

Memorandum	
Date:	29 January 2020
To:	Commonwealth Environmental Water Office
Subject:	Lower Balonne Price Point

Purpose

The Commonwealth Environmental Water Office (CEWO) has engaged Marsden Jacob to provide advice on the price point for allocation (temporary) water for Lower Balonne Zones 4 and 5 (LBU-04 and LBU-05). For the purpose of this analysis we were advised to assume a purchase within the 2019-2020 water year.

Key Points

1. In Marsden Jacob's opinion should water become available for waterharvesting within the period February to June 2020 (balance of this water year), unsupplemented allocation water is expected to trade for around \$200-250 per ML, with a midpoint of \$225 per ML in the Lower Balonne WMA, noting the value increases over the analysis period as the storage losses will fall.
2. The trade price to the CEWO could be further reduced if irrigators agree to make a contribution toward the EBM, as a philanthropic gesture¹ in a region that has been the subject of significant media attention^{2,3}.
3. Allocation (temporary) trades have not been witnessed in LBU-04 and 05 recently because the region is extremely dry. Allocation trades (for groundwater and surface) have occurred in St George and northern NSW regions for between \$300 and \$450 per ML, associated with cotton production. However, these prices reflect late season watering of crops and do not factor in the significant storage losses (wetting lining material, evaporation and seepage) that will occur because cotton will not be planted until November 2020 (to reduce climatic risks), so water will need to be stored until this time. Current prices in regulated systems are expected to be considerably higher than the prices given for the Lower Balonne. This is a result of the current margins associated with cotton including the ability to reduce losses in delivery of water to crops and more control over the timing of use.
4. Cotton prices are strong at the moment, resulting in high expected gross margins for cotton. If the price of cotton falls, then this will directly affect the margin return and thus the value of the allocation.
5. In the context of Lower Balonne environmental outcomes, less of any water purchased in LBU-04 would reach the Narran Lakes when compared to LBU-05, so it would provide lower environmental benefit with respect to the lakes but would still provide benefits in the river.

¹ <https://www.mda.asn.au/Source/ckfinder/files/Cubbie%20Media%20Release%20August%20202019.pdf>

² <https://www.abc.net.au/news/2020-02-07/murray-darling-basin-dispute-over-northern-irrigators-flood-flow/11942610>

³ <https://insidestory.org.au/how-come-the-darlings-dried-up/>

Background

The Lower Balonne is part of the wider Condamine–Balonne region in south-west Queensland. The Shire of Balonne has an area of approximately 31,000 km² located on the NSW border some 500 km from the east coast of Australia. A region of surprising diversity and unique attractions, the Balonne Shire is rich in native bird and animal life, wide open spaces, beautiful waterways, and historic buildings.

The term ‘Lower Balonne Distributary system’ (or simply ‘Lower Balonne’) is generally used to describe the system of interconnected rivers, creeks and watercourses that make up the relatively complex floodplain channel system which makes up the area between St George in south-west Queensland and the Barwon River in NSW. The CEWO is considering implementing an event-based mechanism (EBM) in the Lower Balonne if there is an opportunity between February and June 2020. If the EBM proceeds, the CEWO would focus on purchasing temporary water from properties with water harvesting licences located in LBU-04 and 05.

Characteristics of the market

The Lower Balonne allocation water market can be characterised as inactive, with very little trade occurring and no market evidence because transactions are negotiated directly, and prices are not reported. This, coupled with an absence of specialised water market brokers in the region, requires a valuation that draws on neighbouring catchments with similar land and water use characteristics.

The Lower Balonne is a cotton dominated growing region making the market highly seasonal. Whether or not irrigators are likely to participate in the market, depends on the timing of flow events, crop planning decisions, crop water demand and the climatic outlook. Most irrigation needs in the Lower Balonne are met from harvesting water from rainfall events, either directly from overland flows (OLF) or water harvesting (WH) from ‘unregulated’ flows in the rivers and distributary channels. Irrigators must hold allocations for water harvesting which identify the timing and quantities of water that can be harvested when announced.

