Murray DAIRY

Dairy Australia
Your Levy at Work

REGIONAL IRRIGATED LAND AND WATER USE MAPPING IN THE GOULBURN MURRAY IRRIGATION DISTRICT

DAIRY EVALUATION

This Dairy Evaluation report has been developed by Dairy Australia and Murray Dairy, to provide an analysis of the dairy industry based on data from the Regional Irrigation Land and Water Use Mapping in the Goulburn Murray Irrigation District project (GB CMA 2017).

The Regional Irrigated Land and Water Use Mapping in the GMID project was co-funded by:

- Goulburn Broken Catchment Management Authority (GB CMA)
- Department of Environment, Land, Water and Planning (DELWP)
- Department of Economic Development, Jobs, Transport and Resources (DEDJTR)
- Dairy Australia (DA) and Murray Dairy (MD)
- Goulburn-Murray Water (GMW)
- Goulburn-Murray Water (Connections)
- North Central Catchment Management Authority (NCCMA)

The Steering Committee included:

- Carl Walters (chairperson), GB CMA
- Rebecca Caldwell (project manager), GB CMA
- Andy McAllister (spatial sciences), DEDJTR
- Rabi Maskey (evaluation), DEDJTR
- Lisa Hocking, DELWP
- Charles Harman Brown, DELWP
- Michael Mozina, DELWP
- Graeme Hannan, GMW
- John Weber (spatial sciences), GMW
- Claire Miller (dairy analysis), Dairy Australia
- Jenny Wilson (dairy analysis), Murray Dairy
- Tim Shanahan / James Burkitt, NCCMA
- Marcus Hann (consultant), HMC Property Group
- Rob Gunn (consultant), HMC Property Group
- David McKenzie (consultant), HMC Property Group
- Mark Nayar / Shannon Lancaster/ Jacki Madgwick, GMW Connections

Dairy Australia
Locked Bag 104, Flinders Lane, Victoria 8009
Phone: (03) 9694 3777 Fax: (03) 9694 3733
www.dairyaustralia.com.au

Murray Dairy
255 Ferguson Road, Tatura VIC 3616
Phone: (03) 5833 5312 Fax: (03) 5833 5929
Email: admin@murraydairy.com.au
www.murraydairy.com.au

Table of Contents

Table of Figures

List of Tables

Executive summary

The GMID dairy industry is in transition, driven by changes in water policy over the past 10 years as well as volatile market and seasonal conditions. The Murray-Darling Basin Plan is a key change driver, with GMID dairy farmers selling at least 164GL to the Commonwealth for the environment.

Dairy remains an extensive land use across the GMID, with 1142 properties with dairy sheds and 765 properties associated with dairy together covering 180,665 hectares. Properties means land titles, or parcels, not necessarily farm enterprises which can operate over multiple properties.

A further 54,853 hectares (759 properties) were identified as dairy agistment/fodder, but could not be linked to a functioning dairy shed.

The number of dairy properties with a functioning dairy shed has declined steeply, from 2721 properties in 2000-2004 down to 1143 properties in 2009/10 and 1142 in 2015/16.

Many dairy properties that fell idle during the Millennium drought were again being used for dairy in 2015/2016, but land use was less intensive and so less productive per hectare at an enterprise level.

The GMID dairy industry is now more exposed to the temporary water market to meet its production needs, increasing farmers' business risk.

In 2003/04, for example, the GMID dairy industry used about 30% more water each year (922GL) than its farmers collectively owned in HRWS (709GL). The extra came from cheap 'sales' water, which was effectively water allocated but unused by other GMID irrigators.

Now GMID dairy is using 59% more water (~740GL) than it owns in HRWS (465GL). Dairy farmers compete for the extra water on a market supplying the whole southern-connected Basin.

Dairy farmers are highly sensitive to the temporary water price: 26% said prices over $150/ML were not viable for their business, and 56% said prices over $200/ML were not viable. The weighted average price in 2015/16, a dry year, was $220/ML, peaking over $300/ML in November 2015 and $250/ML in May 2016.

The high price of water is linked to the GMID dairy industry's significant reduction in water use in 2015/16, from an annual average 740GL in 2012-2015 down to 600GL.

Uncertainty about water availability increased substantially as a barrier to changing irrigation practices, from 19.3% of GMID irrigators surveyed in 2004/05, to 46% of GMID irrigators in 2015/16 and 52.9% of GMID dairy farmers.

This suggests irrigators are uncertain about accessing enough water at a price they can afford to run the upgraded systems and realise the return on their investment.

GMID dairy industry ownership of High Reliability Water Shares (HRWS) fell from 709GL in 2003/04 down to 465 GL a decade later.

The GMID dairy industry now uses about 25% less water a year than a decade ago.

Annual average milk production has fallen 26%, from 2345ML in 2003-2006 to 1740ML average over the last five years.

This indicates that while many dairy farmers have upgraded their farm systems to use water more efficiently, milk production remains closely linked to the water available for the industry to use.

Introduction

This Dairy Evaluation report has been developed by Dairy Australia and Murray Dairy, to provide an analysis of the dairy industry, based on dairy specific data from the Regional Irrigation Land and Water Use Mapping in the Goulburn Murray Irrigation District (GMID) project (GB CMA 2017). The project sought to investigate the dynamic nature of land use and industry change, to provide strategic direction for government and industry. The project was an opportunity to renew the land and water use data for all irrigated properties, and to interview a randomly selected subset of irrigators in the GMID for the 2015/16 irrigation season (GB CMA 2017).

The report identified that dairy is the second most extensive land use in the GMID, operating across 1907 properties (or land titles) covering 180,665 hectares. Dairy cattle agistment/fodder land use category accounted for another 759 properties covering 54,853 hectares, but could not be linked back to a functioning dairy. Dairy accounts for around half the irrigation water used, with the remainder used by perennial and annual horticulture, cropping and mixed farming (GB CMA 2017).

The dairy industry is in transition, driven by changes in water policy over the past 10 years as well as volatile market and seasonal conditions. Drivers include the Millennium drought (including the severe drought years of 2006/07, 2007/08 and 2008/09), unbundling water rights from land, removing water trade restrictions, introduction of carryover and drought reserves, and increased competition from new and expanding agricultural industries in irrigation districts downstream.

The Murray-Darling Basin Plan is another key change driver. Under the Plan, GMID irrigators sold an estimated 365GL of High Reliability Water Shares (HRWS) or 23% of the GMID total, to the Commonwealth Government for the environment, primarily between 2008 and 2012 (estimate based on water trade data in Cummins 2016). The GMID dairy farmers' estimated share of the 365GL HRWS sold to the environment is at least 164GL.

