Contents

Report outline 5
Executive summary 6

2018-19 water year at a glance 8
National weather conditions 9
Prices and volumes traded 10

Murray - Darling Basin – Surface water 12
Weather conditions 14
Storages and allocations 15

Prices and volumes traded 16
Other commentary 32

Queensland – Surface water 33
Weather conditions 33
Storages and allocations 34
Prices and volumes traded 35
Bundaberg 38
Burdekin-Haughton 40
Other commentary 41

Groundwater markets 43
Introduction to groundwater markets 43
Prices and volumes traded 44
Lower Murray Groundwater 44
South Australia Lower Limestone Coast Groundwater 46
Lower Lachlan Groundwater 48
Other commentary 49

Environmental water 51
Overview of Environmental Water 51
Current environmental water held 51
The impacts of environmental water holders in the water market 53
Government announcements and policy developments 53
National developments 53
Foreign ownership and investment in water 55
Murray- Darling Basin Authority (MDBA) price reporting audit 56
<table>
<thead>
<tr>
<th>Section</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>State-specific developments</td>
<td>57</td>
</tr>
<tr>
<td>New South Wales (NSW)</td>
<td>57</td>
</tr>
<tr>
<td>Victoria</td>
<td>57</td>
</tr>
<tr>
<td>Queensland</td>
<td>58</td>
</tr>
<tr>
<td>South Australia (SA)</td>
<td>59</td>
</tr>
<tr>
<td>Western Australia</td>
<td>60</td>
</tr>
<tr>
<td>Tasmania</td>
<td>60</td>
</tr>
<tr>
<td>Australian Capital Territory</td>
<td>61</td>
</tr>
<tr>
<td><strong>Outlook for 2019-20</strong></td>
<td>62</td>
</tr>
<tr>
<td>National weather outlook for 2019-20</td>
<td>63</td>
</tr>
<tr>
<td>Murray-Darling Basin</td>
<td>65</td>
</tr>
<tr>
<td>Allocations and storages</td>
<td>65</td>
</tr>
<tr>
<td>Possible volumes of water available in the market</td>
<td>68</td>
</tr>
<tr>
<td>Other factors that may shape the market</td>
<td>69</td>
</tr>
<tr>
<td><strong>Queensland</strong></td>
<td>71</td>
</tr>
<tr>
<td><strong>Further improvements to Australian water markets</strong></td>
<td>72</td>
</tr>
<tr>
<td>Waterfind’s six areas of focus for further water market reform</td>
<td>73</td>
</tr>
<tr>
<td><strong>Further water market tools, information and services</strong></td>
<td>78</td>
</tr>
<tr>
<td>Online Water Market Platform</td>
<td>79</td>
</tr>
<tr>
<td>Brokering</td>
<td>79</td>
</tr>
<tr>
<td>Account management</td>
<td>79</td>
</tr>
<tr>
<td>Valuation service</td>
<td>80</td>
</tr>
<tr>
<td>Entitlement reports</td>
<td>80</td>
</tr>
<tr>
<td>Asset conversion</td>
<td>80</td>
</tr>
<tr>
<td>Water market information</td>
<td>80</td>
</tr>
<tr>
<td>Advisory services</td>
<td>80</td>
</tr>
<tr>
<td>Further information</td>
<td>81</td>
</tr>
<tr>
<td>References</td>
<td>82</td>
</tr>
</tbody>
</table>
Report outline

This report provides a detailed account of Australian water market-related activity, over the 2018-19 water year. It presents a summary of the weather conditions experienced in the markets, storages and allocations throughout the season, and statistics on the number of trades, volumes traded and prices paid. Further qualitative observations are provided on the key events that shaped the water markets over the season. A high-level overview is provided, focusing on the three major market areas:

- The first is the Murray-Darling Basin (Basin), where over 92 percent of all water is traded. Focus is given to the surface water markets in the southern connected part of the Basin (Southern Connected Basin); the New South Wales (NSW), Victorian and South Australian (SA) Murray markets, and the Murrumbidgee and Goulburn markets, where notable market events occurred over the year.
- The second is Queensland, where water trading and water markets continue to mature. Focus is given to the Bundaberg and Burdekin-Haughton surface water schemes where, collectively, 60 percent of the State’s trades occurred in 2018-19.
- The third area of focus is groundwater markets (Section 1) where activity rose sharply in 2018-19 on the back of drought. Three key markets are selected, the NSW Lower Murray, the SA Lower Limestone Coast and the NSW Lower Lachlan groundwater sources.

Section 1 looks at other activity that has shaped Australian water markets. Focus is given to the environmental water holders and government announcements and policy developments over 2018-19.

The report then looks to the future. Firstly, attention is given to the outlook for the 2019-20 year in Section 2, focusing on the Basin and Queensland. Then, Section 3 looks at further improvements that can be made to the Australian water markets to make them more effective and efficient.

Finally, Section 4 presents a range of tools, information and services that water market participants can access to assist them with their water market needs.

Information used in this report has been sourced from state water registers, Waterfind’s data warehouse, the Bureau of Meteorology, and other third-party sources. While every effort has been made to ensure it is accurate, no assurance can be given that it is free from errors or omissions.
Executive summary

Waterfind’s 2018-19 Water Markets Annual Report, provides a quantitative and qualitative look at the key water markets, and the events that shaped the 2018-19 year. It shows that water markets continue to be an essential tool for irrigators in times of water scarcity.

The 2018-19 season was characterised by drought conditions in much of Australia, leading to lower storages and allocation levels. In the Murray-Darling Basin, where approximately 92 percent of water trading occurs, there was high trade activity and record, or near record, water prices. Temporary water prices, for example, peaked at $850 per ML in the Murrumbidgee, some $600 higher than the peak in 2017-18.

While there were generally lower volumes of trades across the Basin, there was a record volume of water traded from the Goulburn to the Murray system, despite a restriction on out-trade from Goulburn, being in place for more than half of the season.

The drought conditions have also seen mining companies increase their participation in the Basin water market, which have traditionally been dominated by farmers.

The value of surface water entitlements grew significantly in 2018-19, with the major markets increasing by 37 percent (or $7.3 billion) from the previous year.

In Queensland, the volume of temporary water traded increased by 39 percent, while permanent volumes increased by 19 percent. The volume of temporary water traded was the highest in the Bundaberg and Burdekin-Haughton markets, where cumulatively 60 percent of all Queensland water was traded. In both these markets, temporary water prices increased from 2017-18. However, the highest price for temporary water was in the Nogoa Mackenzie system, where trade peaked at $605 per ML.

The low supply of surface water as a result of the drought, saw water market participants in the Basin look underground in 2018-19. Groundwater trading volumes, and prices, increased substantially in many markets in 2018-19, when compared with the previous year. For example, in the Lower Murray Groundwater market, there was a price increase of over 500 percent from 2017-18.

In response to increased demand for groundwater resources, the NSW government released the largest volume of new water entitlements in recent times. This was one of many key events driven by government over the year.

On a positive note, there has been substantial policy and legislative progress by State and Federal governments, including a commitment by the Australian Government to renew the National Water Initiative. Other state government initiatives have included the release of 11 water sharing plans for consultation in NSW, an improved River Murray water allocation planning process in South Australia, and amendments to the Queensland Water Act 2000, to allow temporary access to strategic water infrastructure reserves.
While reform in 2018-19 has been significant, there is still room for improvement. For example, in 2018-19 the Murray-Darling Basin Authority released the findings of its audit into reporting of the prices paid for water traded in the Basin. It found that “no Basin government has robust arrangements in place to gather comprehensive price information”.

This report identifies six areas of further improvement to increase the effectiveness and efficiency of the water market. Amongst them is a requirement for a comprehensive public review into water asset investment and foreign water asset ownership. Waterfind has observed growing concern regarding the impact investors and speculators are having in the marketplace. Without robust information and debate, this concern will continue to grow.

Further, there is also urgent improvements required to the way water assets are valued and recognised under legislation, to assist Australian irrigators to finance the purchase of permanent water rights.

There is also an urgent need for a nationally consistent, agreed upon, framework that covers rules and standards for the role and interaction of government in the marketplace. For example, this report highlights the impact of environmental water holders in the Basin markets. In 2018-19, 109 GL of water was acquired by the Commonwealth Environmental Water Holder (CEWH) across the Basin markets. Environmental water holders are now the largest water right holders in the Basin, cumulatively holding 4,370,255 ML of water entitlements.

In 2018-19, an announcement by the CEWH of its intention to trade water in the Goulburn market resulted in price decreases in the temporary price in the Goulburn and Murray markets. This demonstrates to the market the ability of environmental water holders to lower temporary water pricing, as a result of new water supplies they can bring to the market.

A centralised water market platform, providing a licencing and regulatory framework, would also benefit the market, as would a review into the requirement for regulation of water market intermediaries, given how important their conduct is for market confidence and efficiency.

The outlook for the next season is low rainfall, storages and allocations that will continue to affect much of Australia; placing an increasing importance on water markets. It is therefore critical for these markets to function effectively and efficiently. The proposed improvements, and other initiatives such as the Australian Competition and Consumer Commission (ACCC) inquiry into the water market will be important in achieving this.
In 2018-19 most governments progressed substantial policy, regulatory and legislative changes that will improve the effectiveness and efficiency of water markets. Low rainfall and allocations, generally lower volumes of water traded, record and near record prices characterised the year for much of Australia.
National summary

Trade activity continues to be highest in New South Wales, Victoria and South Australia; although there are differences between the temporary and permanent market. Market activity is also increasing in Queensland. Permanent water entitlements increased on average by 37 percent across the major Australian water markets from the previous year.

National weather conditions

Rainfall for the year was generally below average for Australia as a whole (Figure 1). Below to very much below average rainfall was recorded across most of New South Wales and southern Queensland, as well as adjacent border regions of South Australia and Victoria. Rainfall was also below average for southern Tasmania, the western half of South Australia, much of eastern and northern Western Australia, and large parts of the Northern Territory. Rainfall for the Basin as a whole was the tenth lowest on record.3

Figure 1: Australian Rainfall Deciles – 1 July 2018 to 30 June 2019
**Prices and volumes traded**

In 2018-19, approximately 5,470 gigalitres (GL) of water was traded on the temporary market across Australia (a reduction of 27 percent from 2017-18), with the majority traded in New South Wales (45 percent), Victoria (43 percent) and South Australia (6 percent) (Chart 1).

Approximately 1,642 GL of water was traded on the permanent market (an increase of 3 percent from 2017-18), with the majority traded in New South Wales (47 percent), Victoria (19 percent) and South Australia (17 percent) (Chart 2).

---

**Chart 1: Total volume of water traded (ML), Temporary – Australia, 2018-19**

VIC 43%

NSW 45%

QLD 6%

SA 6%

---

**Chart 2: Total volume of water traded (ML), Permanent – Australia, 2018-19**

NSW 47%

QLD 15%

VIC 19%

TAS 2%

SA 17%
Table 1 shows the total volume of water entitlement available in nine selected water markets at the closing of the financial year 2018-19. It also shows that these markets have a total value in excess of $27 billion, dominated by the Murray ($12 billion or 46 percent) and Murrumbidgee ($6 billion or 23 percent) water markets. This is an increase of 37 percent over the 2017-18 closing value.

Table 1: Volume and value of water entitlements for key selected water markets, 2018-19

<table>
<thead>
<tr>
<th>Water Market</th>
<th>Entitlement Volume (ML)</th>
<th>Entitlement Value at closing of 2018-19 ($M)</th>
<th>Change in Entitlement Value from closing of 2017-18 ($M)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Murray</td>
<td>4,074,912</td>
<td>$12,369</td>
<td>$3,754</td>
</tr>
<tr>
<td>Murrumbidgee</td>
<td>2,252,292</td>
<td>$6,224</td>
<td>$1,715</td>
</tr>
<tr>
<td>Gwydir*</td>
<td>529,865</td>
<td>$1,210</td>
<td>$190</td>
</tr>
<tr>
<td>Goulburn</td>
<td>1,552,909</td>
<td>$3,820</td>
<td>$845</td>
</tr>
<tr>
<td>Namoi**</td>
<td>260,027</td>
<td>$556</td>
<td>$47</td>
</tr>
<tr>
<td>Macquarie</td>
<td>646,294</td>
<td>$1,071</td>
<td>$199</td>
</tr>
<tr>
<td>Bundaberg***</td>
<td>375,829</td>
<td>$311</td>
<td>$91</td>
</tr>
<tr>
<td>Nogoa Mackenzie</td>
<td>232,992</td>
<td>$619</td>
<td>$90</td>
</tr>
<tr>
<td>Lachlan</td>
<td>620,482</td>
<td>$835</td>
<td>$381</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>10,545,602</td>
<td>$27,015</td>
<td>$7,312</td>
</tr>
</tbody>
</table>

* Value based on General Security water only
** Value based on Lower Namoi General Security water only
*** Value based on Medium priority water only
Murray-Darling Basin – Surface water

Well below average rainfall dominated, the demand for, and supply of, water across the Basin. For temporary water, there were generally lower volumes of water traded, increases in the number of trades in many markets, and significant price increases from the previous year. In most permanent water markets, there were increases in the number of trades, volume and prices compared to the previous year. The Basin was also the subject of much political and media attention during the year.

In summary, the Basin (Figure 2) experienced well below average rainfall across 2018-19, with some areas experiencing the driest year on record. As a result, there were low storages and allocations across the year compared with recent years (Figure 4). There was a lower volume of temporary water traded overall compared with the previous season, but higher volumes were traded in the permanent market. This section discusses this in more detail, with a focus on the largest markets in the Southern Connected Basin (Figure 3) – Murray (NSW, Victoria and SA), Murrumbidgee and Goulburn.

