example, back trade)
- the level of conveyance losses
- the existing capacity and delivery constraints.

The ability to deliver water from one system to another is generally set out in water trading rules, through the use of trading zones. Water trading zones are often used to clarify the trading rules and to simplify the administration of trades. Each water resource plan area may have a number of water trading zones, some of which may be on the same river. The regulated southern-connected system — including the Murray, Victorian regulated tributaries and the Murrumbidgee River — is operated as one connected system. It is assumed that all trading zones within this system are hydrologically connected (ACCC 2009c). By comparison, the northern Basin is dominated by unregulated systems, or regulated rivers controlled by a single storage, so trading zones in these regions are often discrete (SKM 2009a).

Large conveyance losses can hamper delivery from one site to another and preclude trade. In the southern-connected system, a minimum flow is maintained to meet

critical human needs throughout the Basin, including supplying South Australia. Most losses are associated with these requirements, and additional flows tend to incur only small losses. The system is operated using a number of storages, and as such, it is difficult to determine the path of the water from a particular storage to an extraction point. When a trade occurs within the system, no change is made in delivery to reflect conveyance losses. In contrast, the intermittent flows of the northern Basin make accounting for conveyance losses more important, if somewhat problematic.

The ability to facilitate a trade may also be limited by capacity constraints that limit the volume of water that can move between two zones. Capacity constraints result from either physical or environmental restrictions on the volume of flow that can pass a certain point in a river, channel or pipe. These constraints are usually dealt with through trading rules, by creating separate trading zones upstream and downstream of the constraint, and limiting trade between the zones. The most significant river channel constraint in the Basin is the Barmah Choke, where limits on flow from the Upper Murray to the Lower Murray are in place to prevent unseasonal flooding of the Barmah Forest. The capacity of the Barmah Choke is 8500 ML/day at Barmah (MDBC 2008b).

Trade in the regulated systems of the Basin

A well-functioning market with multiple transactions and participants is aided by the presence of large volumes of water, backed by infrastructure to store and deliver that water. Indeed, the majority of tradeable entitlements are on issue in the regulated systems of the Basin (table 3.2), where the majority of trade (in both entitlements and seasonal allocations) occurs (NWC 2008).

Interstate trade in both entitlements and seasonal allocations is more administratively complex and is currently conducted according to agreements between Basin states. The Murray-Darling Basin Agreement establishes the rules for trade in the southern-connected systems of New South Wales, Victoria, South Australia and the ACT. Trade between Queensland and New South Wales operates on a very limited basis at present, although scope for trade between Queensland and other states will increase (particularly in the Border Rivers) as the necessary institutional arrangements are developed (ACCC 2009c). In Queensland, trading is restricted to within geographic areas supplied by a particular water supply scheme. Trading is not possible between schemes (NWC 2008).

Presently, interstate trading in entitlements is almost nonexistent, with no trades occurring in the 2008-09 season and only one trade of 200 ML (between New South Wales and Victoria) occurring in 2007-08 (NWC 2009a). However, the interstate

trade in allocations is relatively strong, accounting for 28 per cent of trades by volume (up from 15 per cent in 2007-08) in 2008-09.

Table 3.2 **Tradeable water entitlements on issue[a], 2007-08**

	Regulated systems		*Unregulated systems*		*Groundwater*	
	Number	Nominal volume (GL)	Number	Nominal volume (GL)	Number	Nominal volume (GL)
NSW	10 401	8 464	1 345	110	2 867	1 004
Victoria	37 260	3 550	7 704	162	6 236	490
Queensland	10 893	3 142	1 018	349	369	76
SA	3 703	980	223	1	5 719	215
ACT	27	64	0	0	114	1

a Figures are for the entire state including non-Basin jurisdictions.

Source: NWC (2008).