Project results

Stage 1 - Land use surveys

Stage 1 of the project involved mapping the observed land use on all irrigation properties across the GMID ('properties' means all land titles, or parcels; not farm enterprises. Farm enterprises may operate across one, two, three or more properties). Where it was unclear what a property was being used for, this was cross-checked where possible with property owners. Further detail on the methodology used is provided in the Technical Report (GB CMA 2017).

Figure 1 shows that in 2015/16 dairy remains an extensive land use across the GMID, with 1907 properties with dairy and associated with dairy, covering 180,665 hectares. A further 54,853 hectares (759 properties) were identified as dairy cattle agistment/fodder, but could not be linked to a functioning dairy.

The 2015/16 dairy land use footprint is larger than in the 2009/10 (Figure 2) survey (HMC Property Group 2010), which was undertaken at the worst of the Millennium drought, when many dairy farmers had left the industry or curtailed production. Ex-dairy was used as a category in 2009/10 to identify land in transition at that time. Almost one-third (34,000ha) of the 114,500ha of dairy properties reported in the 2009/10 land use survey had transitioned to other land uses such as cropping.

Figure 3 shows that in 2000-2004, the dairy land use footprint consisted of 2721 properties each with a functioning dairy shed. In 2015/16, the number of properties with a functioning dairy shed had fallen to 1142 but 765 more properties had a dairy-associated land use while a further 759 properties were identified as dairy agistment/fodder but could not be linked a functioning dairy.