Cotton growing dominates water usage and profitability and has driven the development of the irrigation industry in the region. Data from the Australian Bureau of Statistics (ABS) indicates that the clear majority (97%) of water used for irrigation in the Lower Balonne since the year 2000 has been applied to cotton, and provides over 50% of total agricultural production in the Balonne local government area.⁴

The Lower Balonne Water Management Area (WMA) contains 10 separate zones stretching from the upstream extent of the ponded area of EJ Beardmore Dam to downstream into three separate bifurcations, leading to Narran, Ballandool, Bokhara and Culgoa rivers. The value of allocation (temporary) water can differ significantly across each zone during an irrigation year, depending on crop water requirements and seasonal conditions (e.g. temperature and rainfall).

For the purpose of this price point report, we have been asked to provide a market price estimate on the Lower Balonne Zones 4 and 5 (LBU-04 and LBU-05) situated on the Balonne Minor River and Narran River within the remainder of the 2019-2020 water year.

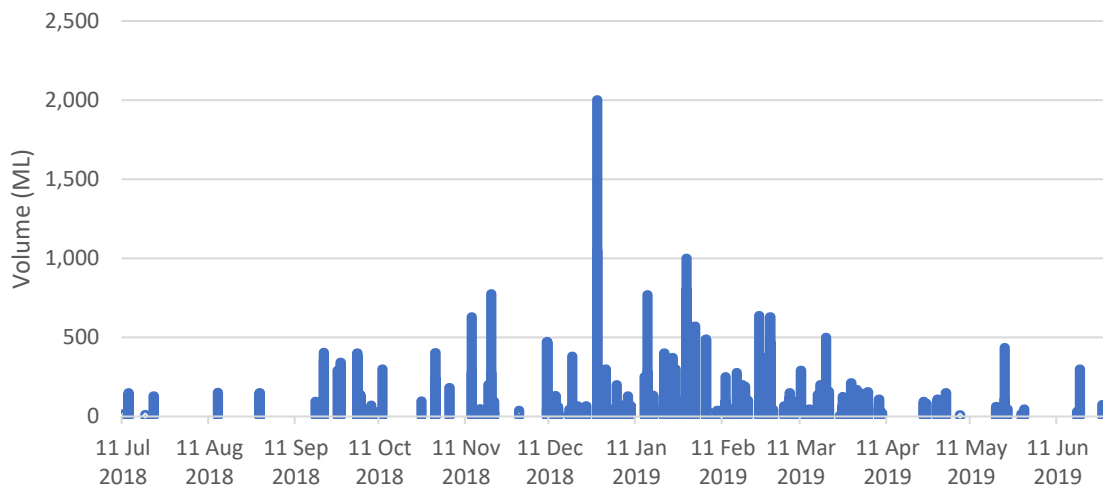
⁴ BDA Group and CSIRO (2017). A Comparative assessment of event-based mechanisms for providing water to the Narran Lakes’. A report prepared for the Commonwealth Environmental Water Office’

Recent water market activity

Unfortunately, there is no public register of seasonal assignment (also known as allocation or temporary trades) prices for the any catchment within Queensland, but trade volumes are collected and reported. However, based on the publicly available data, no seasonal assignments in the Lower Balonne WMA have been reported in 2019/20.

The main trading activity within the Lower Balonne area traditionally occurs within the supplemented zones of the St George Water Supply Scheme (WSS)⁵. Trading activity for the St George WSS can be seen in Figure 1, where over the last year approximately 16 GL has been traded within the scheme.

Figure 1: Trading volume (ML) for the St George Supply Scheme



Source: BOM⁶

According to intermediaries that were interviewed in preparing this memorandum, very little demand and market activity has been witnessed for seasonal assignments in the St George WSS. This is predominantly driven by low water availability. However, one intermediary reported that the most recent trades in the St George WSS had been contracted in January 2020 at \$400/ML. Based on the timing of the purchase, it can be assumed that this water was used to finish off this year’s cotton crop.