Figure 2: Murray-Darling Basin

Sources:
» Geoscience Australia
» Murray–Darling Basin Authority
**Figure 3: Southern Connected Basin**

![Map of Southern Basin System - major towns and irrigation areas]

**Figure 4: Murray-Darling Basin Authority Active (Usable Water) Storage June 2000 to present**

![Graph showing MDBA Active Storage: June 2000 to present]

- Long-term Average Active Storage
- Active Storage
- Maximum Active Storage (at full supply level)

Note: For clarity many small rivers, creeks, weirs and waterbodies are not shown on this map. Some rivers, water bodies, and irrigation areas are not labelled. Irrigation areas are coloured and labelled in brown.

Geographic coordinate system, Datum GDA-94

Map Scale: 1:3,000,000

Data Sources:
- Drainage, Rivers, Water bodies, States, Weirs, Locks, Towns: (c) Commonwealth of Australia (Geoscience Australia)
- Irrigation areas: (c) Murray-Darling Basin Commission (2006)
- Dams: Australian Government, Department of Environment & Water Resources.

Map produced by Environmental Resources Information Network, Australian Government, Department of Environment & Water Resources. Date: 30 May 2007
Weather conditions

Winter 2018
The normal winter rain-bearing systems were weaker and less frequent than usual in 2018-19 across the Basin. Winter rainfall was the fourteenth driest on record, with well below average rainfall in most of New South Wales and the eastern and northern areas of South Australia and Victoria.

Well above average mean temperatures for winter were experienced in much of South Australia and New South Wales (amongst the ten warmest winters on record). Near average temperatures were recorded in southwest and northeast Victoria, and, along southeast South Australia.

Spring 2018
At a state level, spring rainfall across the Basin was mixed, with Victoria experiencing the ninth driest Spring on record, New South Wales experiencing slightly below average rainfall, and South Australia receiving average rainfall.

Regionally, below average rainfall occurred in south eastern South Australia, inland southeast and northwest New South Wales, while above average rainfall occurred throughout western and northern areas of South Australia, and areas along the northern and central coast of New South Wales.

Spring was also the ninth warmest on record, with above average temperatures experienced throughout the day for South Australia, Victoria and New South Wales. However, cooler than average nights in September in South Australia and Victoria contributed to frost damage in the grain growing areas.

Summer 2018-19
Summer rainfall was below average in the southern connected part of the Basin. Rainfall was very much below average across north eastern and central southern South Australia, northern New South Wales, small areas along west and south Gippsland, and along either side of the borders between Victoria and New South Wales (Figure 3). However, small areas in northwest Victoria experienced above average rainfall in December, driven by storms associated with tropical cyclone Owen.

New South Wales and Victoria recorded the warmest summer on record, and South Australia experienced its second-warmest summer on record. An unusual extended period of heat-waves occurred over most of South Australia, central and northern Victoria, and the majority of inland New South Wales, between December 2018 and January 2019.

Autumn 2019
The warm weather continued throughout Autumn, with maximum, mean and minimum temperatures all being well above average for all Basin states.

Daytime Autumn temperatures were particularly warm in New South Wales (the fourth warmest on record) and South Australia (the fifth warmest on record). Night temperatures were also warmer than average across the whole of Victoria, and slightly higher than average in South Australia.

Most agricultural areas of South Australia, southwestern New South Wales and western Victoria, through to central Victoria and west Gippsland recorded below to very below average rainfall throughout autumn. South Australia experienced 50 percent less than average rainfall, and had the driest first five months of the calendar year since 2008. New South Wales experienced 32 percent less, and Victoria 21 percent less than average autumn rainfall.
Storages and allocations

Water storages

Water storage levels within the Murray-Darling Basin closed at 35 percent, compared to 54 percent at the same time the previous year. Chart 3 shows that decline for the Murrumbidgee and Murray Goulburn storages, based on 30 June levels over the past three years. Poor inflows and above average temperatures contributed to these lower storage levels. As shown in Figure 4, winter of 2015-16 was the last time active (or useable) storage levels in the Basin were this low.

Chart 3: Water storages in the Basin 2017-19

Chart 3 details major dams with data from the BOM but does not include all Southern Connected Basin dams.
**Allocations**

**New South Wales (NSW)**


Both High Security and General Security NSW Murray allocations stayed at the same level throughout the season. NSW Murray High Security allocation stayed at 97 percent of entitlement, while General Security licence holders received zero percent throughout the whole season. In comparison, the previous year High Security stayed at 97 percent for the entire season, while General Security allocations opened at 11 percent and gradually increased to 51 percent throughout the year, due to favorable storage conditions in the River Murray system in 2016-17.

Murrumbidgee High Security allocation stayed at 95 percent of entitlement for the whole season. Following the dry winter conditions and with storage inflows close to historical lows, General Security licence holders received 3 percent opening allocations which gradually increased to 7 percent throughout 2018-19. In comparison to last year, High Security allocations were the same (95 percent for the entire season), while General Security allocations opened at 17 percent and gradually increased to 45 percent.

**Victoria**

The 2018-19 season started with low opening allocations for High Reliability water shares in the Goulburn (32 percent), Loddon (32 percent) and Murray (41 percent) systems. These all steadily increased throughout the year, reaching 100 percent between December-March, where they remained until the end of the season. In 2017-18, allocations for High Reliability water shares were greater, with opening allocations of 66 percent in the Murray and 36 percent in the Goulburn and Loddon; all of which steadily increased to 100 percent between October-December. In both the 2017-18 and 2018-19 seasons, Low Reliability allocations in the Goulburn, Loddon and Murray systems opened at zero percent and remained at this level for the entire season.

**South Australia (SA)**

After the 2016-17 season, which opened at 36 percent, the highest spring inflows in 23 years improved inflows to the Basin major storages. This resulted in SA Murray entitlement holders receiving 100 percent opening allocation for the 2017-18 season. Allocations again opened at 100 percent for the 2018-19 season, and remained at this level for the entire season.

**Prices and volumes traded**

The start of 2018-19 saw some market connections closed due to trading rules. However, with the exceptions of the Murrumbidgee, which was closed to in-trade for the majority of the season, and the Goulburn, which was closed to out-trade for half of the season, generally the season was more stable than previous years. This made temporary water free to trade between most major markets, enabling market participants to source and sell additional water throughout the season.

The main trade restrictions that impact the Basin are:

- The NSW and Victorian inter-valley trade (IVT)
- The Murrumbidgee and Murray IVT
- The Goulburn and Murray IVT
- The Lower Darling and Murray IVT
- The Barmah Choke

Table 2 summarises these trading restrictions over the 2018-19 season. The impact of these on prices and volumes traded is discussed in the following sections of this report.
Table 2: Major Basin-related trading restrictions in 2018-19

<table>
<thead>
<tr>
<th>Trade restriction</th>
<th>Summary of 2018-19 activity</th>
</tr>
</thead>
<tbody>
<tr>
<td>The NSW and Victorian inter-valley trade (IVT)</td>
<td>Trade between New South Wales and Victorian Murray markets was closed from the beginning of the 2018-19 season until mid-August 2018.</td>
</tr>
<tr>
<td>The Murrumbidgee and Murray IVT</td>
<td>Trade from the Murrumbidgee to Murray (Victoria, New South Wales and South Australia) was opened throughout 2018-19.</td>
</tr>
<tr>
<td></td>
<td>However, Murray to Murrumbidgee was closed until late May 2019, resulting in a limited opportunity to move water between these markets in the year.</td>
</tr>
<tr>
<td>The Goulburn and Murray IVT</td>
<td>The Goulburn system was closed for out-trade to the Victorian, New South Wales and South Australian Murray until mid-January 2019.</td>
</tr>
<tr>
<td></td>
<td>However, the volume of water delivered from the Goulburn system to the Murray in 2018-19 was close to 430 GL. This volume was not just a record for the Goulburn system, but also for the combined volume of all inter-valley trades to the River Murray system (Goulburn and Murrumbidgee systems) delivered in a water year (Figure 5).</td>
</tr>
<tr>
<td>The Lower Darling and Murray IVT</td>
<td>Temporary trade between these markets was closed throughout the entire 2018-19 season.</td>
</tr>
<tr>
<td>The Barmah Choke</td>
<td>The Barmah Choke remained open for the entire 2018-19 water year. This compares to 2017-18, where there were six closure events within the first quarter of the water year.</td>
</tr>
</tbody>
</table>

Figure 5: Delivery of inter valley trade to the River Murray system
Murrumbidgee – Temporary

Trade from the Murrumbidgee Valley to Murray Valley in Victoria, New South Wales and South Australian Murray, was closed for the majority of 2018-19. Trade restrictions were lifted in late May 2019, resulting in a limited opportunity to move water between these markets.

As a result of this restriction, combined with low allocations for Murrumbidgee General Security entitlements and a lower quantum of carry over water compared to previous seasons, there was a generally lower supply of water to the Murrumbidgee market than in recent years, and a much-increased average value of temporary water.

The Murrumbidgee market represented the highest temporary water price in the Southern Connected Basin, with average monthly prices commencing at $242 per ML and closing at $544 per ML (Chart 4).

The largest increase in prices throughout the season, occurred between September and October 2019, with temporary prices rising by 37 percent to $342 per ML. The highest price paid was in February 2019 at $850 per ML.

Observations in the Murrumbidgee market were consistent with previous drier conditions, with a smaller volume traded but a larger number (6 percent increase from 2017-18) of trades. Waterfind sees this as a demonstration of markets working ‘harder’ in drier times, which also increased pressure on water authorities and brokers involved with transacting and approving these increased number of smaller transactions.

Monthly volume traded, changed significantly during the season (Chart 4) with two large trading spikes (January and May 2019). The first increase appears to have been influenced by shifting of environmental water. The second may be due to opening of trades through the Murrumbidgee IVT and closing of the season.

Chart 4: Murrumbidgee Temporary (Combined) water – Volumes and prices, 2018-19
**Murrumbidgee – Permanent**

Permanent pricing for both General and High Security entitlements increased in value throughout the 2018-19 season.

The highest price paid for General Security entitlements peaked in July at $2,350 per ML, then reduced in the following months, possibly as a reflection on the poor outlooks for the 2019-20 season presented at that time (Chart 5). General Security prices rose by 15 percent to $2,119 per ML, while, High Security prices increased by 42 percent to $5,318 per ML (Charts 5 and 6).

Chart 5: Murrumbidgee Permanent water (General security) – Volumes and prices, 2018-19
High Security entitlements reached a peak in June 2019 at $7,000 per ML. Market activity (measured in total ML traded) in the Murrumbidgee General Security entitlement market reduced by 20 percent, while the higher yielding High Security entitlement market activity increased by 47 percent when compared to the previous season.

The large increase in trades seen for General Security water in July and December 2018 and for High Security water in December 2018 looks to have been influenced by a few individual large trades.

Chart 6: Murrumbidgee Permanent water (High security) – Volumes and prices, 2018-19
**Murray (NSW, Victoria and South Australia) – Temporary**

Trade from the NSW Murray market to the Victorian Murray market was closed from the beginning of the 2018-19 season until late July.

This is may help to explain some of the differences seen in the NSW Murray market compared to the other Murray markets. For example, the annual average price for temporary water was lower in the NSW Murray market (approximately $375 per ML) than SA and Victorian Murray markets (approximately $393 per ML). As a result of these differences, NSW Murray and Victorian and SA Murray temporary markets have been separated for discussion purposes in this report.

Table 3 highlights the most significant market events that shaped the Murray temporary water markets in 2018-19 and demonstrates the impact of government announcements on prices.

Throughout September and October 2018 the Commonwealth Environmental Water Holder (CEWH) traded 20,837 ML of temporary water held in the Goulburn system, via a tender process. The announcement from the CEWH of its intention to trade water resulted in a decrease in price in the (at the time disconnected) Murray markets. Prices for these markets then started to trend upwards for the remainder of the season, including some spikes as unsuccessful market participants in the CEWH tender re-entered the market to secure water. This demonstrates to the market the ability of environmental water holders to lower temporary water pricing as a result of new water supplies they can bring to the market.

Table 3: Key market events in the NSW, Victorian and SA Murray temporary markets

<table>
<thead>
<tr>
<th>Major market event</th>
<th>Impact</th>
<th>Discussion</th>
</tr>
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<tbody>
<tr>
<td>July to August 2018</td>
<td>Prices increased by 42 percent over 15 days</td>
<td>Uncertainty of market movement and impact of third allocation announcement along with drier conditions. Murrumbidgee still shut for in-trade.</td>
</tr>
<tr>
<td>January 2019</td>
<td>Prices increased by 56 percent over 23 days</td>
<td>Driven by the first 2019-20 season allocation forecast announcement in conjunction with allocation announcements and January being the driest on record. Murrumbidgee still shut for in-trade.</td>
</tr>
<tr>
<td>August 2018</td>
<td>Prices decreased by 7 percent over a few days</td>
<td>Driven by the Commonwealth Environment Water Holder’s intention to trade in the (at the time disconnected) Goulburn system.</td>
</tr>
<tr>
<td>April 2019</td>
<td>Prices increased by 23 percent over 10 days</td>
<td>Driven by new 2019-20 season allocation forecasts in conjunction with allocation announcements and low confidence in the market signaled by very low volumes of trades.</td>
</tr>
</tbody>
</table>
New South Wales (NSW) Murray

Low allocations for NSW Murray General Security entitlements and a lower quantum of carry over water compared to previous seasons meant there was a lower supply of water to the market than last year and a much-increased average value of temporary water.