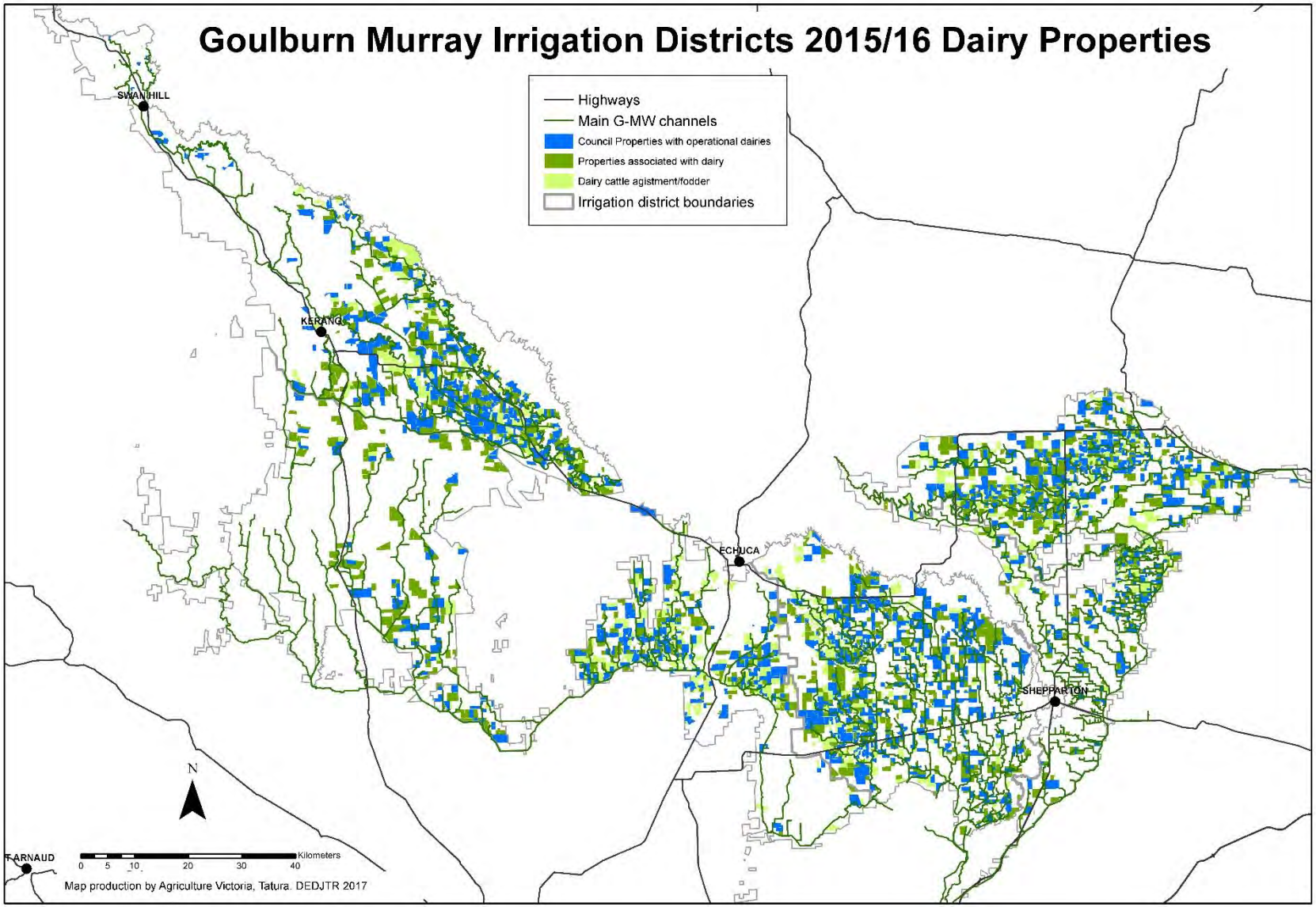

Figure 1: Dairy footprint 2015/16

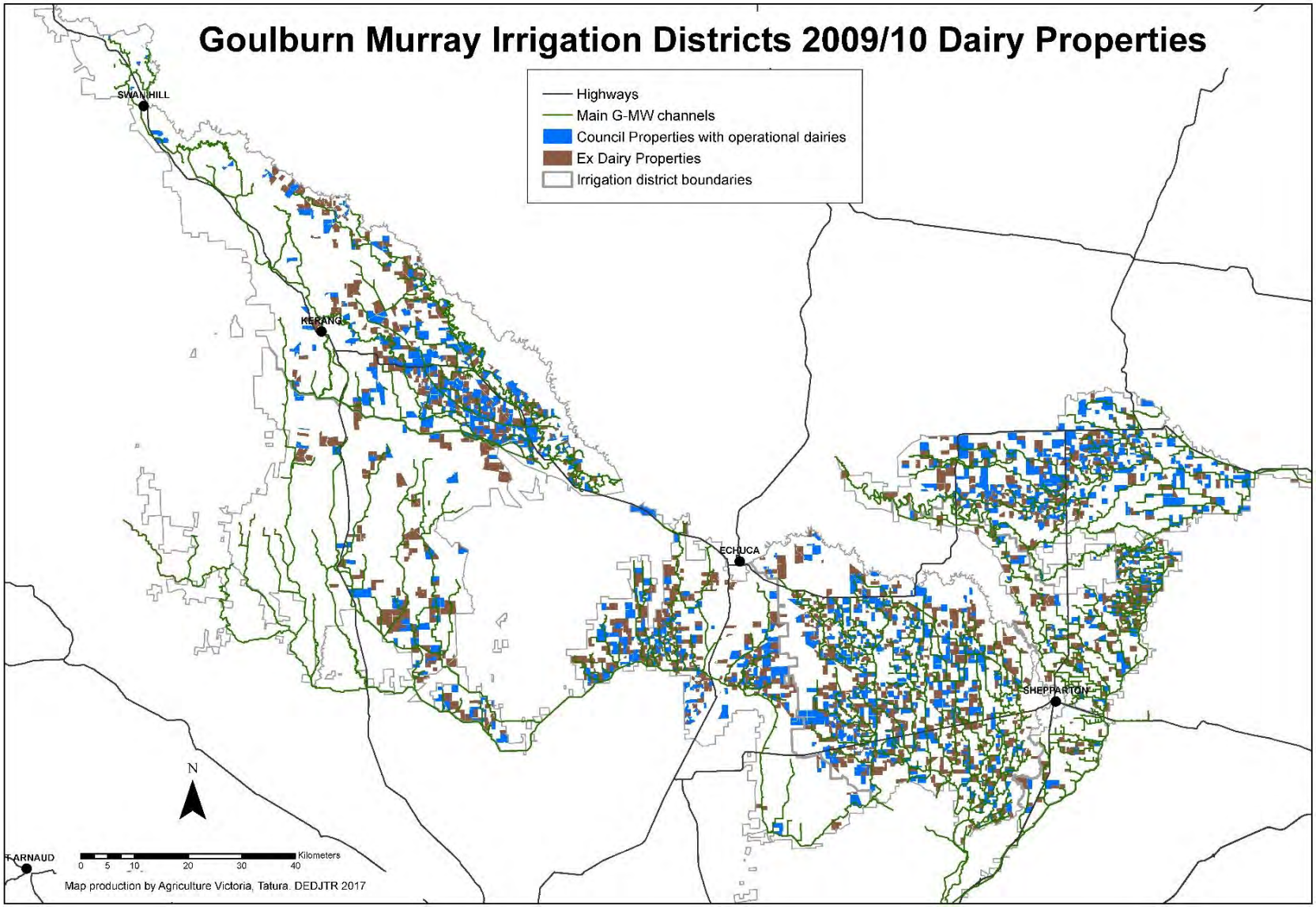

Figure 2: Dairy footprint 2009/10

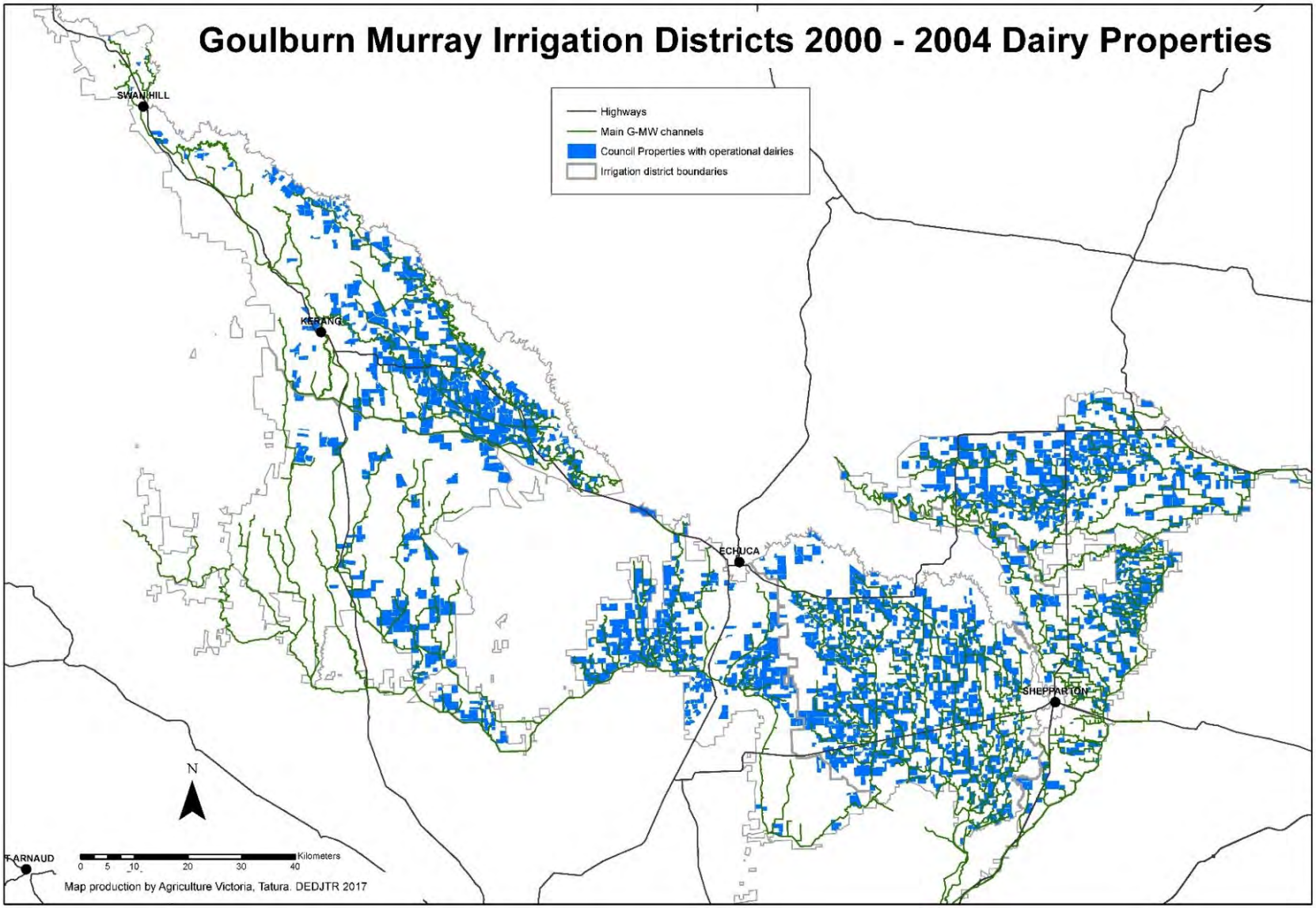

Figure 3: Dairy footprint 2004/05

Table 1 shows that many dairy properties that fell idle during the Millennium drought, were again being used for dairy production in 2015/2016. But while the dairy industry's land use footprint has almost recovered to its pre-drought extent, the 2015/16 survey revealed its land use is less intensive and therefore less productive per hectare at an enterprise level.