Trade in unregulated systems

Trade in unregulated systems is small relative to trade in regulated systems in the Basin. This is largely because water diversions in these catchments are a small proportion of total water use in some states (table 3.2). However, it is also due to the difficulty in trading water within and between unregulated systems because of:

- physical limitations in transferring water from one user to another (both upstream and downstream) where flows are not controlled by infrastructure or storages and there is potential for substantial conveyance losses
- the potential for water traded downstream to be extracted by third parties
- impacts of individual trades on third parties and the environment
- limited information on water access rights required to facilitate trade (for example, maximum extraction rates, daily pumping rates and monitoring of flow variability)
- high transaction costs associated with managing, monitoring and ensuring compliance with water trading within a region or between regions.

Currently, water trading markets are not generally well established in unregulated systems in the Basin, although trading zones exist already in some parts of the Basin (SKM 2009b). Consistent with the *Water Act 2007* (Cwlth), the Murray-Darling Basin Authority will establish and enforce rules for trade in unregulated systems as part of the water trading rules, which may facilitate trade in the future.

FINDING 3.1

Water markets are well developed and active in the southern-connected Basin, but not in parts of the northern Basin where entitlements are generally rules based rather than storage based.

Trade in groundwater

Groundwater trades are usually assessed on an individual basis and are usually restricted to within the same management zone or aquifer. The recent drought and low surface water availability has seen a rapid growth in groundwater trade (ACCC 2009c). For example, Goulburn-Murray Water approved 130 groundwater trades for the 2006-07 season, a 250 per cent increase from the previous year (NWC 2008). However, the relatively small volumes of entitlements issued (table 3.2) mean that the market for groundwater trade is relatively thin in many management zones.

The current presumption in many jurisdictions of zero connectivity between groundwater and surface water (NWC 2009b), precludes trade between these sources. However, should this presumption be reversed, and conjunctive management of the two resources be introduced (as is recommended by the NWC 2009b), this would facilitate greater trade in groundwater systems.

Market intermediaries

The growth and evolution of water markets in the Basin has been accompanied by the development of intermediary market services, such as water brokers and water exchanges. By 2007, trading through market intermediaries accounted for around 80 per cent of trades, with the remainder being privately negotiated, principally in Victoria and Queensland (The Allen Consulting Group 2007). Intermediaries have also been used extensively to undertake applications to the tender rounds of RTB, with around 57 per cent of offers (by value) submitted to DEWHA through a broker or solicitor (sub. DR85). To this point, the market for intermediary services has developed without specific restriction or regulation (The Allen Consulting Group 2007). There are competing platforms and methods of arranging trade in water entitlements or seasonal allocations across the Basin.

Brokers and exchanges active in the Basin

As there is no registry for water brokers, it is difficult to estimate the number of brokers currently operating (The Allen Consulting Group 2007). There are a few

full-time specialist water brokers such as Waterfind, but most firms practice water broking in addition to another business such as real estate, consultancy, or financial advice. Additionally, some brokers are contracted to exchanges such as Waterexchange, or work directly for an exchange as part of the services offered by that exchange (for example, Watermove and SunWater Exchange).

Presently, numerous water exchanges, using different methods of operation, operate throughout the Basin (table 3.3). The National Stock Exchange of Australia (NSX) runs the most prominent of these, known as Waterexchange, which operates in the same manner as a stock exchange, on a system of posted sell and buy bids. There are also a number of exchanges that operate with a pooled system. This involves a pool of buyers and sellers in each trading zone being gathered over a set time period. A price for each pool is calculated and all successful buyers and sellers within the pool receive this price. The pool price will be greater than or equal to the highest bid of any successful seller, and less than or equal to the lowest bid of any successful buyer. Some firms, such as Waterfind, also negotiate private trades between buyers and sellers.