The annual average weighted price for NSW Murray temporary water increased by 185 percent to $375 per ML in 2018-19.

The price of temporary water in the NSW Murray market peaked at $633 per ML in April. Average monthly prices closed at $459 per ML, a 80 percent increase from the opening price (Chart 7).

With respect to trade activity, total temporary trades for the year 2018-19 decreased by 17 percent less than 2017-18. Also, there was a 40 percent decrease in volumes traded between the years.

Temporary trade volume peaked in July 2018 and June 2019 which looks to have been influenced by shifting of environmental water.

Chart 7: NSW Murray Temporary water – Volumes and prices, 2018-19
Victoria and South Australia (SA) Murray (combined)

The highest price paid peaked at $695 per ML in February 2019. This coincided with a period where record temperatures were reached in some parts of the Basin. Furthermore, in February 2019 resource managers of SA, Victoria and New South Wales, released their first outlook for the 2019-20 season, which included an announcement that SA Murray entitlement holders would receive opening allocations of a minimum of 21 percent (compared to 100 percent in 2018-19), and considerably lower allocations for Victoria and NSW.

The annual average weighted price for Victoria and SA Murray temporary water (combined) increased by 175 percent from 2017-18, to $393 per ML in 2018-19.

Average monthly prices closed at $502 per ML, a 127 percent increase from the opening price at $221 per ML (Chart 8).

With respect to trade activity, total temporary trades for the year increased 22 percent more than 2017-18. Conversely, there was a 13 percent decrease in volumes traded between the years.

Chart 8: Victoria and SA Murray (combined) Temporary water – Volumes and prices, 2018-19
New South Wales (NSW) Murray – Permanent

The annual average weighted price for General Security permanent water increased by 36 percent from 2017-18, to approximately $1,939 per ML in 2018-19.

Prices for General Security entitlements peaked at $2,240 per ML in October 2018. Average monthly prices closed 12 percent higher than the opening price (Chart 9).

The total number of trades in NSW General Security entitlements increased by 56 percent over 2017-18. Also, the volume traded increased, to 30,943 ML in 2018-19.

Trade volume increased significantly in September 2018. This was due to two large trades.

Chart 9: NSW Murray Permanent water (General security) – Volumes and prices, 2018-19
The annual average weighted price for High Security permanent water increased by 42 percent from 2017-18, to approximately $5,328 per ML in 2018-19.

Prices for High Security entitlements peaked at $7,055 per ML in May 2019. Average monthly prices closed 46 percent higher than the opening price (Chart 10).

Whereas, the total number of trades in NSW High Security entitlements decreased by 7 percent from 2017-18. Whereas, the volume traded decreased by 16 percent in 2018-19.

Trade volume increased significantly in October 2018. This looks to have been influenced by shifting of environment water.

Chart 10: NSW Murray Permanent water (High security) – Volumes and prices, 2018-19
Victorian Murray – Permanent (Low Reliability and High Reliability)

The annual average weighted price for Victorian Low Reliability permanent water increased by 48 percent from 2017-18, to approximately $529 per ML in 2018-19.

Prices for Low Reliability peaked at $1,000 per ML in July 2018. Average monthly prices closed at $570 per ML, a 5 percent increase from the opening price (Chart 11).

The total number of trades in Victorian Low Reliability entitlements increased by 80 percent in 2018-19. The volume traded also increased, from 9,933 ML in 2017-18 to 25,386 ML in 2018-19.

Chart 11: Victorian Murray Permanent water (Low Reliability) – Volumes and prices, 2018-19
The annual average weighted price for Victorian High Reliability permanent water increased, by 38 percent from 2017-18 to approximately $4,155 per ML in 2018-19. Prices for High Reliability entitlements peaked at 6,585 per ML in July 2019. Average monthly prices closed at 42 percent higher than at opening of the season (Chart 12).

The total number of temporary trades in Victorian High Reliability entitlements increased by 22 percent in 2017-2018, while the volumes traded almost doubled over the period, from 31,982 ML trades in 2017-18, to 63,187 ML traded in 2018-19.

The month with the largest volume of trading was in February 2019 with 15,063 ML traded; almost three times the monthly average for 2018-19. This looks to have been influenced by trading of environmental water.

Chart 12: Victorian Murray Permanent water (High Reliability) – Volumes and prices, 2018-19
South Australia (SA) Murray – Permanent (Class 3 Irrigation)

The annual average weighted price for SA permanent (Class 3 irrigation) water increased by 69 percent from 2017-18, to $5,012 per ML in 2018-19.

The total number of trades in SA permanent entitlements decreased by 26 percent in 2018-19.

Prices for SA permanent entitlements peaked at $9,821 per ML in April 2019. Average monthly prices closed at $6,222 per ML, a 68 percent increase from the opening price (Chart 13). Total volumes traded, however, decreased from 22,077 ML traded in 2017-18 to 18,831 ML traded in 2018-19.

The month with the largest volume of trading was January with 5,245.4 ML traded; over double the monthly average for 2018-19. A single high-volume trade contributed to this increase.

Chart 13: SA Murray Permanent water– Volumes and prices, 2018-19
Goulburn - Temporary
Trade between the Goulburn and Murray was closed for the large majority of the 2018-19 season, limiting trading opportunities for Goulburn, Campaspe, Broken and Loddon entitlement holders. Trade restrictions were lifted in mid-January 2019 and, from this date, Goulburn temporary prices increased substantially, until the close of the season (Chart 14). As a result of this restriction, combined with low allocations for Goulburn entitlements, and a lower quantum of carry over water compared to previous seasons, there was lower supply of water to the Goulburn market. This resulted in an 18 percent decrease in the monthly average trade volumes and a 258 percent increase in the average annual temporary price, when compared to the 2017-18 season.

During September and October 2018, the Commonwealth Environmental Water Holder (CEWH) traded 20,837 ML of temporary water held in the Goulburn system. This was the first time the CEWH participated in the Southern Connected Basin temporary water market. The announcement from the CEWH of its intention to trade water in the Goulburn market, that resulted in a decrease in the price of temporary water. Prices then started to trend upwards for the remainder of the season, with some spikes as market participants who had been unsuccessful in the CEWH tender re-entered the market to secure their water. This demonstrates to the market, the ability of environmental water holders to lower temporary water prices, as a result of new water supplies that they can bring to the market.

Chart 14: Goulburn Temporary water– Volumes and prices, 2018-19
**Goulburn – Permanent**

Permanent prices for both Low and High Reliability entitlements fluctuated throughout the 2018-19 season. On average, Low Reliability prices increase by 46 percent from the 2017-18 season, and High Reliability prices by 21 percent.

Prices peaked, for both Low and High Reliability, in May 2019 (Charts 15 and 16). The number of Low Reliability trades increased by 15 percent from 2017-18 to 2018-19. The average monthly volume of trades increased by 87 percent, over the same period.

Chart 15: Goulburn Permanent water (High Reliability) – Volumes and prices, 2018-19
Chart 16: Goulburn Permanent water (Low Reliability) – Volumes and prices, 2018-19
Other commentary

Murray-Darling Basin Royal Commission

Allegations of water theft by NSW cotton farmers in 2017\textsuperscript{11} prompted the establishment of South Australia’s Murray-Darling Basin Royal Commission (Commission) (of which, Waterfind made a submission to\textsuperscript{12}). On 29 January 2019, the Commission delivered a scathing review of the Basin Plan (the Plan), and accused Commonwealth officials of gross maladministration, negligence, and unlawful actions in drawing up the Plan.

The Plan, signed into legislation by Basin states and the federal government, aimed to remove 2,750 GL of water through irrigated agriculture, and return it to the environment. The Commission found the original plan ignored potentially “catastrophic” risks of climate change and recommended major reform, including resetting water saving limits, repealing the outcome of the Northern Basin Review\textsuperscript{13}, and new measurements for floodplain watering.

In its report, the Commission accused the Murray-Darling Basin Authority (MDBA) of failing to implement the Plan’s reforms; and being “unwilling or incapable of acting lawfully”. The report also found the MDBA failed to act on “the best available science” when it determined the volume of water that could be returned to the environment, and called for new water limits to be set on “the basis of a proper construction of the Water Act, rather than using a triple bottom line\textsuperscript{14} approach”.

Fish deaths in the Lower Darling

In December 2018 and January 2019, the Lower Darling was subject to large scale fish death events covering a 40 kilometre stretch of the river downstream of Menindee Lakes.

In response to these events, an independent panel was appointed by the Australian Government. This panel concluded that “over a million” fish may have died in the series of fish death events.\textsuperscript{15} The panel found there were three main immediate causes of the fish death events:

- low flows
- poor water quality
- sudden change in temperature\textsuperscript{16}.

Murray-Darling irrigators file class action seeking $750m from basin authority

In June 2019, irrigators in Southern New South Wales filed a class action in the New South Wales Supreme Court, seeking $750 million in damages from the MDBA.

Southern Riverina Irrigators Council alleges MDBA mismanagement was responsible for $750 million in losses arising from low water allocations. The claim accuses the MDBA of being reckless and grossly negligent in draining water from the Menindee Lakes in 2016, and discharging water from the Basin knowing there would be little, or none, left for the southern irrigators.\textsuperscript{17}
**Queensland – Surface water**

Most of the water trading in Queensland occurred in the eastern part of the state. Volumes and prices increased for both temporary and permanent trades when compared to the previous year.

**Weather conditions**

**Winter 2018**

Winter rainfall was below average across large parts of western, central and east coast Queensland with above average rainfall in the northwest, near-average in parts of the northern and southern interiors.

Warm days across most of the State saw the fifth-warmest winter on record in terms of mean maximum temperature. Some locations had their highest winter mean daily maximum temperature on record.

**Spring 2018**

It was a dry start to spring, with most of the State recording below average rainfall in September.

It was the third-warmest spring on record for Queensland, in terms of mean temperature. Extreme heat affected eastern Queensland in November, and numerous locations had their highest spring temperature on record.

Severe thunderstorms and bushfires were extremely active in October and November, with large hail and damaging winds.

**Summer 2018-19**

Summer rainfall was well above average, in the northwest, northern interior and northeast coast, with record highs in some areas. In contrast, large areas of southern Queensland reported well below average summer rainfall, and the driest on record at some locations.

Tropical cyclone Owen brought moderate to heavy falls to the north and the east of the State in December, then remnants of ex-tropical cyclone Penny produced moderate to locally heavy falls along the Capricornia to central coasts in early January. From end January to early February, an active monsoon trough and an embedded low-pressure system in northwest Queensland brought extreme heavy falls to northern Queensland.

Major flooding occurred in the Gulf rivers, and the northeast coast of Queensland. In contrast, large areas of southern Queensland had well below average rainfall, with many sites having their driest summer on record, or driest in several decades.
It was the fourth-warmest summer on record for the State in terms of mean temperature. A delayed monsoon onset over the Gulf Country resulted in an extended period of hot days in the northwest in January. A low-intensity heatwave affected parts of Queensland in late February, with some sites reporting their highest summer temperature on record. Significant bushfires were experienced in summer, with over 715,000 hectares burnt.

**Autumn 2019**

Autumn rainfall was well above average from western to central inland Queensland, extending into the southwest and southern parts of the State, also in the northern Cape York Peninsula and areas of the north tropical coast, with a few areas reporting their highest total autumn rainfall for at least 20 years.

It was a very warm start to autumn. March daytime temperatures were warmer than average in the State’s southeast, and a record warm in the South East Coast District. Some locations had their hottest autumn day on record. April mean maximum temperatures were cooler than usual across the central interior, but warmer than usual in the northwest, along the southern border, and parts of the east coast. April mean minimum temperatures were warmer than average across large parts of southern, northern, and eastern Queensland, but near-average elsewhere. In May, mean maximum temperatures were generally warmer than average in the southern and southeastern quarter of the State, as well as the Gulf Country, and there were areas of well above average mean minimum temperatures reported about the Gulf Country, north tropical coast, and southern interior.

**Storages and allocations**

Total storages decreased in the first half of the season (771 GL in the first quarter and 30 GL in the second) and increased in the third (by 253 GL). In the final quarter of the season, total water storages decreased by a total of 201 GL.