Neighbouring catchments

Due to lack of market-based evidence in the Lower Balonne area, to determine a price point for the Lower Balonne Zones 4 and 5, we reviewed a range of neighbouring catchments and their recent temporary trade prices. We evaluated three, predominately cotton producing NSW catchments: the Gwydir, Upper Namoi, and Macquarie & Cudgegong. Several trades were also recorded within the Queensland Macintyre Brook system during August-September 2019 which have also been included. This evidence is summarised in Table 1 and Figure 2.

⁵ Noting that the WSS only overlaps with zones LBU-01 and 02 of the WMA, not zones LBU-04 and 05 that are of specific interest for the CEWO.

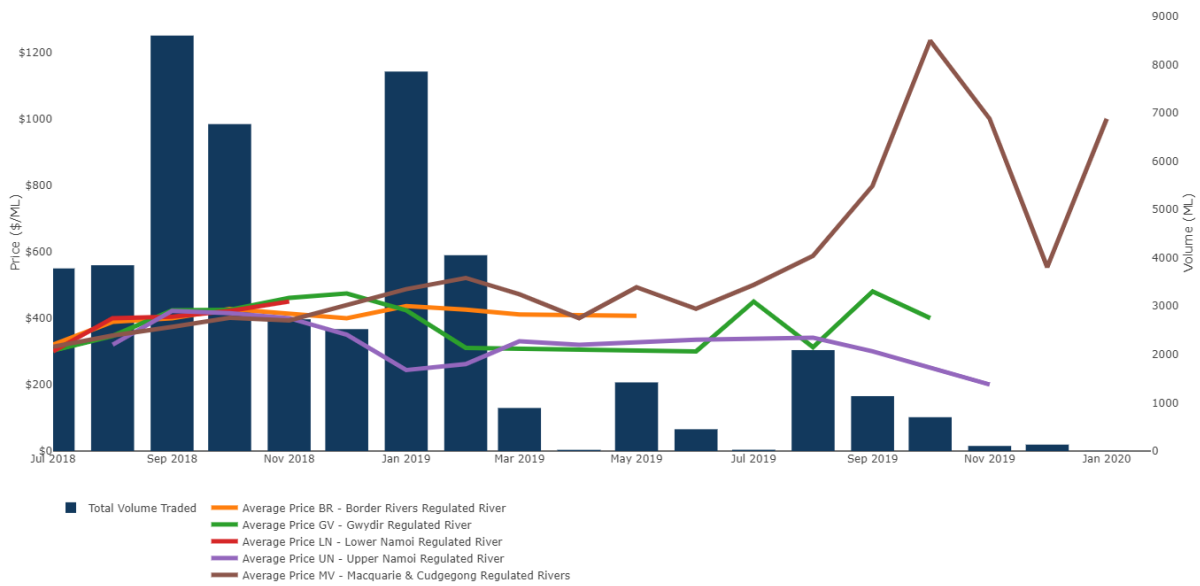
⁶ We note that there is no data recorded for supplemented seasonal assignments for the 2019/20 water year across Queensland in the BoM data, implying that there may be reporting issues between Queensland water authorities and the BOM.

Table 1: Most recent volume weighted average prices (VWAP) for selected neighbouring catchments⁷

Catchment	VWAP (\$/ML)	Month of valuation
NSW Gwydir	\$400	October 2019
NSW Upper Namoi	\$200	November 2019
NSW Macquarie & Cudgegong	\$1,000	January 2020
Queensland Macintyre Brook	\$472	September 2019

Source: Marsden Jacob Analysis

Figure 2: Recent temporary market activity in the volume Namoi, Macquarie & Cudgegong, NSW Border Rivers and Gwydir.



Source: Waterflow™

The subdued market activity across the northern Murray-Darling Basin (MDB) surface water sources has been driven by low water availability and announced allocations. According to water market intermediaries, those irrigators with access to groundwater have been more reliant on that water source in terms of their 2019/20 summer crop programs. Consequently, temporary trading activity across the northern NSW groundwater markets has been more active compared to surface water trading (Table 1). Prices have been broadly in line with the surface water market, acknowledging that the pumping cost for groundwater can be significant⁸ and hence the trade prices tend to be lower compared to surface water.