Table 3.3 **Principal water exchanges**

Exchange	*Ownership*	*Regions Serviced*	*Products Traded*	*Method of Operation*
Watermove	Victorian Government (operated by Goulburn-Murray Water)	Southern NSW and Victoria	Entitlements and allocations	Weekly Pool
Waterexchange	The National Stock Exchange of Australia (NSX)	NSW, Victoria and SA	Allocations and forward contracts	Posted sell and buy bids
Waterfind	Private Firm	NSW Victoria and SA	Entitlements and allocations	Negotiated trades between buyers and sellers
Sunwater Exchange	Queensland Government (operated by Sunwater)	Queensland	Allocations	Pooled price system
Watermart	Coleambally Irrigation Corporation (acting as a broker for Waterexchange)	A service for Coleambally Irrigation Corporation customers	Entitlements and allocations	Posted sell and buy bids
Murrumbidgee Water Exchange	Murrumbidgee Horticulture Council	NSW	Allocations	Posted sell and buy bids
Murray Irrigation Exchange	Murray Irrigation Limited	NSW	Entitlements and allocations	Posted sell and buy bids

Source: NWC (2008).

The role of intermediaries

Market intermediaries perform a significant proportion of trades and fulfil important functions in the market. Intermediaries reduce transaction costs for their clients by matching buyers and sellers across disparate locations and sources. Furthermore, they may reduce the costs associated with searching for information about trading rules, obtaining regulatory approvals and finalising any administrative requirements for transfer of ownership.

The widespread use of intermediaries suggests the expertise of such parties is valued by market participants. The existing exchanges and brokers could be utilised should on-market purchases be pursued as an alternative to the tender process, as part of the buyback.

FINDING 3.2

Market intermediaries, including brokers and exchanges, have developed alongside the market to facilitate increased trade.

Exchanges and some brokers may also provide market information that is accessible to all participants. Efficient markets require up-to-date information on trades so that market participants can make informed decisions. At present, all trades are required to be recorded on state-based registries. However, each of these registries is different, both in terms of the way they operate and the information supplied. Consequently, the current system has so far 'generally not provided the information required to fully inform water trading decisions' (NWC 2009b, p. 149). The fragmented exchanges and poor reporting standards of the state registries are in contrast with other commodity markets. COAG has committed to the development of a National Water Market System and the Australian Government has recently announced funding of $56 million for the project (Wong 2009a) (box 3.4).

Brokerage fees

The brokerage fees paid for any particular trade depend upon the level of service provided by the broker. Typically, brokers offer a wide range of services, from matching of buyers and sellers through to settlement, conveyance and registration of the trade. Brokerage fees typically take the form of a percentage of the sale price for both the seller and the buyer, with a minimum (and sometimes a maximum) charge per transaction specified. For example, Watermart charges a fee of 2.5 per cent of each transaction, with a minimum charge of $50 (Watermart 2009).

Box 3.4 **The National Water Market System**

In November 2008, COAG committed to improving access to, and dissemination of, market information through the development of a National Water Market System. The system is being developed by the Department of the Environment, Water, Heritage and the Arts in conjunction with representatives of state governments, the Bureau of Meteorology and other Australian Government departments, including the National Water Commission. The system will be a national portal to each state registry. The state registries will be enhanced and a common registry will be in place for New South Wales, South Australia, Tasmania, the Northern Territory and the ACT. The system will provide water market information on elements such as price and volume of sales, show individual licence water account information and provide information to the Bureau of Meteorology for the National Water Account. In time, the portal may be further developed to provide an access point for initiating transactions. The first element, the national portal, is due to be completed by April 2010.

3.4 Pricing of water

As noted above, water is traded primarily through buying and selling of either seasonal allocations or entitlements. The prices of each are determined by different, but linked factors.

Price of seasonal allocations

The market for seasonal allocations is driven largely by the demand and supply conditions within that season. Irrigators make the decision to buy or sell seasonal allocations based on a number of variables, reflecting their particular circumstances. Individual preferences, access to information, attitudes to risk and liquidity considerations may all be important. The value of a seasonal allocation to an irrigator, will depend on how it can be used within the season and access to carryover rights. It will also depend on:

- expected yields and commodity prices, the costs of other inputs, and the scope to substitute other inputs in the short term
- fees and charges paid for delivery
- transaction costs.

In a well functioning market, the price will reflect the opportunity cost of using that water elsewhere. In any given season, this will depend on the timing and nature of announcements regarding allocations, the prevailing weather conditions and expectations about future conditions. The marginal value that an individual places

on surface water will depend on their ability to substitute to water saving technologies, or other water sources, such as groundwater or floodplain harvesting.