At the end of June, storages were holding 10 percent less water (6,973 GL) compared to the same time the previous year 7,788 GL).
Table 4: Allocations, selected Queensland water schemes, 2018-19

<table>
<thead>
<tr>
<th>Scheme</th>
<th>Priority</th>
<th>Quarter 1</th>
<th>Quarter 2</th>
<th>Quarter 3</th>
<th>Quarter 4</th>
</tr>
</thead>
<tbody>
<tr>
<td>Barker Barambah</td>
<td>Medium</td>
<td>10%</td>
<td>10%</td>
<td>23%</td>
<td>34%</td>
</tr>
<tr>
<td>Bowen Broken</td>
<td>Medium</td>
<td>100%</td>
<td>100%</td>
<td>100%</td>
<td>100%</td>
</tr>
<tr>
<td>Bundaberg</td>
<td>Medium Burnett</td>
<td>89%</td>
<td>89%</td>
<td>100%</td>
<td>100%</td>
</tr>
<tr>
<td></td>
<td>Medium Kolan</td>
<td>100%</td>
<td>100%</td>
<td>100%</td>
<td>100%</td>
</tr>
<tr>
<td>Burdekin-Haughton</td>
<td>Medium</td>
<td>78%</td>
<td>100%</td>
<td>100%</td>
<td>100%</td>
</tr>
<tr>
<td>Dawson Valley*</td>
<td>Medium Lower</td>
<td>12%</td>
<td>100%</td>
<td>100%</td>
<td>100%</td>
</tr>
<tr>
<td></td>
<td>Medium Upper</td>
<td>0%</td>
<td>46%</td>
<td>72%</td>
<td>97%</td>
</tr>
<tr>
<td></td>
<td>Medium A</td>
<td>0%</td>
<td>66%</td>
<td>92%</td>
<td>100%</td>
</tr>
<tr>
<td>Macintyre Brook</td>
<td>Medium</td>
<td>100%</td>
<td>100%</td>
<td>100%</td>
<td>100%</td>
</tr>
<tr>
<td>Mareeba-Dimbulah</td>
<td>Medium</td>
<td>100%</td>
<td>100%</td>
<td>100%</td>
<td>100%</td>
</tr>
<tr>
<td>Nogoa Mackenzie</td>
<td>Medium Zones B-D</td>
<td>6%</td>
<td>6%</td>
<td>30%</td>
<td>34%</td>
</tr>
<tr>
<td></td>
<td>Medium Zones E-N</td>
<td>6%</td>
<td>6%</td>
<td>9%</td>
<td>34%</td>
</tr>
<tr>
<td>Upper Burnett</td>
<td>Medium – John Goleby</td>
<td>98%</td>
<td>100%</td>
<td>100%</td>
<td>100%</td>
</tr>
<tr>
<td></td>
<td>Medium – Wuruma/Kirar/</td>
<td>100%</td>
<td>100%</td>
<td>100%</td>
<td>100%</td>
</tr>
<tr>
<td></td>
<td>Jones/Claude Wharton</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*Dawson Valley Q1 begins 1 October; all other regions Q1 begins 1 July

Prices and volumes traded

Statewide
Most of the water trading in Queensland occurs in the eastern part of the state. Rainfall is highest along the east coast, and in the northern part of the State, and during the summer months.

Due to deficiencies with the Queensland water register, temporary water information has been compiled using SunWater data and Waterfind’s data warehouse as a proxy. Trading data for these markets are presented Table 5 and 6.

The number of temporary trades increased by 10 percent between 2017-18 and 2018-19, and increased by 4 percent for permanent trades (Table 5).
Average temporary prices increased by 6 percent from approximately $77 per ML in 2017-18 to approximately $82 per ML in 2018-19. Temporary prices reached a peak in February 2019 at $165 per ML, and closed at approximately $52 per ML for the season.

Permanent entitlement prices in Queensland increased by 68 percent between the years, to $2,419 per ML in 2018-19.

The average monthly volumes of permanent water traded increased by 19 percent, to 5,838 ML per month in 2018-19.

As can be seen in Charts 17 and 18, a large proportion of temporary water traded in 2018-19 occurred the Bundaberg and Burdekin/Haughton markets.

There was a 39 percent increase in the total volume of temporary water traded, and an 19 percent increase in the total volume of permanent water traded (Table 6).

<table>
<thead>
<tr>
<th>Type of Trade</th>
<th>No of Trades 2018-19</th>
<th>No of Trades 2017-18</th>
<th>Difference percentage %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Temporary</td>
<td>1,742</td>
<td>1,586</td>
<td>10%</td>
</tr>
<tr>
<td>Permanent</td>
<td>458</td>
<td>440</td>
<td>4%</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>2,290</strong></td>
<td><strong>2,026</strong></td>
<td><strong>13%</strong></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Type of Trade</th>
<th>Volume Traded (ML) 2018-19</th>
<th>Volume Traded (ML) 2017-18</th>
<th>Difference percentage %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Temporary</td>
<td>334,780</td>
<td>241,490</td>
<td>39%</td>
</tr>
<tr>
<td>Permanent</td>
<td>70,052</td>
<td>58,716</td>
<td>19%</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>404,832</strong></td>
<td><strong>300,026</strong></td>
<td><strong>35%</strong></td>
</tr>
</tbody>
</table>
Chart 17: Queensland – Volume traded by key water markets, Temporary, 2018-19

Chart 18: Queensland – Volume traded by key water markets, Permanent, 2018-19
Bundaberg

There were 362 temporary trades made in 2018-19, with a volume of 41,699 ML. The average monthly number of temporary trades for 2018-19 increased by 10 percent from 2017-18.

Temporary trade prices reached a peak in March 2019 at $50 per ML. The average temporary price was approximately $41 per ML in 2018-19.

Chart 19: Bundaberg Temporary water – Volumes and prices, 2018-19
The volume of permanent entitlements traded increased by 92 percent from 2017-18 to 567 ML per month in 2018-19. The annual weighted average price has remained the same.

Chart 20: Bundaberg Permanent water – Volumes and prices, 2018-19
**Burdekin-Haughton**

There were 99 temporary trades made in 2018-19, with a volume of 26,039 ML. The average monthly number of temporary trades for the 2018-19 season decreased by 22 percent.

The average temporary price was approximately the same for 2017-18 and 2018-19, with a price of $31 per ML. The temporary price paid for temporary water reached a peak in September 2018 at $38 per ML. The average monthly price closed at $15 per ML for the season.

**Chart 21: Burdekin-Haughton Temporary water – Volumes and prices, surface water 2018-19**

Permanent entitlement prices within Burdekin-Haughton increased by 13 percent from 2017-18, to an average of $266 per ML in 2018-19.
Monthly average volume traded for permanent entitlements decreased by 55 percent to 565 ML per month in 2018-19.

**Chart 22: Burdekin-Haughton Permanent water – Volumes and prices, surface water 2018-19**

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**Other commentary**

**SunWater Tenders for long-term lease or permanent water**

In September 2018, SunWater placed a tender resulting in the sale of 12,000 ML of Bundaberg Medium Priority water for a minimum 10-year term allocation in Paradise Dam, in the Bundaberg Water Supply Scheme. This tender was fully awarded.

Over the 2018-19 year, the demand profile in the Burdekin Water Supply Scheme shifted significantly, and demand outstripped supply. In response, in March 2019, SunWater invited tenders for the acquisition of up to 42,000 ML of Medium Priority, and 5,000 ML of High Priority term allocations of water from the Burdekin Haughton Water Supply Scheme, for a minimum 10-year term allocation. At the time of preparing this report, the tender contracts had not yet been fully awarded.
Groundwater markets

In areas with low surface water availability, groundwater markets provided reliable alternatives. Temporary prices increased in many markets as a result.

Introduction to groundwater markets

Groundwater management is, generally, more challenging than surface water management, because it is less visible and groundwater recharge is more difficult to measure than stream inflows. That said, groundwater can be a very reliable source, as it generally is not subject to the short-term climate variability that we see with surface water markets.

However, groundwater trading generally:

- takes longer than surface water trades
- has higher administrative costs, usually as a result of hydrological assessments which can cost several hundred dollars
- is often limited by water quality constraints, mainly high salinity.

Groundwater accounts for around three percent of total water used in Australia. In 2018-19, groundwater trades made up around 3 percent of all temporary water traded in Australia, but around 13 percent of all permanent water traded.

In years where high prices are observed in surface water markets, it is usual for demand to increase in certain groundwater markets, resulting in higher prices in these markets. For example, in 2018-19 in the Lower Murray groundwater market, there was a price increase of over 500 percent from the previous year (see below), with prices increasing from an average weighted price of approximately $38 per ML to approximately $230 per ML.

The severe drought in NSW which has caused mining companies to increase their participation in the Murray-Darling Basin water market traditionally been dominated by farmers. Mining companies have been increasingly active in water markets in 2018-19, with many companies looking underground to secure water.
Prices and volumes traded

Lower Murray Groundwater

The zero percent allocation for NSW Murray General Security entitlement made Lower Murray Groundwater entitlement an attractive alternative water source for risk mitigation purposes throughout 2018-19.

The annual average weighted price for Lower Murray Temporary Groundwater is increased over 500 percent to $223 per ML in 2018-19. The price peaked at $1,690 per ML in October 2018. Average monthly prices, closed at $120 per ML, a 108 percent increase from the opening price (Chart 23). With respect to trade activity, total number trades for the year 2018-19 increased by 85 percent than 2017-18. Also, there was a 42 percent increase in volumes traded between the years.

Chart 23: NSW Lower Murray Groundwater Temporary water – Volumes and prices, 2018-19
The annual average weighted price for Lower Murray Permanent Ground water increased by 97 percent to $1,518 per ML in 2018-19. The price peaked at $1,900 per ML in May. Average monthly prices closed at $1,600 per ML, a 113 percent increase from the opening price (Chart 24). With respect to trade activity, total number trades for the year 2018-19 increased by 50 percent than 2017-18. Also, there was a 58 percent increase in volumes traded between the years.

Chart 24: NSW Lower Murray Groundwater Permanent water – Volumes and prices, 2018-19
South Australia Lower Limestone Coast Groundwater

Despite the Lower Limestone Coast of South Australia generally receiving higher rainfall than in other inland areas of South Australia, dry conditions still impacted the temporary price for SA Lower Limestone Coast Groundwater relative to the 2017-18 season.

The annual average weighted price for Lower Limestone Temporary water is decreased by 12 percent to $136 per ML in 2018-19. The price peaked at $379 per ML in October.

Average monthly prices closed at $80 per ML, a 60 percent increase from the opening price (Chart 25). With respect to trade activity, total number trades for the year 2018-19 decreased by 28 percent than 2017-18. Also, there was a 13 percent decrease in volumes traded between the years.

Chart 25: SA Lower Limestone Coast Groundwater Temporary water – Volumes and prices, 2018-19
The annual average weighted price for SA Lower Limestone Coast permanent water decreased by 20 percent to $715, per ML in 2018-19. The price peaked at $7592 per ML in August 2018.

Average monthly prices closed at $600 per ML, a 37 percent decrease from the opening price (Chart 26). With respect to trade activity, total number trades for the year 2018-19 decreased by 2 percent than 2017-18. Also, there was a 20 percent decrease in volumes traded between the years.

Chart 26: SA Lower Limestone Coast Groundwater Permanent water – Volumes and prices, 2018-19
Lower Lachlan Groundwater

Zero allocation on Lachlan General Security surface water licences, and carryover restricted at 57 percent, made groundwater in the Lower Lachlan Groundwater market an attractive alternative throughout the 2018-19 season.

The annual average weighted price for Lower Lachlan Temporary increased by 139 percent to $110 per ML in 2018-19. The price peaked at $250 per ML in March 2019. Average monthly prices closed at $170 per ML, a 264 percent increase from the opening price (Chart 27). With respect to trade activity, total number trades for the year 2018-19 decreased by 22 percent than 2017-18. Also, there was a 2 percent increase in volumes traded between the years.

There has been limited trading for Lower Lachlan Groundwater Permanent water in the 2018-19 season.

Chart 27: Lower Lachlan Groundwater Temporary water – Volumes and prices, 2018-19
Other commentary

NSW Groundwater release

In October 2018, the NSW government released a total of 222,666 ML of additional groundwater into the market, for certain groundwater regions in the State (Table 7). This was done through a competitive process, with applicants bidding for volumes and prices. This release represents possibly the greatest release of new water entitlements in recent years. The results of this release are not yet publicly available.

Table 7: New groundwater entitlements released in NSW in 2018-19

<table>
<thead>
<tr>
<th>Region</th>
<th>Volume released (ML)</th>
</tr>
</thead>
<tbody>
<tr>
<td>NSW Murray-Darling Basin (MDB) Fractured Rock Groundwater Source</td>
<td>81,102</td>
</tr>
<tr>
<td>NSW Murray-Darling Basin Porous Rock Groundwater Source</td>
<td>50,081</td>
</tr>
<tr>
<td>North Western Unregulated and Fractured Rock Water Source</td>
<td>33</td>
</tr>
<tr>
<td>Greater Metropolitan Region Groundwater Source</td>
<td>50,872</td>
</tr>
<tr>
<td>NSW Great Artesian Basin Shallow Groundwater Source</td>
<td>6,119</td>
</tr>
<tr>
<td>North Coast Coastal Sands Groundwater Source</td>
<td>3,958</td>
</tr>
<tr>
<td>North Coast Fractured and Porous Rock Groundwater Source</td>
<td>28,742</td>
</tr>
<tr>
<td>South Coast Groundwater Source</td>
<td>1,759</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>222,666</strong></td>
</tr>
</tbody>
</table>
Environmental water

Governments are now the largest entitlement holders in the Basin. Their actions can have significant impacts, particularly in drought years.

Overview of Environmental Water

A range of different approaches is taken by Governments and environmental managers to protect the environmental health of our water resources.

One approach is to manage the flow of water in our waterways and wetlands, which has been disrupted from river regulation and overallocation, so that environmental assets are protected and rehabilitated.

A key part of the management of this water has been the establishment of government ‘environmental water’ authorities. Currently there are three government-established environmental water authorities (called environment water holders); the CEWH, the Victorian Environmental Water Holder (VEWH) and the New South Wales Department of Planning, Industry and Environment (NSW DPIE).

The CEWH manages the largest portfolio of environmental water entitlements these have been acquired through the Australian Government’s investment in water-saving infrastructure, and water purchasing throughout the irrigation districts of the Murray-Darling Basin (often referred to as Government water ‘buy-backs’).

The VEWH is an independent statutory body responsible for holding and managing Victoria’s environmental water entitlements. The VEWH is responsible for the delivery of all water for the environment in Victoria. This includes the delivery of water for the environment on behalf of the Commonwealth Environmental Water Holder and Murray-Darling Basin.

NSW DPIE is responsible for the delivery of all water for the environment in NSW. This includes water held by the CEWH.

Current environmental water held

At the end of the 2018-19 season, the total volume of water owned by the three environmental water holders was 4,370,255 ML (Table 8). The following sections provide a more detailed breakdown for each environmental water holder.