Table 2: Most recent volume weighted average prices (VWAP) for selected neighbouring groundwater sources

Water source	Aug-19	Sep-19	Oct-19	Nov-19	Dec-19	Jan-20
Lower Gwydir Groundwater Source	\$215	n.a.	\$271	\$280	\$297	\$226
Lower Namoi Groundwater Source	\$302	\$370	\$235	n.a.	\$308	\$342

⁷ At the time of writing, no temporary trades have been conducted in the NSW Border Rivers or Lower Namoi in the 2019/20 water year.

⁸ According to the groundwater pumping cost ranges between \$20-60/ML, but varies significantly by location.

Water source	Aug-19	Sep-19	Oct-19	Nov-19	Dec-19	Jan-20
Upper Namoi Zone 2	n.a.	\$105	\$150	\$234	n.a.	\$100
Upper Namoi Zone 3	\$100	\$301	\$305	\$450	\$450	\$150
Upper Namoi Zone 4	\$346	\$226	n.a.	\$439	\$428	\$330
Upper Namoi Zone 5	\$165	n.a.	\$171	n.a.	\$250	\$250

Source: Marsden Jacob Analysis

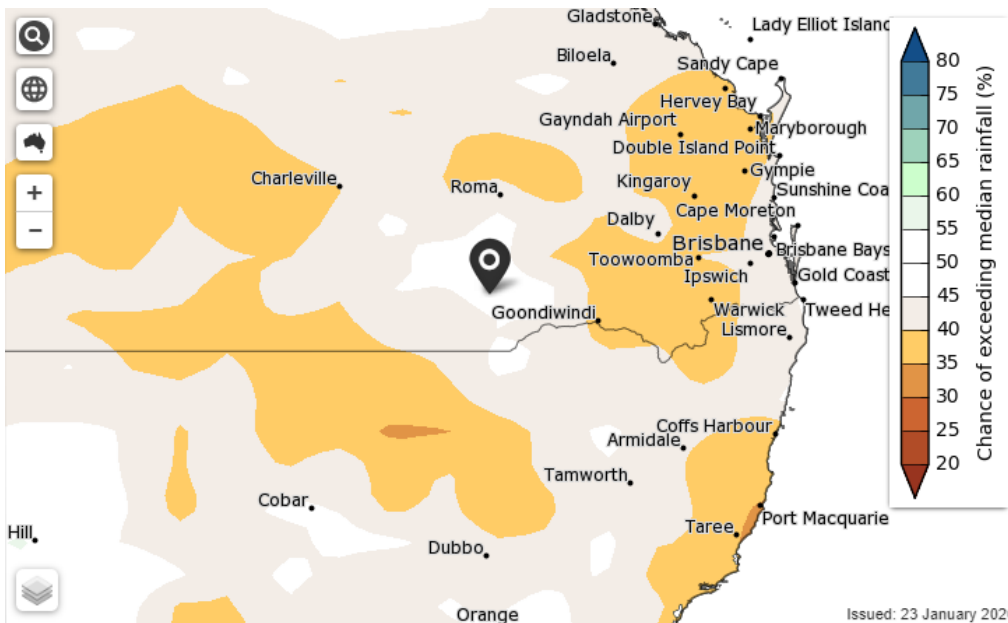
Overall, the price point comparison between neighbouring catchments and groundwater areas shows prices peaked been around the \$450/ML during the 2019/20 cotton irrigation season (with the exception of the NSW Macquarie and Cudgegong where market participants such as industrial water users that have a higher capacity to pay for water have been securing small parcels from the market).

Water availability and climate outlook

The Bureau of Meteorology (BOM) seasonal outlook for February to April 2020 shows no strong tendency towards either wetter or drier than average conditions across the northern Basin, with day and night temperatures likely to be above average. While outlooks for drier than average conditions have eased compared to those issued for late 2019, several months of above average rainfall would be needed to see a recovery from current long-term rainfall deficiencies.

Anything in between would likely be lost to seepage and or evaporation with little reaching in stream or to dams. Figure 3 below shows the 3-month rainfall outlook for the northern Basin with the chance of exceeding the median rainfall is below 50% for most areas. The median for St George for the 3 month period of February to April is 101mm.