Table 1: Dairy trends in the GMID

GMID census/land use mapping	No. properties with a functioning dairy shed[2]	GMID milk production[3]	No. of dairy farmers[4]	No. dairy cows in GMID[3]
2004/05	2721[1]	2379 ML	2200	431,666
2009/10	1143 [5]	1412 ML	1377	279,843
2015/16	1142 [5]	1728 ML	1258	320,901

1. GMW (2006)
2. Property refers to land title, or parcel. One dairy farm may have several separate parcels of land as part of the enterprise, and this is counted as 2, 3 or 4 properties primarily devoted to dairying rather than one single dairy farm or enterprise. In 2016, dairy cattle agistment properties and properties used for dairy-related fodder production were also categorised (see Tables 2 and 3).
3. Source: Dairy Australia
4. Dairy farmers are levy payers registered with Dairy Australia. Some farm enterprises may include more than one levy payer, such as share farmers or family members.
5. GB CMA 2017

When matched with Dairy Australia milk production records (Figure 4), it can been seen that the GMID had more dairy farm enterprises in 2004/05, each covering a smaller area that was intensively irrigated; milk production that year was 2379 million litres. In 2015/16, there were fewer dairy enterprises spread over more properties with less reliance on irrigation; total GMID milk production was 1728 million litres.

While the data indicates that the number of dairy farmers has declined over the last decade, those remaining in 2016 have partially offset the production lost by farmers leaving the industry, by expanding herds and throughput in their sheds. For example, the survey found an increase of large rotary dairy capacity to around half of the milking capacity.

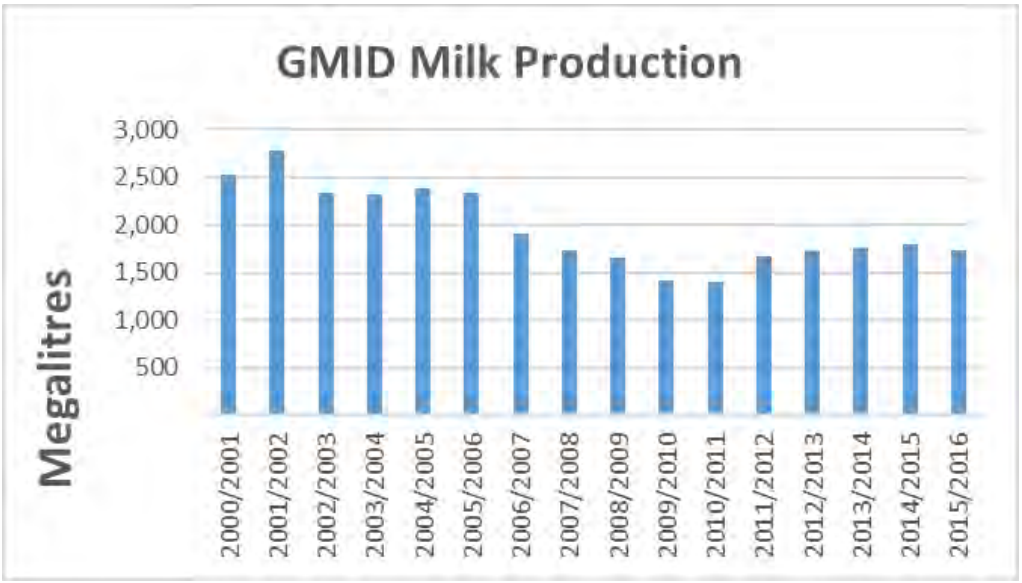

Figure 4: GMID annual milk production

Source: Dairy Australia

Tables 2 and 3 compare the hectares (and equivalent property titles) across each land use category between the 2004/05 (GMW 2006), 2009/10 (HMC Property Group 2010) and 2015/16 land use surveys (GB CMA 2017).

Table 2 shows a comparison between the hectares (and equivalent properties) across each dairy-related land use category from 2000 to 2015/16. The 2000-04 period was chosen for comparison to reflect the peak period of production in the GMID for the dairy industry; the 2009/10 data was collected near the end of the drought and presented in the 'Changing land use report' (HMC Property Group 2010).

Data shows that properties with functioning dairy sheds ('Dairy') had a steep decline from 2721 properties (235,584 ha) in 2000-2004, down to 1143 in 2009/10 (123,571 ha), with 1700 properties (114,500 ha) identified as transitioning out of dairy, as they did not appear to be used for dairy activities.

In 2015/16, the number of properties with functioning dairies remained about the same as in 2009/10, with 1142 properties covering 126,720 hectares. Another 1524 properties (108,798 ha) were identified with land uses associated with dairy or dairy agistment/fodder.

Table 2: Dairy land use change from 2000 to 2015/16

Land Use	2000-2004 [1]	2009/10	2015/16
Dairy [2]	235,584 ha (2721 properties)	123,571 ha (1143 properties)	126,720 ha (1142 properties)
Ex-dairy (in transition)		114,500 ha (1700 properties)	
Associated with dairy [3]			53,945 ha (765 properties)
Dairy cattle agistment/fodder [4]			54,853 ha (759 properties)
Total hectares (ha) [5]		238,071 ha (2843 properties)	235,518 ha (2666 properties)

Source: GB CMA 2017

1. This period reflects the peak production in the GMID dairy industry and is sourced from Valuers for that period.
2. Dairy properties are defined as council rated properties that have a functioning dairy shed.
3. Properties associated with dairies that have been linked to dairy properties through customer data and therefore form part of the dairy enterprise.
4. Dairy agistment/fodder represents former dairy properties that either still service the dairy industry or are in transition (but have not been linked to a dairy property or enterprise).
5. Total (ha) do not always match between periods due to exits and entries from new properties that previously weren't dairies.

Table 3 shows the outcome of the 2009/10 ex-dairy category and what those properties have transitioned to following refined categorisation in 2015/16. These 2015/16 categories (e.g. associated with dairy and dairy cattle agistment/fodder) would have existed in 2009/10, but were grouped as ex-dairy. Therefore some of the ex-dairy category (114,500ha) in 2009/10 would have actually still formed part of larger dairy enterprises even if unused at the time, as evident in 2015/16.

The 2015/16 data allows an improved understanding of the transition of dairy land use since 2009/10. For example, of the 114,500ha or 1700 'ex-dairy' properties in 2009/10, in 2015/16 the data identifies that 42,000ha (519 properties) are still directly linked to a dairy enterprise; 37,000ha (559 properties) that were previously associated with dairy now identify as dairy agistment/fodder but are not able to be linked directly to a property with a functioning dairy; and, 34,000ha (506 properties) have transitioned and are classified as mixed/grazing or cropping.