Table 8: Total volumes of environmental water holdings, 2018-19

<table>
<thead>
<tr>
<th>Holder</th>
<th>Volume held (ML)</th>
</tr>
</thead>
<tbody>
<tr>
<td>CEWH</td>
<td>2,830,000(^{23})</td>
</tr>
<tr>
<td>VEWH</td>
<td>640,000</td>
</tr>
<tr>
<td>NSW DPIE</td>
<td>900,255</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>4,370,255</strong></td>
</tr>
</tbody>
</table>
**CEWH**

Approximately 109 GL was acquired by the CEWH over the 2018-19 year\(^24\). The trend in the volume of water held by the CEWH can be seen in Chart 28.

**VEWH**

The VEWH works to achieve the best environmental outcomes with the water that is available. It prepares a seasonal watering plan each financial year which scopes where, when and how environmental water can be used, carried over, or traded in Victoria.\(^25\) This plan is guided by the objectives and functions of the VEWH that are established under a 2011 amendment to the Victorian Water Act 1989.

The VEWH does not make available to the public information on the volume of water it acquires throughout a water year until it publishes its annual report. At the time of preparing this report, the 2019-20 annual report is not yet available.

In March and April 2019, the VEWH traded 10 GL of Victorian Murray water allocation in northern Victoria. The revenue received is not publicly available at the time of preparing this report.

**NSW DPIE**

A moratorium on water entitlement acquisition has been in place in NSW since May 2009.\(^26\) As a result, no water entitlement was acquired by the NSW DPIE in 2018-19. However, 15 GL of water allocation was traded on the temporary water market over the year. The revenue received is not publicly available at the time of preparing this report.

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Chart 28: Commonwealth Environmental Water Holdings

![Chart 28: Commonwealth Environmental Water Holdings](image-url)
The impacts of environmental water holders in the water market

Since the introduction of environmental water holders, these institutions have significantly impacted the water market. The largest impact has been experienced in the Murray-Darling Basin, where the entitlement ownership is greatest. Some impacts and concerns raised include:

- price impacts
- other participants behaviour in the marketplace
- the growth of the investor and arbitrator market and foreign investment on market activity
- the criteria on who can trade water on behalf of these environmental water holders
- impacts on regional communities from significant reductions in the level of water entitlement
- an obligation for environmental water holders to lease back water to irrigators during drought periods
- a lack of transparency in the movement of water and how this impacts trading limits.

All three environmental water holders publish ‘environmental water strategies’ which provide some indication of their decisions about when, where and how much water to release for the environment, based on intended environmental outcomes. At this time, there are differences in how this is done between the environmental water holders. For example, the CEWH publishes its trade intentions quarterly, while the VEWH does so on an annual basis.

Delivering the right amount of water for the environment, in the right places and at the right times is complex. It is also difficult to ensure the right level of trade-off between environmental and other economically productive uses of water – particularly in times of drought. However, it is Waterfind’s view that there are some additional areas for improvement with environmental water holders, as discussed in Section 3.

Government announcements and policy developments

Governments across Australia have been busy progressing water policy and legislation, with some good reform activities occurring in the season.

National developments

National Water Initiative review

On Friday 5 March 2019 the Australian Government stated that it supported the Productivity Commission’s recommendation of renewing the National Water initiative (NWI). This is significant news for water reform in Australia.

In its review (released on 26 January 2019), the Productivity Commission recommended that Australian, State and Territory Governments should maintain trade reforms to date, and improve arrangements to facilitate open and efficient water markets. It proposes three priority areas:

- the removal of trading rules, policies and other barriers to trade
- reviewing the effectiveness and efficiency of service standards for trade approvals
- improving governments’ provision of water market information.

The Productivity Commission has also called for the MDBA to be split into two separate institutions - The Murray-Darling Basin Agency and The Basin Plan Regulator – a move rejected by the MDBA27.

The Productivity Commission’s specific recommendations, and the Australian Government’s response, are listed in Table 9.
<table>
<thead>
<tr>
<th>Productivity Commission’s Recommendation</th>
<th>Australian Government’s Response</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Recommendation 4.1 (a)</strong></td>
<td>The Australian Government supports in-principle recommendation 4.1 (a), noting implementation is a matter for relevant states and territories. Water markets are now well developed in the Murray-Darling Basin and in some other areas and could efficiently allocate water between alternative water users, both within and across sectors, including the urban sector. However, water trading within and between sectors needs to be more transparent and have similar costs and administrative rules. This is particularly important given the scale of agriculture water use relative to other sectors.</td>
</tr>
<tr>
<td>State and Territory Governments should remove those residual trading rules, policies (whether or not explicitly stated) and other barriers that prevent water being traded, or otherwise transferred, between the irrigation and urban sectors.</td>
<td></td>
</tr>
</tbody>
</table>

| **Recommendation 4.1 (b)**              | The Australian Government agrees in-principle recommendation (b). The Australian Government acknowledges there is potential for shortening of the approval times requirement under the trade approval service standards set by governments, noting the standards have not been updated since 2009. These standards do not apply to non-Basin jurisdictions, although some non-Basin states have chosen to report against the standard. |
| The Australian Government should commission an independent review of the effectiveness and efficiency of service standards for trade approvals. The review should consider whether the standards require shorter approval times. | |

| **Recommendation 4.1 (c)**              | Response: The Australian Government supports in-principle recommendation (c), noting implementation is a matter for relevant states and territories. A key outcome of the NWI is for parties to facilitate the operation of efficient water markets (para. 58). This depends on market participants having complete, accurate, and timely information, supporting well-informed trading decisions and, in turn, promoting market confidence and increased trading activity. The Australian Government continues to observe issues arising from the lack of transparent and timely data, including: the price and volume of trades, the type of trade, and details of alternative products (such as carryover and other forms of storage). The Australian Government will consider these recommendations with states and territories in the context of the renewal of the NWI. |
| The role of governments in providing water market information should be focused on ensuring the quality and accessibility of water resource, market rules and basic trade data. In fulfilling this role, State and Territory Governments should improve the quality and accessibility of trade data in water registers. Australian, State and Territory Governments should revise relevant provisions in the National Water Initiative to align with recommendation 4.1 (a). |
Foreign ownership and investment in water

On 1 March 2019, the Treasurer released the first report of the Register of Foreign Ownership of Water Entitlements, as at 30 June 2018. Amongst the findings of this report was the following:

- The total volume of foreign owned water entitlements (groundwater and surface water) across Australia was 4,035 GL (10.4 percent of total entitlements).
- The greatest usages of foreign held water entitlements was for agriculture (66.5 percent) and mining (26.3 percent) (Chart 29).
- China and the United States were the largest foreign water entitlement holders, each with 1.9 percent of total water entitlement, followed by the United Kingdom with 1.1 percent.
- A total of 9.4 percent of the water entitlements in the Basin are foreign held.
- Over 81 percent of foreign held water entitlement is held within Australian incorporated entities.

Chart 29: Foreign interests in Australian water entitlements by use
Table 10: Foreign owned entitlement by state territory, as at 30 June 2018

<table>
<thead>
<tr>
<th>State</th>
<th>Percentage of entitlement that is foreign owned</th>
</tr>
</thead>
<tbody>
<tr>
<td>New South Wales/Australian Capital Territory</td>
<td>8.7</td>
</tr>
<tr>
<td>Victoria</td>
<td>2.7</td>
</tr>
<tr>
<td>Queensland</td>
<td>18.4</td>
</tr>
<tr>
<td>Western Australia</td>
<td>25.9</td>
</tr>
<tr>
<td>South Australia</td>
<td>7.0</td>
</tr>
<tr>
<td>Tasmania</td>
<td>4.3</td>
</tr>
<tr>
<td>NT</td>
<td>3.3</td>
</tr>
<tr>
<td><strong>Total (Australia)</strong></td>
<td><strong>10.4</strong></td>
</tr>
</tbody>
</table>

Murray- Darling Basin Authority (MDBA) price reporting audit

In June 2019, the MDBA released the findings of its audit into reporting of the prices paid for water traded in the Basin. The audit assessed how effectively each Basin state collects, validates, records, and reports water trade price information, based on 2017-18 data.

Mandatory price reporting obligations were introduced in 2014, these require vendors to tell the relevant state agency the price of trades, and those agencies are obliged to provide this information to the Bureau of Meteorology.

The audit found that “no Basin government has robust arrangements in place to gather comprehensive price information”. As a result, some of the data reported by Basin states is “incomplete and inaccurate”. For example, of all trades reported, 44 percent were submitted with a zero-dollar price. The audit also found that “water trade data is dispersed across a great many approval authorities that use a multiplicity of processes built around the needs of water managers rather than the needs of the market.”

The audit demonstrates that much more needs to be done to ensure the collection of robust pricing information on the water market. As stated by the MDBA “several straightforward steps were required by governments to improve the quality of price data and to increase market transparency and confidence.”
State-specific developments

New South Wales (NSW)

Water Reform Action Plan
In December 2017, the NSW Government released its Water Reform Action Plan (WRAP) in response to an independent investigation into NSW water management and compliance. The WRAP contains forty actions the NSW Government is to undertake to ensure delivery of its responsibility with regard to the management of water. These actions relate to:

- Introducing best practice for water management
- Building a compliance and enforcement regime that ensures strong and certain regulation
- Ensuring transparency in how NSW shares, allocates and manages water
- Building capacity to support implementation of water reforms

In February 2019, an independent review was conducted into the progress of the WRAP’s actions. Five actions were not subject to the scope of the review. The review found that all but one action had been completed.

Water Sharing Plans
The 2018-19 year saw some significant reviews to the main water planning instruments in NSW. Water Resource Plans are a key requirement of the Commonwealth Basin Plan 2012. These plans set out the rules for how water is used at a local or catchment level, including limits on how much water can be taken from the system, and how water quality standards can be met. There are 20 Water Resource Plans required to be developed in NSW and, in 2018-19, eleven were presented and consulted on (Appendix A).

In NSW, Water Sharing Plans, made under the NSW Water Management Act 2000, are the primary mechanism for defining water-sharing (and rules for water trading) arrangements. Four Water Sharing Plans were replaced or amended in 2018-19 (Appendix A).

NSW Water metering rules
In April 2019, NSW introduced new water metering rules, designed to improve water accountability and transparency. These require that new non-urban water users who install new or replacement meters from 1 April 2019 to ensure the new meter is pattern-approved, has tamper-evident seals and a data logger, and is installed by a duly qualified person.

Victoria

Review of Goulburn to Murray trade rule
As highlighted in Section 1, there was a record delivery of water from the Goulburn system to the River Murray in 2018-19. In October 2018, the Victorian Government announced that it was reviewing the existing Goulburn to Murray trade rule, to better understand how much water can be delivered down the Goulburn, particularly during summer and autumn, without impacting the environmental condition of the lower Goulburn or the entitlements of others. It has also flagged that it is considering certain restrictions on the use of tagged accounts, in response to the growing volume of water being moved through these accounts. (Section 2 discusses the impact this may have on the 2019-20 season).

Improved water market information
During 2018-19, the Victorian Water Register made some enhancements to the provision and accessibility of water market information for the public. For example, in April 2019, historical trade limit data functionality was introduced.
Queensland

Rural Water Management Program – Water markets, trading and unsupplemented water releases

In March 2018, the Queensland Government published the findings of an audit conducted by an independent expert panel to into non-urban water measurement and compliance. The report included recommendations for improved metering, investigations and compliance, and water information transparency. All of these are fundamental elements underpinning efficient water markets.

For example, as stated by the panel, metering allows for accurate measurement of water use, which benefits the community and water users by enabling water trading.36

In July 2018, the Queensland Government accepted most of the panel’s recommendations, and launched the Rural Water Management Program to address those recommendations. Within this program is a Bulk Water Opportunities Statement, released in December 2018, which aims, amongst other things, to:

- understand why water allocations are underutilised in some areas of the state
- improve processes and information provision to support increased water trading
- provide water customers and investors with integrated and coordinated advice about access to water37

As part of the Bulk Water Opportunities Statement, the Queensland Government has developed a process for release of unallocated water to improve uptake of unallocated water reserves, to improve access to water allocations and to maximise the value of water that is available seasonally and over the long term.

Amendments made in 2018-19 to the Queensland Water Act 2000 now allow temporary access to strategic water infrastructure reserves.38 For the first time this was utilised in May 2019, with expressions of interest being sought for 90,000 megalitres of water made for short-term access to irrigators along the Dawson River (reserved for the Nathan Dam and Pipeline project), to expand or diversify irrigation activity 39.

Trading in Burdekin Water Plan

An amendment made to the Burdekin Water Plan in June 2019, has established water trading in the upper sub-catchments (Upper Burdekin, Cape Campaspe and Belyando-Suttor). The plan area has the largest water supply scheme in Queensland (Burdekin Haughton Water Supply).40.
South Australia (SA)

The South Australian River Murray Water Allocation Plan

The River Murray water source provides a significant proportion of the total volume of irrigated water in South Australia.

On 3 March 2019, the South Australian Government released a new SA River Murray Water Allocation Plan. This included changes to allocation announcements and carryover arrangements. In summary:

- Minimum opening allocation announcements will be made earlier than in previous years, based on very conservative water availability projections (this approach aims to minimise the risk that allocations may be reduced within a water year, as was the case in the Millennium Drought 2006-07).
- During a water year when irrigation allocations are less than 100 percent, the Department for Environment and Water (DEW) would provide updates to allocations on a fortnightly basis and updated water outlook information on a monthly basis.
- Entitlement holders will receive a range of water allocation outlook information, including probability scenarios that represent possible allocations under different water availability and operational conditions.
- These changes provide greater consistency with the approach adopted in New South Wales and Victoria.
- Private carryover is free, and not will be subject to losses.