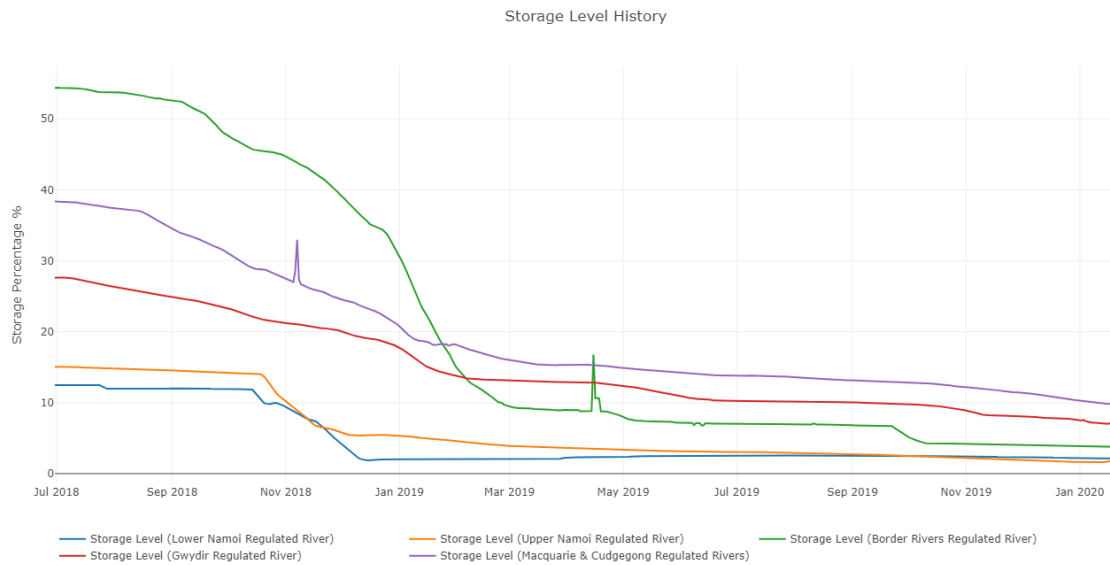
Figure 3: February to April 3 month - change of above median rainfall @ St George



Source: BOM

Current storage levels across the NSW northern basin are all below 10% capacity with the Namoi and NSW Border Rivers below 5% capacity (Figure 4).

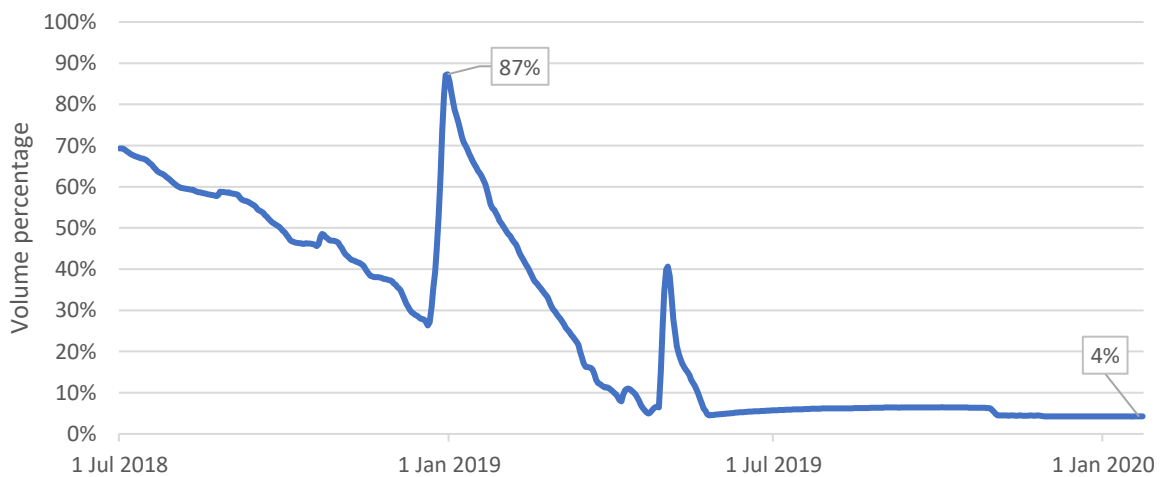
Figure 4: Storage levels for the five NSW catchments