Table 3: Outcome of dairy land use change from ex-dairy category shown in Table 2.

Land Use	2009/10	2015/16 (ex-dairy transition)
Ex-dairy [1]	114,500ha (1700 properties [1])	
Dairy [2]		12,000ha (109 properties)
Associated with dairy		30,000ha (410 properties)
Dairy agistment/fodder		37,000ha (559 properties)
Mixed & grazing		14,000ha (208 properties)
Cropping		20,000ha (298 properties)
Total hectare (ha)	114,500ha	113,000ha [3]

Source: GB CMA 2017

1. Properties defined as council rated properties with a non-functioning dairy shed.
2. Properties defined as council rated properties with a functioning dairy shed.
3. There are other minor categories of change that account for differences in (ha) between 2009/10 and 2015/16 (i.e. Lifestyle).

Water ownership and use in the GMID

Water entitlement ownership was analysed and water use records used, to map water use on each irrigation classified property (13,230) across the GMID. This showed significant changes in water ownership and use over the last 15 years (Figure 5).

Before 2006, overall water use was close to the total HRWS owned in the GMID. Water use declined between 2006 and 2012, due to low allocations in the drought followed by wet conditions. Over the same period, the volume of HRWS owned within the GMID declined by about 440GL.

An estimated 365GL HRWS, or 23% of the GMID total, was purchased by the Commonwealth in the buybacks between 2008 and 2012; HRWS sales out of the GMID were relatively low before and after the Basin Plan buybacks (Cummins 2016).

GMID irrigators have transferred an estimated additional 38GL HRWS to the environment in return for Government funding for farm water efficiency upgrades under the Basin Plan.

Dairy water ownership

Table 4 shows that HRWS ownership in the GMID dairy industry fell from 709GL in 2003/04 down to 465GL a decade later. The decrease coincides with the Commonwealth Government buybacks for the environment under the Murray-Darling Basin Plan.

Dairy farmers have fairly consistently accounted for about 45% of HRWS water ownership in the GMID since 2001; it is reasonable to assume they therefore conservatively account for at least 45%, or 164GL, of the estimated 365GL HRWS sold out of the GMID to the Commonwealth for the Basin Plan.

GMID dairy farmers have transferred at least another estimated 23GL HRWS to the Commonwealth for the environment in return for federal funding for on-farm water efficiency upgrades (estimate based on dairy properties in the GB CMA Farm Water Program) (GB CMA 2017a).

Dairy water use

Table 4 shows the GMID dairy industry is now using about 25% less water in an average season now than it did before the most severe years of the Millennium drought from 2006/07 – 2008/09, and the Basin Plan buybacks.

Note that surface water use by the GMID dairy industry dropped almost 20% from 740GL in 2014/15 down to 600GL in 2015/16. This drop reflects dry seasonal conditions in 2015/16; HRWS allocations being slow to reach 10%; low General Security allocations in NSW; and, high temporary water prices around $220/ML weighted average for the season (peaking over $300/ML in November 2015 and $250/ML in May 2016) (Aither 2016).

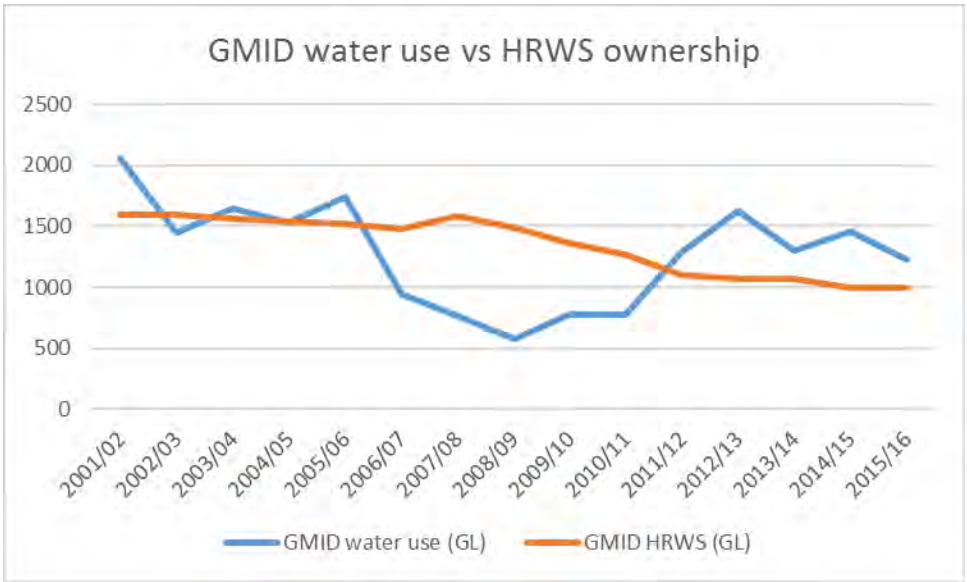

Figure 5: GMID total water use and entitlement change

Data source: GMW and DEDJTR from GB CMA 2017.

Table 4: GMID dairy water use and entitlement change

Year	GMID HRWS (GL)	GMID water use (GL)	Dairy HRWS (GL)	Dairy water use	% dairy water use more than HRWS owned
2001/02	1597	2053	819	1065	+30%
2002/03	1598	1450			
2003/04	1567	1652	709	922	+30%
2004/05	1543	1534			
2005/06	1517	1739			
2006/07	1480	945			
2007/08	1585	769			
2008/09	1490	574			
2009/10	1365	774			
2010/11	1273	772			
2011/12	1103	1286			
2012/13	1068	1622	470	746	+59%
2013/14	1068	1295			
2014/15 [1]	1000	1456	465	740	+59%
2015/16	1000	1230	465	600	+29%

Data source: GMW and DEDJTR from GB CMA 2017.

1. 2014/15 water use and entitlement is based on dairy enterprises and dairy agistment. Dairy enterprises are estimated to hold 380GL with a change in water use from 600GL in 2014/15 to 500GL in 2015/16.

Water use and milk production

The 25% reduction in water use correlates with a 26% reduction in annual average milk production in the GMID (Figure 4), falling from 2345 ML average in 2002/03 – 2005/06, before the severe drought years and the Murray-Darling Basin Plan buybacks, down to 1740 ML average over the last five years. It shows that while many dairy farmers have upgraded farm systems to use water more efficiently, milk production remains closely linked to the water available for use.