Water Register funding/announcement

The South Australian Government has proposed improvements to South Australia’s Water Register, assisted by an investment of $13.2 million by the Australian Government.

In November 2018, Waterfind contributed to consultation on the new and enhanced register which proposes changes in the following areas:

- Introducing a scheme for registration of security interests and caveats
- Changes to facilitate better trade and transactional services
- Changes to improve certainty and confidence in the register
- Changes to improve trade data and price discovery, and the ease of doing transactions
- Changes relating to bundled and unbundled water rights

The new system is to be fully implemented by 30 June 2021.
Western Australia

Waterfind has not identified any significant policy developments relevant to Western Australian water markets in 2018-19 year.

Comprehensive water trading information for Western Australia remains unavailable to the public. The Western Australian Department of Water and Environmental Regulation only provides the number of trades, not the volumes or value of trades, in its annual report. The 2018-19 report is not yet published at the time of preparing this report.

Most water trading in Western Australia is carried out in the Gascoyne irrigation region, via the irrigation water service provider Gascoyne Water, and in the Harvey irrigation region, via the irrigation water service provider, Harvey Water.

Both Gascoyne Water and Harvey Water do not release information on sales in the current year. The Bureau of Meteorology publishes some limited trade information for these regions for Surface water only.

Table 11: Western Australia water trade activity, 2018-19 – number of trades and volume

<table>
<thead>
<tr>
<th>Surface Water</th>
<th>No. of trades</th>
<th>Volume (ML)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Short term transfers (allocation)</td>
<td>85</td>
<td>4,575</td>
</tr>
<tr>
<td>Permanent trades (entitlement)</td>
<td>24</td>
<td>1,395</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>109</strong></td>
<td><strong>5,970</strong></td>
</tr>
</tbody>
</table>

Tasmania

Water trading is exceptionally limited in Tasmania, with little formal trading recorded occurring in 2018-19 (Table 12). This is primarily due to limited scarcity from an abundance of water supply compared to demand, and a lack of interconnectivity between water schemes, which are still relatively young.

Table 12: Tasmanian water trade activity, 2018-19 – number of trades and volume

<table>
<thead>
<tr>
<th>Surface Water</th>
<th>No. of trades</th>
<th>Volume (ML)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Short term transfers (temporary)</td>
<td>180</td>
<td>10,411</td>
</tr>
<tr>
<td>Permanent trades</td>
<td>20</td>
<td>2,435</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>200</strong></td>
<td><strong>12,846</strong></td>
</tr>
</tbody>
</table>

There is no statutory requirement to report the price paid for a water trade in Tasmania. Most water trading transactions are reported as being for $0 value. In March 2019, the Tasmanian Government announced its Rural Water Use Strategy. This strategy is to set the direction for legislative and policy reform in the rural water sector for the next few decades, by guiding the State’s future water management arrangements, including through regulatory reform of the State’s water resources. Little detail is known yet about the scope of the reform, and whether it will include water markets and trading.
Australian Capital Territory

Water markets are not yet as mature in the ACT as in other states in Australia. Water trading is available within the ACT, however interstate water trading is not yet available to, or from, the Territory. No water was traded in 2018-19. The commencement of interstate trading is awaiting agreement of trading protocols with other jurisdictions of the Murray-Darling Basin (MDB).

Water trading in the ACT

The ACT has a total of 77,289 ML Water Access Entitlement’s (WAE’s). Of these, the government owned utility - Icon Water – own 71,000 ML (or around 92 percent) while the remaining 6,289 ML is a combination of private, ACT and Commonwealth Government entitlements respectively.

WAE’s may be purchased or sold, either permanently, or for a specified period. All trading is subject to the requirements of the Water Resources Act 2007, which provides that each trade must be approved or rejected by the ACT Environment Protection Authority.

In 2013, the ACT completed an enlargement of the Cotter Dam from 4 GL capacity to 76 GL; nearly 20 times its original size. This will increase the ACT’s total water storage capacity by 35 percent.

The increased security of supply through the increase in the dam capacity has resulted in an additional 15 GL of surface water entitlement being available to the ACT Government. The ACT Government is considering trading this water once the necessary regulatory frameworks are in place.

To inform its decision, in 2018-19, the ACT Government engaged Waterfind to provide a market valuation of this water entitlement, and give consideration to the costs and benefits of the trading options available.
Outlook for 2019-20

The 2019-20 season will present challenges, with many of the issues currently facing market participants extending well into the year. Low rainfall, storages and allocations will affect many of the markets; placing an increasing importance on water trading. Improving the market efficiency, governance and institutional arrangements will also be a focus for the 2019-20 year.
National weather outlook for 2019-20

Climate models suggest the current El Niño–like warmth in the central tropical Pacific Ocean will cool in the coming months. As a result, the drying influence on Australian climate from a warm tropical Pacific will reduce over the season.

Indian Ocean temperature forecasts indicate a positive Indian Ocean Dipole (IOD) through the southern winter, which is likely to be the dominant climate driver for Australia. Typically, a positive IOD brings below average winter-spring rainfall for southern and central Australia.

In the immediate term, a drier than average three months is likely for much of Australia. Chances of a drier July to September 2019 are highest across southwest and southeast Australia, where chances of a drier three months exceed 75 percent (Figure 6). July is likely to be drier than average for much of southern WA, southeast SA, eastern Tasmania, and much of the eastern mainland extending from Victoria up eastern NSW and into southern Queensland.

July to September temperatures are likely to be warmer than average for most of Australia, except in far north Queensland (Figure 7,8).

Figure 6: Chance of exceeding the median rainfall, July-September 2019
Figure 7: Chance of exceeding the median minimum temperature, July-September 2019

Figure 8: Chance of exceeding the median maximum temperature, July-September 2019
Murray-Darling Basin

Allocations and storages

Due to the current weather outlooks and end of season dam storages, all Basin states’ resource managers have taken a conservative approach for opening allocations for the 2019-20 season.

Opening allocations for all three states in the Southern Connected Basin were announced on 1 July 2019. Table 13 presents the opening allocations for the key Basin markets.

Table 13: Opening allocations for key Basin water markets

<table>
<thead>
<tr>
<th>New South Wales</th>
<th>Victoria</th>
<th>South Australia</th>
</tr>
</thead>
<tbody>
<tr>
<td>Murrumbidgee HS</td>
<td>95%</td>
<td>2%</td>
</tr>
<tr>
<td>Murrumbidgee GS</td>
<td>0%</td>
<td>0%</td>
</tr>
<tr>
<td>NSW Murray HS</td>
<td>97%</td>
<td>2%</td>
</tr>
<tr>
<td>NSW Murray GS</td>
<td>0%</td>
<td>26%</td>
</tr>
<tr>
<td>Lachlan HS</td>
<td>87%</td>
<td>2%</td>
</tr>
<tr>
<td>Lachlan GS</td>
<td>0%</td>
<td>19%</td>
</tr>
<tr>
<td>Macquarie HS</td>
<td>70%</td>
<td></td>
</tr>
<tr>
<td>Macquarie GS</td>
<td>0%</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Stock &amp; Domestic (Class 1) 100%</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Country Towns (Class 2) 68%</td>
</tr>
<tr>
<td></td>
<td></td>
<td>River Murray Irrigation (Class 3) 31%</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Industrial &amp; Dairy (Class 5) 100%</td>
</tr>
</tbody>
</table>

Tables 14 to 18 show water current allocation outlooks for the 2019-20 season under a range of inflow scenarios for key Basin markets.

The following announced allocations have since increased (as at 15 July 2019):

- Vic Murray HR: 6%
- Goulburn & Loddon HR: 8%
- Campaspe HR: 31%
- Bullarook HR & LR: 100%
- SA Murray (Class 3): 38%
Table 14: Murrumbidgee General Security – Allocation scenarios 2019-20

<table>
<thead>
<tr>
<th>Historical Inflow Scenario</th>
<th>1-Sep-19</th>
<th>1-Nov-19</th>
</tr>
</thead>
<tbody>
<tr>
<td>99 chances in 100 (extreme) (99%)</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>9 chances in 10 (very dry) (90%)</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>3 chances in 4 (dry) (75%)</td>
<td>0</td>
<td>10</td>
</tr>
<tr>
<td>1 chance in 2 (median) (50%)</td>
<td>5</td>
<td>25</td>
</tr>
</tbody>
</table>

Any carryover water can be added to these indicative allocations.

The Murrumbidgee Valley regulated river water source is in Stage 2 drought criticality, meaning drought operational planning has begun in preparation for extreme dry conditions which may continue through 2019-20. The figures in table 14 are based on storage behavior modelling using all years and General Security carryover of 8 percent. The system has been tracking at about the 85th percentile in the last three months (April to June 2019).

Table 15: NSW Murray General Security – Allocations scenarios

<table>
<thead>
<tr>
<th>Historical Inflow Scenario</th>
<th>1-Sep-19</th>
<th>1-Nov-19</th>
</tr>
</thead>
<tbody>
<tr>
<td>99 chances in 100 (extreme) (99%)</td>
<td>0%</td>
<td>0%</td>
</tr>
<tr>
<td>9 chances in 10 (very dry) (90%)</td>
<td>0%</td>
<td>0%</td>
</tr>
<tr>
<td>3 chances in 4 (dry) (75%)</td>
<td>0%</td>
<td>7%</td>
</tr>
<tr>
<td>1 chance in 2 (median) (50%)</td>
<td>0%^</td>
<td>30%*</td>
</tr>
</tbody>
</table>

Any carryover water can be added to these indicative allocations.

#Extreme dry baseline additionally includes Murrumbidgee end of system flows
^By September, under median inflow conditions, Conveyance allocation is likely to be about 110GL
*Barmah-Millewa Allowance payback commences

The NSW Murray regulated river water source is in Stage 2 drought criticality, meaning drought operational planning has begun in preparation for extreme dry conditions which may continue through 2019-20. Based only on New South Wales’ share of inflows, the figures in table 15 are based on multi-history modelling using all years, and assume 99 percent inflow conditions through 2019-20, and carryover of 18 percent.
### Victoria

#### Table 16: VIC Murray High-Reliability – Allocation scenarios 2019-20

<table>
<thead>
<tr>
<th>Inflow Conditions</th>
<th>Similar Inflow Season</th>
<th>15-Aug-19</th>
<th>15-Oct-19</th>
<th>16-Dec-19</th>
<th>17-Feb-20</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wet</td>
<td>2016/17</td>
<td>45%</td>
<td>100%</td>
<td>100%</td>
<td>100%</td>
</tr>
<tr>
<td>Average</td>
<td>2005/06</td>
<td>34%</td>
<td>59%</td>
<td>98%</td>
<td>100%</td>
</tr>
<tr>
<td>Dry</td>
<td>2015/16</td>
<td>25%</td>
<td>40%</td>
<td>48%</td>
<td>55%</td>
</tr>
<tr>
<td>Extreme Dry</td>
<td>2006/07</td>
<td>17%</td>
<td>21%</td>
<td>23%</td>
<td>29%</td>
</tr>
</tbody>
</table>

Inflow volumes to major storages that are greater in: 10 years out of 100 (Wet); 50 years out of 100 (Average); 90 years out of 100 (Dry); 99 years out of 100 (Extreme Dry)

#### Table 17: Goulburn & Loddon High-Reliability – Allocation scenarios 2019-20

<table>
<thead>
<tr>
<th>Inflow Conditions</th>
<th>Similar Inflow Season</th>
<th>15-Aug-19</th>
<th>15-Oct-19</th>
<th>16-Dec-19</th>
<th>17-Feb-20</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wet</td>
<td>2010/11</td>
<td>45%</td>
<td>98%</td>
<td>100%</td>
<td>100%</td>
</tr>
<tr>
<td>Average</td>
<td>2003/04</td>
<td>33%</td>
<td>63%</td>
<td>90%</td>
<td>100%</td>
</tr>
<tr>
<td>Dry</td>
<td>2008/09</td>
<td>16%</td>
<td>34%</td>
<td>40%</td>
<td>43%</td>
</tr>
<tr>
<td>Extreme Dry</td>
<td>2006/07</td>
<td>9%</td>
<td>15%</td>
<td>18%</td>
<td>20%</td>
</tr>
</tbody>
</table>

Inflow volumes to major storages that are greater in: 10 years out of 100 (Wet); 50 years out of 100 (Average); 90 years out of 100 (Dry); 99 years out of 100 (Extreme Dry)

Based on historical flow records that have been adjusted to match climate conditions observed since 1975, Tables 16 and 17 show the estimated High Reliability water share seasonal determinations for the Victorian Murray and Goulburn systems through the 2019-20 season.
South Australia

As SA Murray Class 3 allocations opened at just 31 percent at the beginning of the 2019-20 season (having since increased to 38 percent on 15 July), entitlement holders were able to carryover up to 20 percent of unused allocations from 2018-19, for use in the 2019-20 season. Further increases throughout the season are likely, with the main inflow season for the Murray historically occurring between July and October (Table 18).