Source: Marsden Jacob Analysis and Waterflow

Figure 5 shows the volume of water stored in Beardmore Dam which is the primary source of water for the St George WSS⁹. Current levels at the time of writing are 4% of total capacity, whereas at this time a year ago the volume reached 87% capacity following strong inflows. Low water levels in dams servicing cotton producers have constrained planting of irrigated cotton. As a result, for most summer crops, area planted is forecast to fall from 2018–19 levels.

Figure 5: Percentage volume of EJ Beardmore Dam since 1 July 2018



Source: Marsden Jacob Analysis and BOM data

⁹ Noting that the WSS only overlaps with zones LBU-01 and 02 of the WMA. ⁹ Noting that the WSS only overlaps with zones LBU-01 and 02 of the WMA, not zones LBU-04 and 05 that are of specific interest for the CEWO.

Commodity analysis

Although cotton is by far the dominant water use, in recent years the high evaporation and water loss rates from the drier than average conditions have stimulated an increase in the area of winter cropping (mainly wheat with some chickpeas) and some opportunistic late summer cropping (predominantly mung beans). Cotton planting decisions are typically made in October with planting taking place in November. The introduction of genetically modified cotton has led to an extension of the 'planting window' under the resistance management plan and allowed later planting, it is unlikely however that planting would occur beyond early December.

Cotton planting decisions are generally based on an irrigators best estimate of crop water demand and the amount of water in storage on a property. Water use efficiency per hectare and per bale of cotton produced has been measured in the Condamine and Lower Balonne at a lower rate of around 5.9 ML/ha and 1.6 bales/ML respectively (or 9.5 - 10 bales/ha)¹⁰, although this varies substantially across farms. However, recent discussions with growers have identified that they need between 8-10 ML per hectare (depending on rainfall) leading to a typical yield of 12-13 bales per hectare. These rates are in line with the latest Australian cotton industry gross margin budgets¹¹.

There will be variations according to individual farm storage and irrigation management characteristics which determine likely losses during the growing season. Importantly, in some cotton growing regions landholders may plant some additional speculative area depending on their individual risk appetite, in the knowledge that they may need to abandon some planted area if water harvesting opportunities during the growing season do not eventuate. However, our stakeholder consultation in this project has identified that they only plant based on the amount of water in storage because flow events are unpredictable.

The window of opportunity for the proposed event-based mechanism (EBM) is between February to June 2020. During this time irrigators are typically looking to capitalise on any winter rains by planting wheat in May or earlier following a cotton harvest or they might decide to store the water so that it is available for the next cotton growing season, recognising that storing the water can result in significant losses (through evaporation and seepage).

As previously discussed, at the time of writing this price point report the availability of water in storages is very low and the climate outlook does not indicate any significant rainfall to produce flows, however, circumstances can change quickly. As a result, it is unlikely any winter planting would be undertaken without significant rain events. Further, yield targets would be less achievable as the water application rate per hectare would be higher (typically 2 to 5 ML/ha plus losses) due to the current soil moisture deficit.

Thus we believe that it is more likely that these factors would result in irrigators holding onto any water to grow cotton. This has been confirmed in recent stakeholder engagement which identified that irrigators in LBU 4 and 5 indicated that they generally prefer to wait until water becomes available to grow cotton rather than grow a winter crop.

¹⁰ Montgomery and Wigginton (2012). Benchmarking WUE in the Australian cotton industry in The Australian cotton water story: a decade of Research and Development 2002-2012, Cotton Catchment Communities CRC, Narrabri

¹¹ CottonInfo, 2019. Available here: <https://www.cottoninfo.com.au/publications/australian-cotton-industry-gross-margin-budgets>

Consequently if a water harvesting event occurs in the Lower Balonne over the period February to June 2020, the growers will want to be compensated according to the value of the forgone cotton growing opportunity, but they also realise that they will need to store the water ahead of the irrigation season and they will incur losses through storage wet up, evaporation and seepage.