A contributing factor may be rising temperatures associated with climate change offsetting productivity and water efficiency gains from the upgrades. For example, the higher temperatures of the last 10 years are affecting pasture production, with farmers changing pasture and forage crop species due to warmer, shorter springs and plant heat stress impacts, as well as reduced water availability. Higher temperatures also increase the amount of water required to maintain the same level of pasture and fodder productivity

By comparison, milk production has increased 30% in NE Victoria to an average 263ML a year. Almost no water has been recovered for the Basin Plan from this area, which is also cooler than in the GMID.

Exposure to the temporary market

The data indicates that GMID dairy farmers are now more reliant on the temporary water market to meet their production needs. Pre-2006, GMID dairy farmers as a group used on average 30% more water each year than they owned in HRWS (i.e. in 2001/02 dairy farmers owned 819GL in HRWS, but used 1065GL) (Figure 5).

The additional water used by the dairy industry pre-2006 was available in the form of cheap 'sales' allocations within the GMID. Sales water was effectively a redistribution of unused or underused allocations.

This surplus 'sales' pool has since been absorbed through environmental water deals pre-Basin Plan, the activation and trade of 'sleeper' licences leading to full uptake of the available resource each year, the Basin Plan buybacks, and the introduction of carryover and associated 'spill-able' accounts. Drought has also changed the metrics for deciding annual water allocations, while climate change is also having an effect, particularly in reducing rainfall and runoff in the autumn break.

By comparison, GMID dairy is now using 59% more water (~740GL) than it owns in HRWS (465GL) (Figure 5). Dairy farmers must now compete for that additional water in the temporary market spanning the whole southern connected Basin, and against new and expanding industries such as almonds that have emerged over the last 10 years.

Stage 2 – Interview summary for dairy

Stage 2 of the project involved HMC Property Group (consultants) interviewing 384 property owners through approximately 45-minute face-to-face questionnaires. Property-owners were selected randomly to ensure a cross representation from each industry and geographical area (e.g. municipality) (Table 5). This section presents selected results on land and water use from the 121 dairy farmers interviewed (Table 5). The full set of results from the questionnaire is provided in the Technical Report (GBCMA 2017).

Table 5: Dairy interviewees – geographic distribution

Municipality – n=121	Number	% Dairy Farmers
Campaspe	59	48.8
Gannawarra	15	12.4
Loddon	4	3.3
Shepparton	27	22.3
Moira	16	13.2
Total	121	100%

Source: DEDJTR 2017

Water ownership

In the GMID, 73.5% of dairy farmers interviewed said they did not own enough HRWS water entitlement to meet their irrigation needs (Table 6). More than 30% own less than 200ML of HRWS, including 4.2% owning none at all (Table 7).

While historically GMID dairy farmers have always used more water than they owned, Table 6 should be considered in the context of Table 4, which shows that as a group, dairy farmers now own substantially less entitlement and need to access more water over and above their entitlement volume than previously. Coupled with the substantial proportion owning less than 200ML, which is considered low for most production systems, this indicates a greater exposure and therefore vulnerability to external water market drivers outside their control than was the case before the water policy reforms and the Murray Darling Basin buybacks.

Table 6: Adequacy of entitlement to meet need

I have the amount of water entitlement to irrigate my property that I require	% Dairy Farmers
Disagree	73.5
Undecided	5.3
Agree	21.2

Source: DEDJTR 2017

Table 7: Volume of HRWS ownership

High Reliability Water Share at present	% Dairy Farmers
0 ML	4.2
1-50 ML	11.1
51-100 ML	5.1
101-200 ML	10.3
201-500 ML	36.8
501-1000 ML	22.2
More than 1000 ML	10.3

Source: DEDJTR 2017

Reliance on the temporary market

Consistent with Tables 4, 6 and 7, many dairy respondents reported having sold large volumes of water and that allocation trade was playing a significant role in dairy farm businesses. (Table 8)

Just over 61% said allocation trade was part of their long-term business plan, and 54.2% said allocation trade made up a large part of their water use on-farm. Almost half (49.2%) said they relied heavily on the temporary market to meet their water needs.

Sixty-seven percent of dairy respondents said allocation trade had a negative effect on their ability to make a profit in 2015/16; 9.2% said it had a positive effect. More than 75% of dairy farmers said the temporary water price was affecting their water buying/selling decisions (Note: 2015/16 was a dry season, with a weighted average seasonal price of $220/ML, peaking over $300/ML in November 2015 and $250/ML in May 2016) (Aither 2016).

More than 65% of dairy respondents said that allocation trade negatively affected their ability to plan and implement a water budget, with a similar proportion reporting trade negatively affected their ease of business operation.

Table 8: Allocation trade

Reliance on allocation trade to manage through the irrigation?	%
No or little reliance	31.4
Some reliance	19.5
Large reliance	49.2
Allocation trade affecting the ability to make profit?	%
Negative impact	67.0
No impact	23.9
Positive impact	9.2
Part of long-term plan for business to use allocation trade?	61.3
Allocation trade forms a large part of farm water use?	54.2
Current price affected your water purchase and selling decisions?	75.3
Allocation trade within own business?	8.6
Allocation trade affecting the ability to plan and implement water budget?	%
Negative impact	65.1
No impact	25.7
Positive impact	9.2
Allocation trade affecting ease of operation?	%
Negative impact	64.2
No impact	28.4
Positive impact	7.3

Source: Modified from GB CMA 2017

Water policy reforms

Dairy farmers were have been very aware of the rapid and profound changes in water policy and management at State and Federal level over the last decade. Almost 60% said their business plan was affected by water policy (Table 9). Policy changes that may be included as part of this include unbundling, the Murray-Darling Basin Plan, relaxed trade restrictions, the introduction of carryover in Victoria and new drought reserves, all of which have affected water affordability and availability.

Table 9: Water policy effects on business

My farm business plan will be affected by water policy	%
Little or no influence	24.6
Some influence	18.1
Large influence	57.4

Source: GB CMA 2017

Water price sensitivity

Dairy farmers were highly sensitive to the temporary water price, with 26% saying water prices over $150/ML were not viable for their business, and 56% saying prices over $200/ML were not viable (Table 10).

In context, annual weighted average prices in the southern Basin have ranged from $20/ML in very wet years (2011/12) to $220/ML in dry years (2015/16). The median price in 2014/15, considered an average year in terms of seasonal conditions and water allocations, was $120/ML (Aither 2016)

More than three-quarters said the price in 2015/16 affected their buying and selling decisions. The weight average price in this year was $220/ML, peaking over $300/ML in November 2015 and $250/ML in May 2016. The prices reflected the dry season with Victorian HRWS allocations slow to reach 100% and low General Security allocations in NSW, so significantly less total volume of water available for irrigation across the southern connected Basin.