Table 18: SA Murray (Class 3) – Allocation Scenarios 2019-20

<table>
<thead>
<tr>
<th>Allocation scenario</th>
<th>1-Jul-19</th>
<th>1-Sep-19</th>
<th>1-Nov-19</th>
<th>1-Jan-19</th>
<th>1-Apr-19</th>
</tr>
</thead>
<tbody>
<tr>
<td>Exceptionally dry</td>
<td>31%</td>
<td>43%</td>
<td>48%</td>
<td>55%</td>
<td>60%</td>
</tr>
<tr>
<td>Extreme dry</td>
<td>47%</td>
<td>66%</td>
<td>75%</td>
<td>79%</td>
<td></td>
</tr>
<tr>
<td>Very dry</td>
<td>50%</td>
<td>71%</td>
<td>93%</td>
<td>97%</td>
<td></td>
</tr>
<tr>
<td>Dry</td>
<td>60%</td>
<td>84%</td>
<td>100%</td>
<td>100%</td>
<td></td>
</tr>
<tr>
<td>Average</td>
<td>69%</td>
<td>100%</td>
<td>100%</td>
<td>100%</td>
<td></td>
</tr>
<tr>
<td>Wet</td>
<td>86%</td>
<td>100%</td>
<td>100%</td>
<td>100%</td>
<td></td>
</tr>
</tbody>
</table>

Possible volumes of water available in the market

Based on the current projected weather outlook, storages and allocations, Waterfind estimate that there may be approximately 2.7 million ML of water in the market in the MDB in the 2019-20 season. This compares with 6.6 million ML in the 2018-19 season (a reduction of around 60 percent) and 2.2 million ML in 2007-08 (an increase of around 23 percent) during the height of the millennium drought that affected much of south-eastern Australia.

Figure 9: Volume of water in the market in the MDB
Other factors that may shape the market

**Commodity prices**

The export values for table grapes, citrus and stone fruit are expected to continue to increase into 2019-20, with higher prices and volumes. This has been driven by Chinese demand, improved freight protocols, and extended marketing opportunities for Australian fruit exporters.

Demand for Australian almonds and other nuts are also expected to increase into 2019-20. These commodities have increased in recent years. In 2015 the area under production was 31,115 ha producing a record crop of 82,509 tonnes. Since then the industry has gone through a significant expansion which was estimated would increase orchard area to 45,000 hectares by 2018-19 with production increasing to 130,000 tonnes by 2025.\(^56\)

Large increases in these commodities in the past few years will mean increasing water demands as these plantations mature. Currently, almost 30 percent of almond bearing trees are not yet fully mature\(^57\). The perceived significance of this demand on the water market is reflected by the fact that the Almond Board of Australia is itself calling for a moratorium on further plantations, citing concerns these plantations are having on permanent and temporary water prices\(^58\).

Future water demand from horticulture in the Southern Connected Basin is expected to increase from 1,230 GL per year, to between 1,300 GL and 1,400 GL per year, once all current plantings reach full maturity\(^59\). Government activity will continue to impact the water market in 2019-20. In particular, through the following:

**Government regulatory reform**

The Terms of Reference for this inquiry had not been set at the time of preparing this paper. However, it is likely that the impacts of this inquiry will be far reaching in the water market, with the scope likely to include implications for market power, water prices, and the behaviour of market participants. The findings of this inquiry, if adopted, could be significant. The Australian Government Water Minister has already flagged possible intervention in the market as a result of the Inquiry\(^60\). Any major impacts arising from this inquiry are unlikely to be seen until late in 2019-20 year, due to the time taken to conduct these types of processes.

**Continued water purchasing and trading by environmental water holders**

Given the low allocations available across the market, any environmental water holder trading activity will be accentuated in the coming season. At the time of preparing this report, the Commonwealth Environmental Water Holder has announced that they have no plans to either buy or sell allocations or entitlements in the July to September period\(^61\), and the VEWH has stated that it would consider selling part of its allocation in northern region systems, if foreseeable environmental demands can be met; most likely from summer 2019-20 onwards, and be more likely following an average to wet winter-spring.\(^62\)

There may be additional impacts to the water market following comments made by the Australian Government Environment Minister that irrigators should be able to ‘borrow’ water reserved for maintaining river health, in times of drought\(^63\). Such a move however, would require legislative change.
**Victorian Minister Intervention in the Lower Murray market**

On 9 July 2019, the Victorian Minister for Water directed Lower Murray Water and Goulburn Murray Water to refer all licence applications in the lower Murray region to her for assessment for the next 12 months. It is the Minister’s position that no new licences for extraction will be issued, or limit increases granted, unless it can be shown there will be no increased risks to the environment or entitlement holders.64

This position follows the release of analysis that suggested that horticultural demand in the lower Murray region currently accounts for almost all allocation against entitlements held in average years. That analysis also suggested it will likely become more difficult for horticulture businesses and all other irrigated agriculture water industries to meet their demands in dry to average years if they are reliant on the allocation market. This could potentially lead to increased water prices in the future, particularly in dry years, as well as loss of production of horticultural plantings.65

The Victorian Minister for Water has stated she will review this approach in 12 months, when further MDBA modelling is complete. Until then, the Victorian Minister has requested New South Wales and South Australia consider similar actions.
Queensland

Allocations and storages

As at 30 June 2019, the total dam storage in Queensland was at 67 percent full, compared to 75 percent at 30 June 2018.

Table 19 presents the opening announced allocations for selected Queensland water schemes for the 2019-20 water year, that were available at the time of preparing this report. It shows there has been a general decline in allocations for medium priority water, with high priority water, generally the same (100 percent for most cases).

Table 19: Opening allocations, selected Queensland water schemes, 2019-20

<table>
<thead>
<tr>
<th>Scheme</th>
<th>Priority</th>
<th>Opening allocation 2019-20 (%)</th>
<th>Opening allocation 2018-19 (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Barker Barambah</td>
<td>Medium</td>
<td>0</td>
<td>10%</td>
</tr>
<tr>
<td>Bowen Broken</td>
<td>Medium</td>
<td>100%</td>
<td>100%</td>
</tr>
<tr>
<td>Bundaberg</td>
<td>Medium Burnett</td>
<td>71%</td>
<td>89%</td>
</tr>
<tr>
<td></td>
<td>Medium Kolan</td>
<td>100%</td>
<td>100%</td>
</tr>
<tr>
<td>Burdekin Haughton</td>
<td>Medium</td>
<td>83%</td>
<td>78%</td>
</tr>
<tr>
<td>Dawson Valley*</td>
<td>Medium Lower</td>
<td>N/A</td>
<td>12%</td>
</tr>
<tr>
<td></td>
<td>Medium Upper</td>
<td>N/A</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td>Medium A</td>
<td>N/A</td>
<td>0</td>
</tr>
<tr>
<td>Macintyre Brook</td>
<td>Medium</td>
<td>*not yet released</td>
<td>100%</td>
</tr>
<tr>
<td>Mareeba-Dimbulah</td>
<td>Medium</td>
<td>100%</td>
<td>100%</td>
</tr>
<tr>
<td>Nogoa Mackenzie</td>
<td>Medium Zones B-D</td>
<td>0</td>
<td>6%</td>
</tr>
<tr>
<td></td>
<td>Medium Zones E-N</td>
<td>0</td>
<td>6%</td>
</tr>
<tr>
<td>Upper Burnett</td>
<td>Medium – John Goleby</td>
<td>86%</td>
<td>98%</td>
</tr>
<tr>
<td></td>
<td>Medium – Wuruma/Kirar/Jones/ Claude Wharton</td>
<td>100%</td>
<td>100%</td>
</tr>
</tbody>
</table>

Other factors that may shape the market

The legislative changes to the Queensland Water Act 2000 that now allow temporary access to strategic water infrastructure reserves will continue to shape markets in areas where certain projects are proposed.

There is likely to be continued growing interest in permanent water sales to secure certainty of water, and reduce risk to irrigators and other industrial users.
Further improvements to Australian water markets

Australian water markets are world leading. But it has taken a great deal of effort to get here. It will take more to realise their full potential.
Waterfind's six areas of focus for further water market reform

The water market functionality we benefit from today is the result of National and state water reform. Most significantly, the Council of Australian Governments (COAG) Water Reform Framework initiated in 1994 aimed to clarify water property rights and facilitate and promote water trading. The next wave of large reform came in 2004 with National Water Initiative (NWI). This agreement aimed to facilitate the efficient functioning of water markets.

While reform has been significant, some aspects have not kept up with the dynamic pace and shape of the water market. As pointed out by the Productivity Commission in its May 2018 report, many of the NWI objectives have/are being met, but there is more work needed to ensure fully efficient water markets. This includes removing barriers to trade, improving water market information, and reducing administrative costs and times. Waterfind supports the Productivity Commission’s recommendations, and is pleased the Australian Government has also shown its support for a renewed NWI.

Waterfind proposes that further water reform opportunities are possible, and has identified six areas of focus for the next round of water market reform. These are discussed further in Section 3.

1. A nationally consistent, agreed upon, framework that covers rules and standards for the role and interaction of government in the marketplace. The framework should cover at a minimum, the setting of allocations in a way that is transparent and consistent, and a review of regulatory involvement in the market.

2. Improvements to the way water assets are valued and recognised under state and federal legislation.

3. Improvements to the access and robustness of water titles including the ability to mortgage and online search and lodge changes.

4. A centralised water market platform providing a licencing and regulatory framework for market participants.

5. A review into the requirement for regulation of water market intermediaries.

6. A comprehensive public review into water asset investment and foreign water asset ownership.

To maximise the likelihood of success, the proposed reforms must be sufficiently resourced, similar to the 1994 and 2004 COAG water reform frameworks.
A nationally consistent, agreed upon, framework that covers rules and standards for the role and interaction of government in the marketplace

As shown in Section 1 government acquisition and ownership are significant considerations in the water market. The method for entitlement acquisition continues to attract concern and criticism (for example, refer to the ‘Watergate’ event and opinions on the government’s irrigation infrastructure efficiency upgrades).

The setting of allocations is also an area that causes concern and confusion with water market participants.

With any marketplace there should be clear separation of functions between rule makers, regulators, market operators, intermediaries, and buyers and sellers. A framework that covers the rules and standards for the role and interaction of government in the marketplace is urgently needed. This framework should cover at a minimum:

- The setting of allocations in a way that is transparent and consistent
- Regulatory involvement in the market

The setting of allocations in a way that is transparent and consistent

Temporary water markets are critical for Australian irrigators to manage short term water supply changes and challenges. This market has much higher price fluctuation than the permanent market (where demand and supply conditions often work naturally against each other in the long term). Rapidly changing demand and supply conditions can see the same Australian irrigators paying between $20 to $700 per ML for temporary water across irrigation seasons.

Waterfind has examined pricing data and has found the highest short-term contribution to price changes is water allocation announcements. These announcements are mainly the responsibilities of state agencies responsible for sharing finite resources between competing interests. Most state bodies now understand the importance of those announcements to the market, and have created structures and processes to protect leakage of those announcements to the market ahead of time. They have also made improvements to the transparency of how allocation decisions are made.

However, some state agencies put their Water Ministers as the key allocation announcers or refer to non-public models which they use to establish the announced allocation. This process, unfortunately creates the potential perception of market participants with in a qualitative process of setting allocations, rather than the quantitative process that they actually are.

To address this, Waterfind recommends that all models and calculations used to determine allocations are publicly
accessible. Ideally, these would show real time changes to underlying water conditions, sharing arrangements between competing users, water security measures, and changes to allocations under different future water supply scenarios.

This additional transparency would minimise inefficiencies and distortions from information asymmetry and market announcements, and promote an overall greater level of confidence in the water market.

**Regulatory involvement in the market**

Currently, the largest holders of tradable Australian water rights are government or public entities responsible to regulate the market (Section 1). While this is not dissimilar to other major national assets such as land, stocks and shares, unlike these assets there is a lack of Nationally consistent rules in which water regulators engage with the market.

Waterfind recognises that some regulators go to significant lengths to create transparent and consistent rules for market engagement (such as publishing trading intentions, see Section 1), which are designed to remove adverse market impacts from their engagement. However, these rules are imperfect and are not consistent. They also lack suitable coinciding measures, with which to monitor if they are successful in their intentions.

Market regulators also create their own short-term marketplaces (such as tenders) rather than utilising a transparent and independent market platform. Each time this occurs, important and disturbing signals are sent to the market, which are not consistent with the overall national objective of building market confidence in managing and sharing our water resources through market-based measures.

Proper market function and design would create barriers of responsibilities from regulators, rule enforcers, intermediaries and participants. While this may not be immediately achievable, market regulators could take some important short-term steps towards proper market function in the ways in which they utilise the Australian water market.

Benefits of addressing the above include:

- minimising adverse and unintended consequences of governments in the marketplace, including inefficiencies and distortions from information asymmetry and market announcements
- providing overall greater confidence in the water market (and avoiding such events as ‘Watergate’)
- increasing economic efficiency
- protecting regulators and their staff from potential insider trading accusations and or challenges.

**Improvements to the way water assets are valued under state and federal legislation**

Growing hardship in some parts of Australia from current drought conditions, compounded by well-intended recent financial reform, has made an urgent case for a review of the way water assets are valued under financial legislation. This must be nationally consistent to ensure a level playing field across states.

Trading water is essential to our economy, directing scarce water resources to best economic use. The lack of efficient financing to purchase permanent water rights is hindering economic efficiency.

Banks, generally, have limited understanding of water markets and trading. They use outdated valuations of water entitlements, and limited flexibility such as tenor and repayment profile further compound this lack of understanding. Adhering to global accounting standards, banks treat water licenses as intangible. This puts them in the same class as derivatives and, as a result, they are required to 100 percent risk-weight them by the Australian Prudential Regulation Authority (APRA) for capital purposes. This compares to a risk weighting of as little as 25 percent for mortgages on residential property. The risk weighting results in significantly increasing a bank’s cost of funds for permanent water rights in Australia.
Waterfind believes Australian water rights have many of the same characteristics of real property; rights that are registerable, tangible, transferable, enforceable and able to be objectively valued.