Commodity markets

The ABARES Agricultural commodities December quarter 2019¹² outlook highlights a few key issues for cotton markets going forward including:

- Prospects for summer crop production in Queensland are poor because of the long period of below average rainfall in most cropping regions and an unfavourable outlook for seasonal conditions over summer. Area planted to summer crops in Queensland is forecast to fall by 42% in 2019–20 to around 356,000 hectares. This is due to a significant forecast fall in area planted to irrigated cotton and grain sorghum. Summer crop production is forecast to more than halve to 684,000 tonnes.
- Area planted to cotton is forecast to fall by 74% to 30,000 hectares in 2019–20, which is expected to be mainly comprised of irrigated cotton. Cotton production is forecast to decline by 61% to 63,000 tonnes of cotton lint and around 89,000 tonnes of cottonseed in 2019–20. The average yield is forecast to increase by 50% as a result of the expected dominance of irrigated cotton in planted area.
- Winter crop production in 2019–20 is estimated to have fallen by 5% to around 678,000 tonnes, the third consecutive year of falling winter crop production in Queensland since record high production was achieved in 2016-17. If the forecast for 2019–20 is realised, this will be the lowest production since 1994–95, when 312,000 tonnes was produced.

Cotton margin analysis

To inform this price point analysis for the CEWO, we have thus used a gross margin calculator for cotton that has been calibrated to average regional circumstances. This calculator is used to estimate the margin return that the irrigators might have received if they were to use the water to irrigate a cotton crop rather than selling it to the CEWO.

Based on our analysis, cotton prices for the current and the upcoming 2021 season have a range of \$575 to \$622 per bale. Discussion with stakeholders have revealed indicative cotton lint prices for Northern NSW at the moment are as follows, see Table 3.

Table 3: Indicative cotton lint cash price (AUD per bale)

Year of harvest	2020	2021	2022	2023
\$/bale	\$622	\$576	\$550	\$539

Source: Marsden Jacob Analysis

Further, NSW Department of Primary Industry Weekly Commodity report for 24 Jan 2020, shows the latest United States Department of Agriculture report has revised production and mill use estimates

¹² ABARES 2019, Agricultural commodities: December quarter 2019, Australian Bureau of Agricultural and Resource Economics and Sciences, Canberra, December. CC BY 4.0. <https://doi.org/10.25814/5de08beb55ba8>

down, which will further reduce global ending stocks and provide price support leading to a \$583/bale valuation¹³. Hence, over the short term it is expected that cotton prices are likely to remain firm.

The buoyant cotton price outlook is also being supported by the increase in global cotton prices and the depreciation of the Australian dollar. Moreover, according to Rabobank¹⁴, the implementation of any US-China trade agreement for cotton - even a temporary or partial settlement - is likely to go some way towards restoring confidence in the broader textile market.

As the EBM window stretches across three seasons (end summer, autumn and early winter), we have therefore provided margin analysis for the transaction to occur in summer, autumn and winter based on cotton prices of between \$500 and \$650 per bale to account for potential evaporation and seepage losses to store water till the next cotton growing window.

Table 4: Cotton Margin analysis

Summer – Dec to Feb

Impact of Yield and Price on Gross Margin (\$/ML)				
Lint Yield (t/ha)	\$500/bale	\$550/bale	\$600/bale	\$650/bale
8	\$ 78	\$ 98	\$ 118	\$ 138
10	\$ 129	\$ 154	\$ 179	\$ 204
12	\$ 179	\$ 209	\$ 239	\$ 269

*Assumptions = furrow irrigation, 2*relifts, 10ML/ha application rate, \$100/bale seed price*

Autumn – Mar - May

Impact of Yield and Price on Gross Margin (\$/ML)				
Lint Yield (t/ha)	\$500/bale	\$550/bale	\$600/bale	\$650/bale
8	\$ 94	\$ 118	\$ 142	\$ 166
10	\$ 154	\$ 184	\$ 214	\$ 244
12	\$ 215	\$ 251	\$ 287	\$ 323