Average seasonal allocation prices can vary considerably during the year and from year to year (figure 3.2).

Price of entitlements

The value of an entitlement to an irrigator is derived from the expected value of the seasonal allocations that the entitlement delivers into the future. The price of entitlements is less affected by short-term fluctuations in supply and demand and tends to reflect the expected net present value of the seasonal allocations the entitlement is expected to yield over the long term, as well as some risk premium. This means the value of an entitlement is influenced by longer term trends in prices and other economic variables (for example, interest rates and exchange rates). In general, the price of entitlements follows the same trends as allocations but with less volatility (Bjornlund and Rossini 2007). The prices of entitlements will vary depending on their location and reliability (table 3.4), and where trading constraints limit demand for entitlements in a particular region the price will be affected (Chapter 10).

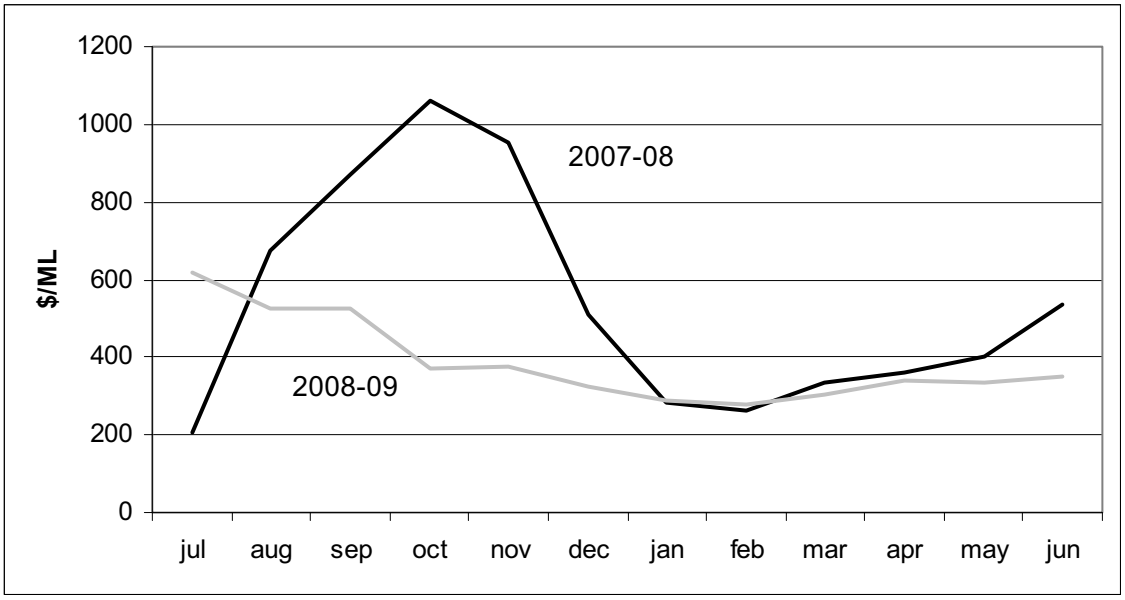
Table 3.4 **Allocation and entitlement prices for selected entitlement types, 2008-09**

Entitlement type	*Average allocation price*	*Average entitlement price*
	$	$
NSW Murray HS[a]	363	2 564
NSW Murray GS[b]	363	1 095
NSW Murrumbidgee HS	343	3 100
NSW Murrumbidgee GS	343	1 284
SA Murray HS	352	2 380
Vic Greater Goulburn HR[c]	370	2 228
Vic Murray HR	340	2 174

[a] High Security. [b] General Security. [c] High Reliability.

Source: Waterfind (2009).

Figure 3.2 **Average seasonal allocation prices for the southern-connected Basin, 2007-08 and 2008-09[a]**



a This data is supplied by Waterfind in good faith, with the following disclaimer: Every effort is made to ensure accuracy and timeliness. However, no responsibility is accepted for any errors or omissions in this information, nor for any loss or damage arising from its use.