The high price of water is linked to the GMID dairy industry's significant reduction in water use in 2015/16, down from an annual average 740GL to 600GL as shown previously in Table 4.

Table 10: Price sensitivity for dairy farmers

The price above which temporary water becomes unviable ($/ML) for my business to purchase	%
150	26
200	56.2
250	12.3
>250	5.5
Current price affected your water purchase and selling decisions n=98	**%**
Yes	75.3
No	22.4

Source: DEDJTR 2017

Changing irrigation practices

Dairy farms have embraced the opportunity to upgrade their irrigation infrastructure over the last five years, with 65.3% undertaking works. Of the dairy farmers surveyed, 46.3% had received funding from Federal Government programs such as the On-Farm Irrigation Efficiency Program (OFIEP), or State programs. In return, these farmers transferred some of their HRWS to the environment (Table 11).

Table 11: Dairy on-farm infrastructure and irrigation practices

Questions	%
Implementation of improved on-farm irrigation systems?	52.6
Irrigation infrastructure upgraded in last 5 years?	65.3
Government funding for infrastructure upgrade?	46.3
Increased production after modernisation? (n=40)	75
Planning to change irrigation infrastructure in next 5 years? (n=102)	52

Source: DEDJTR 2017

Only 40 of the 121 dairy farmers interviewed answered the question whether modernising their irrigation infrastructure had increased production; of this 40, 75% said production had increased. It is worth noting on-farm modernisation does not necessarily mean more milk production using the same or less water in all cases; other research indicates the productivity gains are evident in other areas, such as labour and equipment savings (GB CMA 2017a). Rising temperatures associated with climate change may also be offsetting productivity and water efficiency gains, as noted above.

Asked whether they planned to change their irrigation infrastructure in the next five years, 52% of the 102 dairy farmers who responded said yes (Table 11).

But almost two-thirds of dairy farmers identified uncertainty about water allocations as the main barrier to changing their irrigation practices, compared with 53.9% of GMID irrigators in general, and followed by lack of financial resources (57%) and inadequate water availability (52.9%) (Table 12).

Uncertainty about adequate water availability also increased substantially as a barrier to changing irrigation practices from 19.3% of GMID irrigators surveyed in 2004/05, to 46% of all GMID irrigators in 2015/16 and 52.9% of GMID dairy farmers. This suggests irrigators may be reluctant to invest further in farm upgrades and improved practices because they are uncertain about accessing enough water at a price they can afford to run the upgraded systems and realise the return on their investment.

Table 12: Barriers to change

Barriers to changing irrigation practices in GMID[1]	Dairy 2015/16 %	All irrigators 2015/16 %	All irrigators 2004/05 %
Inadequate water quality	12.4	13.8	2.3
Uncertainty of water allocation	63.6	53.9	47.1
Lack of financial resources	57.0	52.6	50.2
Lack of time	21.5	21.1	20.0
Insufficient or inadequate information	6.6	7.6	3.6
Doubts about likely success	10.7	9.4	12.1
Age or poor health	11.6	17.7	12.9
Inadequate water availability	52.9	46.1	19.3
Connections/outlet modernisation	20.7	26.3	N/A

Source: DEDJTR 2017

1. Respondents could choose more than 1 barrier

Intention to stay

More than three-quarters (75.6%) of GMID dairy farmers agreed their property would still be irrigated in the next five years; 10.6% disagreed. Respondents were not asked if they thought they themselves would still be irrigating the property (Table 13).

Table 13: Future of the property

This property will be irrigated in next 5 years n=121	%
Disagree	9.4
Undecided	11.1
Agree	79.5

Source: GB CMA 2017

Dairy farming systems - dairy status/functioning

The survey indicates the median dairy herd size in the GMID is 300 milking cows. The vast majority of enterprises use a split calving system, which can relieve the pressure to irrigate pasture through the hot summer months. Many farms shifted from spring calving to split calving in spring and autumn during the Millennium drought (Table 14).

Table 14: Total dairy herd size and calving pattern

Total herd size for the enterprise (n=123)	%
Less than 100	10.6
100-200	25.2
201-300	18.7
301-500	23.6
501-600	5.7
More than 600	16.3
Calving pattern (n=118)	**%**
Autumn	5.9
Spring	9.3
Split	83.9
None	0.8

Source: GB CMA 2017

Willingness to adopt natural resource management practices

Dairy farmers were overwhelmingly willing to adopt practices that would improve natural resource management locally and across the catchment. Practices noted in the interviews included managing salinity and protecting environmental features (Table 15). Table 15 shows a high willingness (86.3%) to manage salinity and high willingness (65.6%) to manage environmental issues.

Whole farm plans (WFP) provide an important template for farmers guide best practice and inform production decisions, with 89.6% of dairy farmers having a professionally prepared WFP (Table 16). Of the 89.6% of WFPs, over half (58.2%) have been completed in the last 10 years (Table 17).

Table 15: Dairy farmer's willingness to manage salinity and/or environmental features

Scale (0-5)	Willingness to manage salinity issues %	Willingness to manage and protect environmental features %
Low (0,1)	4.8	1.6
Medium (2,3)	8.9	32.8
High (4,5)	86.3	65.6

Source: GB CMA 2017

Table 16: Dairy farmers with Whole Farm Plans (WFPs)

Professionally prepared WFP	% Dairy Farmers
Yes	89.6
No	10.4

Source: GB CMA 2017

Table 17: Timeframe of development of WFPs for dairy farmers

When was WFP completed?	% Dairy Farmers
0-5 years	33.0
6-10 years	25.2
More than 10 years	31.3
No WFP	10.4

Source: GB CMA 2017

Discussion

The GMID dairy industry has proved remarkably resilient in the face of climatic extremes and volatile commodity markets over the last 15 years, and it remains an extensive land use in the GMID. As such, it is a critically important component of the regional economy.

Dairy supports more than 4000 people working on farms supplying 16 regional processing facilities which in turn provide more than 3000 jobs across several towns. In addition, GMID dairy supports a multitude of service industries including vets, dairy machinery and irrigation equipment specialists, agricultural stores, financial services, and agronomists.

In 2015/16, the GMID produced more than 1700 million litres of milk with a farm-gate value of more than $740 million; an estimated $595 million of the farm-gate value was reinvested back into the local economy (source: Dairy Australia).

However, the Regional Irrigated Land and Water Use Mapping project (GB CMA 2017) reveals significant changes in water use and ownership in the dairy industry over the last decade. This undermines its resilience to climatic and market shocks in the future. Changes are being driven by Federal and State policy reforms such as unbundling water shares from property titles, the Murray Darling Basin Plan to recover 2750 billion litres of water primarily from irrigators for the environment, and the relaxation of trade restrictions across the southern Murray-Darling Basin.