*Assumptions = furrow irrigation, 2*relifts, 10ML/ha application rate, \$100/bale seed price*

Winter – Jun to Aug

Impact of Yield and Price on Gross Margin (\$/ML)				
Lint Yield (t/ha)	\$500/bale	\$550/bale	\$600/bale	\$650/bale
8	\$ 109	\$ 137	\$ 165	\$ 193
10	\$ 180	\$ 215	\$ 250	\$ 285
12	\$ 251	\$ 293	\$ 335	\$ 377

*Assumptions = furrow irrigation, 2*relifts, 10ML/ha application rate, \$100/bale seed price*

Source: Marsden Jacob Analysis based on CottonInfo, Cotton Australia and Agmargins

Based on the price outlook for cotton and a lint yield of between 10 and 12 bales/ha, the gross margin for water ranges from \$154 to \$239/ML in Summer, \$184 to \$287/ML in Autumn and \$215 to \$335/ML in Winter.

¹³ <https://www.dpi.nsw.gov.au/agriculture/commodity-report>

¹⁴ <https://www.farmonline.com.au/story/6574317/optimism-for-us-china-deal-global-perspective/>

Price analysis

Marsden Jacob has reviewed the historical data and consulted with industry stakeholders in the preparation of this advice. Based on this analysis we reached the following conclusions.

1. Most recent temporary trades in the St George WSS have been contracted at \$400/ML. Prices for surface and groundwater in the neighbouring regions peaked around \$450-450/ML during the time when irrigators were purchasing water for the 2020 cotton crop. Current prices in regulated systems are considerably higher than the price point for the Lower Balonne. This is a result of the current margins associated with cotton including the ability to reduce losses in delivery of water to crops and more control over the timing of use. Moreover, temporary groundwater prices have softened to \$300-350/ML as the main cotton growing season is approaching its end, and surface water trading in the northern MDB has been subdued due to low water availability and water delivery restrictions¹⁵. As a result, the current prices in the St George WSS reflect the maximum current willingness to pay for allocation (temporary) water in the broader region.
2. Current storage levels in Beardmore Dam and the bleak climate outlook for the region over the next three months does not provide any optimism around growing a viable winter crop, so we believe that irrigators will wait for rainfall and the opportunity to plant a summer cotton crop. Widespread and above-average rainfall across that state's grain-growing regions, particularly in southern Queensland, would be needed to improve the current yield outlook and potential. Thus this price point analysis assumes that if a water harvesting event happens in the Lower Balonne during the remainder of 2019/20 season, the growers will want to be compensated according to the value of the forgone cotton production opportunity for the 2021 crop.
3. Cotton prices are very strong at the moment, resulting in relatively high expected gross margins for cotton. Marsden Jacob's analysis shows that, depending on the time of year a water harvesting event in the Lower Balonne would occur, that the value of a single ML 'in use' to the grower could be anywhere between \$200-290/ML in gross terms (assuming a 12t/ha yield, \$550/bale cotton price and storage losses of between 50% and 30% depending on whether the water comes available early or late in the analysis period).
4. Considering that on-farm storages in the Lower Balonne area are currently empty and have been this way for some time, and subsequently significant losses will result in the wetting up the storage lining materials, and seepage and evaporative losses will occur between the time of water harvesting and crop application. Therefore, in Marsden Jacob's opinion the should water become available for waterharvesting, unsupplemented allocation water is expected to trade for around \$200-250 per ML, with a midpoint of \$225 per ML in the Lower Balonne WMA till the end of 2019/20 water year.
5. In the context of Lower Balonne environmental outcomes, it must also be noted that less of any water purchased in LBU-04 would reach the Narran Lakes when compared to LBU-05, so it would provide lower environmental benefit with respect to the lakes but would still provide benefits in the river.

¹⁵ For instance, deliverability of any water is restricted to some extent in all Northern NSW catchments due to low storage levels. More details here: <https://www.watarnsw.com.au/supply/regional-nsw/operations-updates>