Source: Waterfind (2009).

3.5 Delivery fees and charges

The fees and charges that an irrigation operator levies on customers are a factor in an irrigator's decision to buy or sell seasonal allocations or entitlements. Accordingly, the manner in which delivery fees and charges are set can have important implications for the functioning of water markets and the buyback.

Current structure of fees and charges in the Basin

Irrigation infrastructure operators in the Basin typically charge irrigators fees for administration, storage and delivery. Private diverters (irrigators that divert directly from the river) typically pay administrative costs and for storage in regulated systems. Those irrigators on an irrigation network are typically charged an additional two-part tariff comprised of a fixed access fee and a variable consumption charge based on the volume of water delivered (Appels, Douglas and Dwyer 2004). The fixed access fee is often associated with the provision of infrastructure, including the capital costs associated with maintaining and upgrading the irrigation network. A number of methods exist for allocating fixed costs across

network users. The most common is the number or volume of entitlements held (ACCC 2009a), but other options include assignment of costs per hectare, per property, per connection, per service point, and based on size of delivery share. The variable fee is often associated with the physical delivery of water (or the use of delivery capacity), including pumping and other costs that vary with the volume of water delivered.

These fees and charges are often the same for all users in a district. This is sometimes known as postage stamp pricing (chapter 10). However, some operators differentiate their charges between local zones. While this arrangement more accurately reflects the relative costs of storing and delivering irrigation water in a particular zone, fees and charges are the same for all users within that zone. For example, all irrigators in the Shepparton zone of Goulburn-Murray Water that have a delivery right of 2 ML/day pay a fixed annual fee of $7334.84 ($112 for service and 2 x $3611.42 for infrastructure access) and a variable charge of $8.85 for every ML of allocation delivered, regardless of the costs of service provision to the irrigator's property (table 3.5).

Implications for trade and the buyback

The structure of the two-part tariff typically charged by an infrastructure operator will affect an irrigator's decision to trade. Necessary for the efficient distribution of entitlements and seasonal allocations is a fee structure, where the fixed charge an irrigator faces reflects the fixed cost of infrastructure provision to that irrigator, and the variable charge faced by that irrigator reflects the marginal cost of delivering water to that irrigator. Where fees and charges are not cost reflective in this manner, trade may be distorted. For example, where infrastructure operators set the variable proportion of delivery charges higher than marginal cost, the incentive to trade seasonal allocations out of the district is strengthened. This could result in a less than optimal amount of irrigation and an increase in the risk of stranded assets (Goesch 2001).

Table 3.5 **Water delivery fees and charges for Goulburn-Murray Water, 2009-10**

Goulburn-Murray Irrigation District

Area	*Service*	*Infrastructure access*	*Infrastructure use*
	$/property	$/ML/day	$/ML
Shepparton	112.68	3 611.42	8.85
Central Goulburn	112.68	2 963.73	6.76
Rochester	112.68	2 345.76	7.12
Pyramid-Boort	112.68	1 797.26	6.92
Murray Valley	112.68	2 385.00	7.62
Torrumbarry	112.68	2 571.90	7.41
Woorinen	112.68	3 373.18	20.00

Source: Goulburn-Murray Water (2009a).

In response to these issues, the *Water Act 2007* (Cwlth) requires the ACCC to provide advice to the Minister on water charge rules that aim to produce consistency in the way in which charges are set throughout irrigation areas in the Basin. These charges are to have regard to the NWI principles of user pays, transparency of pricing for storage and delivery, and cost recovery for water planning and management. The advice on Water Charge (Infrastructure) Rules was finalised in June 2009.

An efficient buyback recovers water from where it is least valued. Where fees and charges are set efficiently, that is, they reflect the cost of service provision, price signals enable individuals to make efficient decisions about how much water to demand or supply. Inefficient fees and charges will alter an individual's willingness to pay, or willingness to accept payment for water. This distorts the price of seasonal allocations and entitlements on the market and can compromise the efficiency of the buyback (Chapter 10).