Improving the way water assets are valued would:

- increase the resilience of irrigation communities to deal with drought conditions through improved access to finance
- minimise the transition costs from business transfers and closures
- maximise the competitiveness of Australian owned family farming entities, to compete against foreign and domestic investors who may have access to different sources of financing, beyond the traditional Australian based banks.

**Improvements to the access and robustness of water titles, including the ability to mortgage and online search and lodge changes**

In some parts of Australia, water titles are not fully robust or fully accessible. For example, many customers of water infrastructure operators are unable to access permanent water rights, and some state governments have yet to achieve the requirements of the NWI, in that water titles adopt similar characteristics of land-based titles. Benefits of improving the access and robustness of water titles include:

- increasing economic efficiency from potentially more trading opportunities
- increasing the resilience of irrigation communities to deal with drought conditions through improved access to finance
- minimising the transition costs from business transfers and closures.

**A single national exchange that is a centralised water market platform, providing a licencing and regulatory framework for market participants**

Like the stock market, a centralised exchange would include a licencing and regulatory framework which could be accessed by water market participants.

Waterfind considers it important from a market confidence, and national security perspective, that this centralised exchange be mandated by government to be Australian-owned and operated. In the absence of that mandate, this would be jointly owned by State and Federal Governments. Benefits of this reform include:

- lower costs for market participants
- evidence to APRA of a “marketplace”, which is essential to it shifting its current view of water rights property status and coinciding impacts to financing those rights (Section 3)
- greater consistency and transparency in market information than is currently provided by state-based registers
- overall market protection from appropriate regulation
- greater overall confidence in the marketplace.

**A review into the requirement for regulation of water market intermediaries**

Waterfind has long supported regulation of water market intermediaries. In the absence of industry regulation, some statutory and government owned authorities have developed well intended, but misguided criteria for dealing with water market intermediaries. At a minimum, a review needs to be conducted to determine agreed upon behaviour and operational criteria for market intermediaries.
Without market regulation, Waterfind suggests the following core criteria for government entities, and that the service provider:

- has clear, written terms of use which are agreed to by its customers. These would set out terms in which they conduct and manage water transactions, and clearly articulate the relationship the intermediary has with their customer
- does not create, or purport to create, any sort of agency relationship with their customer
- utilises trust accounts for all transactions that is free from any creditor action of that service provider
- does not trade water in their own right
- provides comprehensive information through an online system that is accessible, and in real time, to its customers (at a minimum, this would provide transaction history and key market driving events)
- has a quality endorsed business operation system that secures these core provisions into the way they do business.

Benefits of this reform include:

- reduced costs for water market intermediaries that arise from differing criteria
- greater protection of water market participants
- greater overall confidence in the marketplace.

**A comprehensive public review into water asset investment and foreign water asset ownership**

Waterfind has observed growing concern regarding the impact investors and speculators are having on the marketplace, including concern from water market participants regarding levels and intentions of foreign ownership of water assets. Without robust information and debate, this concern will continue to grow.

The Register of Foreign Ownership of Water Entitlements report provided some good information into the debate surrounding foreign ownership. However, a comprehensive public review should be carried out to ensure practices and concerns are not having a detrimental impact to the effectiveness and efficiency of water markets. It is hoped that the ACCC Terms of Reference for its upcoming inquiry include scope to significantly assist in the provision of information and debate.
Further water market tools, information and services

The Australian water market and its participants are becoming much more sophisticated. Waterfind’s products and services are there to support this; extending well beyond water brokering.
Waterfind is an ISO quality assured, Australian family owned company, that has been in operation since 2003. Our Australian owned and operated award-winning water market platform, increases confidence and knowledge for those who deal in the water market, and reduces their transaction costs. The following is a range of Waterfind’s key water market related services.

**Online Water Market Platform**

Waterfind offers its clients direct access to the live buy and sell water marketplace through an individualised trading screen. Online traders see the same market information as water brokers, and are provided 24/7 access to market trading screens, water market information, automated alerts, and order clearing. The online water market platform provides users with an ability to dynamically check trade progress and or trade history.

**Brokering**

Waterfind is Australia’s only Australian owned and operated online water market platform. We provide tailored water brokering services to all types of water market participants; large and small, government and corporate, at very competitive rates.

Our brokers undergo comprehensive and on-going training, to ensure they are up to date with market intelligence any changes that may impact water markets.

Our offices are conveniently located in Adelaide, Mildura, Griffith and Brisbane, which enables us to service our clients across the Murray-Darling Basin and Queensland.

Our multi-award winning water exchange platform and quality assured governance and management systems mean that our clients can trade with us efficiently, and with confidence and protection.

**Account management**

We offer water asset owners full account management services, which includes:

- Ongoing management of your water assets to deliver agreed returns using a range of water market options
- Strategic management and acquisition of yearly temporary and permanent purchase requirements
- Your own water trading platform portal, with access to water market information and asset performance statistics.
This platform provides you with the ability to:

- Manage and track long term leasing arrangements, including parking and carryover arrangements
- Value temporary and permanent water rights
- Manage water right holdings across all regions in the one place
- Receive key market information on each water right, including allocations, transfer timing, and process and analytics
- Have online access and dynamic reporting
- Issue online invoicing and have settlement tracking
- Observe historic transfer tracking
- Generate water right performance reporting
- Periodic performance reporting

**Valuation service**

Waterfind offer up to date contemporary valuation techniques on all types of water markets assets.

**Entitlement reports**

Waterfind prepares reports on water entitlements for key water markets. These comprehensive reports include information on:

- key market characteristics
- entitlement price performance
- allocations
- other market information

**Asset conversion**

In some instances, water assets can be converted into other types of water assets that can result in financial gain to asset owners. Waterfind can provide advice and facilitate this conversion as part of its Water Asset Conversion service.

**Water market information**

Waterfind has a range of tailored reports and water market information services which are available either through a subscription service, or on an ad-hoc basis.

Waterfind’s Water Market Information Centre provides the highest quality market information in Australia. It presents a suite of powerful and sophisticated analytical reporting tools that water market participants can use to analyse and understand the Australian water markets, including information on:

- trade volumes and prices
- allocations
- storages
- rainfall, temperature, and evaporation
- commodity prices

While this information may be available from numerous sources, nowhere else is it consolidated in one central location to support efficient, informed decision making.

**Advisory services**

In addition to the above, we offer advice on a range of water market areas including financing, investment, and water scheduling and planning.
Further information

Call 1800 890 285 (free call)
Visit www.waterfind.com.au
Email marketing@waterfind.com.au
Follow @waterfind
Connect www.linkedin.com/company/waterfind-pty-ltd/
References

Charts
Chart 1: Total volume of water traded (ML), Temporary – Australia, 2018-19 10
Chart 2: Total volume of water traded (ML), Permanent – Australia, 2018-19 10
Chart 3: Water storages in the Basin 2017-19 15
Chart 4: Murrumbidgee Temporary (Combined) water – Volumes and prices, 2018-19 18
Chart 5: Murrumbidgee Permanent water (General security) – Volumes and prices, 2018-19 19
Chart 6: Murrumbidgee Permanent water (High security) – Volumes and prices, 2018-19 20
Chart 7: NSW Murray Temporary water – Volumes and prices, 2018-19 22
Chart 8: Victoria and SA Murray (combined) Temporary water – Volumes and prices, 2018-19 23
Chart 9: NSW Murray Permanent water (General security) – Volumes and prices, 2018-19 24
Chart 10: NSW Murray Permanent water (High security) – Volumes and prices, 2018-19 25
Chart 11: Victorian Murray Permanent water (Low Reliability) – Volumes and prices, 2018-19 26
Chart 12: Victorian Murray Permanent water (High Reliability) – Volumes and prices, 2018-19 27
Chart 13: SA Murray Permanent water– Volumes and prices, 2018-19 28
Chart 14: Goulburn Temporary water– Volumes and prices, 2018-19 29
Chart 15: Goulburn Permanent water (High Reliability) – Volumes and prices, 2018-19 30
Chart 16: Goulburn Permanent water (Low Reliability) – Volumes and prices, 2018-19 31
Chart 17: Queensland – Volume traded by key water markets, Temporary, 2018-19 37
Chart 18: Queensland – Volume traded by key water markets, Permanent, 2018-19 37
Chart 19: Bundaberg Temporary water – Volumes and prices, 2018-19 38
Chart 20: Bundaberg Permanent water – Volumes and prices, 2018-19 39
Chart 21: Burdekin-Haughton Temporary water – Volumes and prices, surface water 2018-19 40
Chart 22: Burdekin-Haughton Permanent water – Volumes and prices, surface water 2018-19 41
Chart 23: NSW Lower Murray Groundwater Temporary water – Volumes and prices, 2018-19 44
Chart 24: NSW Lower Murray Groundwater Permanent water – Volumes and prices, 2018-19 45
Chart 25: SA Lower Limestone Coast Groundwater Temporary water – Volumes and prices, 2018-19 46
Chart 26: SA Lower Limestone Coast Groundwater Permanent water – Volumes and prices, 2018-19 47
Chart 28: Commonwealth Environmental Water Holdings 52
Chart 29: Foreign interests in Australian water entitlements by use 55
Figures
Figure 1: Australian Rainfall Deciles – 1 July 2018 to 30 June 2019 9
Figure 2: Murray-Darling Basin 12
Figure 3: Southern Connected Basin 13
Figure 4: Murray-Darling Basin Authority Active (Usable Water) Storage June 2000 to present 13
Figure 5: Delivery of inter valley trade to the River Murray system 17
Figure 6: Chance of exceeding the median rainfall, July-September 2019 63
Figure 7: Chance of exceeding the median minimum temperature, July-September 2019 64
Figure 8: Chance of exceeding the median maximum temperature, July-September 2019 64
Figure 9: Volume of water in the market in the MDB 68

Tables
Table 1: Volume and value of water entitlements for key selected water markets, 2018-19 11
Table 2: Major Basin-related trading restrictions in 2018-19 17
Table 3: Key market events in the NSW, Victorian and SA Murray temporary markets 21
Table 4: Allocations, selected Queensland water schemes, 2018-19 35
Table 5: Queensland – Number of trades, surface water - 2018-19 36
Table 6: Queensland – Volume traded, surface water - 2018-19 36
Table 7: New groundwater entitlements released in NSW in 2018-19 49
Table 8: Total volumes of environmental water holdings, 2018-19 51
Table 9: The Productivity Commission’s water market-related recommendations from its review 54
Table 10: Foreign owned entitlement by state territory, as at 30 June 2018 56
Table 11: Western Australia water trade activity, 2018-19 – number of trades and volume 60
Table 12: Tasmanian water trade activity, 2018-19 – number of trades and volume 60
Table 13: Opening allocations for key Basin water markets 65
Table 14: Murrumbidgee General Security – Allocation scenarios 2019-20 66
Table 15: NSW Murray General Security – Allocations scenarios 66
Table 16: VIC Murray High-Reliability – Allocation scenarios 2019-20 67
Table 17: Goulburn & Loddon High-Reliability – Allocation scenarios 2019-20 67
Table 18: SA Murray (Class 3) – Allocation Scenarios 2019-20 68
Table 19: Opening allocations, selected Queensland water schemes, 2019-20 71
Endnotes
2  Similar analysis can be provided for other water markets on request.
3  The information contained in this section has been adopted from the Australian Bureau of Meteorology www.bom.gov.au/climate/rainfall/
4  Compiled using information from the Bureau of Meteorology.
5  Compiled using information from the Bureau of Meteorology.
6  Compiled using a combination of information from State water registers, Bureau of Meteorology and Waterfind.
8  The information contained in this section has been adopted from Australian Bureau of Meteorology www.bom.gov.au/climate/rainfall/
11 Refer to www.abc.net.au/4corners/pumped/8727626
14 The triple bottom line approach refers to balancing social, economic and environmental impacts.
17 June 2019 permanent trade data was not available for Queensland at the time of preparing this report.
20 For example, it is estimated that as much as 50% of natural flows have been removed from the Murray-Darling River network in some locations. www.mdba.gov.au/managing-water/water-for-environment
21 Until 30 June 2019 this function was carried out by the former NSW Department of Environment and Heritage but will now be handled by NSW DPIE.
23 As at 30 April 2019, 9/7 – data same EI
28 From 1 July 2017 foreign persons are required to register their interests in registrable water entitlements and contractual water rights with the Australian Tax Office.
29 For this report “Industry” contains construction, energy, industry, manufacturing and transport and “Other” contains tourism, trade, other and research usages.
38 The amendments allow temporary access to unallocated water held as strategic water infrastructure reserves under a temporary water licence for up to 3 years. This means that water that has been committed to water infrastructure projects can be accessed for short-term ventures.
41 Western Australia Department of Water and Environmental Regulation, unpublished correspondence, June 2019.
44 Most water trading occurs in Irrigation Tasmania water schemes.
Note historical rainfall outlook accuracy has been between 55 to 65 percent around the main storages (Burrinjuck, Dartmouth, Hume) throughout the July-September period.

Calculation of data

All trade data has been collected from the state water registers, NSW Water Register, SA WaterConnect, Victorian Water Register and Business Queensland. For South Australia, New South Wales, Victoria and Queensland temporary trades the average monthly price per ML has been calculated by first removing $0 and $1 trades and trades with a clearly abnormal high price. For the remaining trades the following formula has been used. Monthly average price = total price for all trades / total volume.

For Queensland Permanent trades information about individual trades are not available. Business Queensland publish number of monthly trades by Water Supply Schemes and a weighted average price of the monthly trades. This information has been used in the report.