The Basin Plan buybacks were the most significant driver. An estimated 365GL HRWS was bought out of the GMID by the Commonwealth Government. This translates to 23% of GMID HRWS now being owned by the Commonwealth Environmental Water Holder. GMID dairy farmers account for at least 164 GL of the 364GL sold to the environment under the Basin Plan.

Many dairy farmers used the proceeds from the buybacks to offset rising debts incurred as they battled to keep herds going through the Millennium drought, when Victorian HRWS allocations fell as low as 33% and allocation prices were averaging $390 - $550/ML. Survival strategies included growing less pasture and more fodder crops, buying in grain and other feed to substitute for home-grown pastures and fodder, and reducing herd sizes and milk production.

The proceeds kept them in business in the short term, but increased their business risk through greater reliance on allocation purchases than they would have been without the Basin Plan.

This risk was masked by the effects of the flood years and large carryover volumes for four years after buybacks ended in 2012. Their vulnerability was exposed in 2015/16, a dry year with low allocations and high temporary water prices.

Dairy farmers' increased reliance on the temporary market is evident in the fact they now use 59% more water than the industry owns in HRWS, compared with 30% before the Basin Plan buybacks and the worst years of the Millennium drought from 2006/07 to 2008/09.

The additional water used by the dairy industry pre-2006 was available in the form of cheap 'sales' allocations within the GMID. Now, dairy farmers must now compete for additional water in an allocation market spanning the whole southern connected Basin, and against new and expanding industries such as almonds that have emerged over the last 10 years.

In this new market, prices can quickly rise out of dairy farmers' reach in dry years, as reported by farmers themselves in one-on-one interviews. Twenty-six percent of dairy farmers interviewed said prices over $150/ML were not viable for their business while another half said the cut-off for their business was $200/ML. In 2015/16, the weighted average price was $220/ML, peaking over $300/ML in November 2015 and $250/ML in May 2016 (Aither 2016).

The limited capacity of dairy farmers to compete for water on the open market in dry years, can be seen in the industry's 20% drop in water use in 2015/16, compared with the year before.

When water is scarce and expensive, dairy farmers can and do respond by, for example, changing the balance between growing pasture and fodder crops, and buying in grain and other feed to substitute for home-grown pastures and fodder. They also respond by reducing herd sizes and milk production. However, these are survival strategies and farmers operate at a loss in these circumstances, as was observed during the severe drought years and again in 2015/16:

> *The combination of below average rainfall, higher temperatures and a competitive temporary water market provided challenging operating conditions for northern Victoria farmers in 2015-16. The drier conditions meant farmers had a greater reliance and exposure to the fodder and temporary water markets.*
>
> *For those farmers who purchased temporary water between years, the average price increased from $120/ML to $236/ML, contributing to a 40% increase in irrigation costs to $0.67/kg MS. Purchased fodder costs increased 47%, up to $0.66/kg MS as farmers supplemented animal metabolisable energy requirements on the fodder market. Overhead costs remained steady year-on-year. (Dairy Australia 2016)*

A late season drop in milk prices exacerbated the effects of the dry season and high water prices on farm profitability. Survival tactics are not sustainable in the long-term, particularly if dry conditions and high prices persist over more than one season, as experienced in Millennium drought.

The increased reliance on a volatile temporary market also means many dairy farmers owning little or no HRWS are highly vulnerable in dry years. More than a quarter of dairy farmers now own less than 200ML HRWS, which is considered low for most production systems.

In dry years, dairy farmers with little or no entitlement may not have water allocation to sell to raise the capital to purchase feed as a substitute for irrigated pasture or fodder crops. For some, this can make their financial position precarious, particularly if dry conditions persist or the industry is hit with a market shock such as the late season fall in milk prices in 2015/16. (It should be noted that during the Millennium drought, dairy farmers still owned much of the entitlement they later sold to the Commonwealth for the environment, and they therefore still had the benefit of albeit limited allocations, but now, that water is no longer available to them in dry years because the HRWS was sold).

While dairy farmers in the past have been able to manage their businesses to ride out periods of low rainfall, albeit at a loss, changes in water ownership and use over the last 10 years have eroded industry resilience. This increases the risk of the industry contracting further in the event of seasonal and market shocks, and further water recovery for the environment.

Where land has gone out of dairy use, it has primarily been replaced by lifestyle properties including recreational equestrian uses, and dryland farming. For example, the survey shows some shift away from dairy closer to major regional centres, like Shepparton and Tatura, where properties that were traditionally able to carry smaller dairies became less profitable.

These small title sizes and proximity to larger towns have lent themselves to lifestyle purchasers, and in some limited areas, some horticultural development. But such land uses do not support regional processing or substantial services industries, or generate the same volume of economic activity and jobs as dairy does per hectare of land used.

Conclusion

The overarching picture is that the GMID is maintaining a strong dairy profile. This is good news for the northern Victorian economy and communities. But it's a brittle picture of falling production, less water being used and more exposure for farmers to a volatile water market with higher price.

Overall, GMID irrigators, and especially dairy farmers, are less certain now about their water security than before the major water management and policy reforms implemented over the last 10 years. Uncertainty over water allocation and price is in turn stifling investment to continue to improve on-farm irrigation systems for more efficient water use and increased productivity (see Table 12).

Milk production in the GMID is still closely linked to water availability and affordability. Greater exposure to the temporary water market, higher water prices, and reduced water availability are together eroding the GMID dairy industry's resilience and making the industry more vulnerable to 'shocks' such as exceptional drought years and global milk pricing.

This vulnerability increases the likelihood that the industry will suffer further contractions in milk production that in turn has consequences for regional milk production and service industries. Further reduction in the total pool of water available for production in the southern Basin could accelerate this decline.

The challenge for the dairy industry is to develop integrated and flexible production systems able to adjust from one year to the next to the water available, and still remain profitable – that is, turn short-term survival strategies into profitable business management strategies. This transition will take time as it depends on working through a complex matrix of financial, cultural and knowledge constraints.

The challenge for the GMID is effective strategic decision-making regarding on and off-farm infrastructure investment, to provide a sound foundation to attract investment in new and expanded irrigated industries and ensure the long-term viability of our industry.

References

Aither (2016). Water Markets Report – 2015/16 review and 2016/17 outlook. http://www.aither.com.au/water-markets-reports/ Accessed 3 March 2017.

Cummins, Tim & Associates (2016). Trends in Northern Victorian Water Trade 2001-2015. 24 February 2016'. For the State of Victoria Department of Environment, Land, Water and Planning. Table 4, p25

Dairy Australia (2016). Dairy Farm Monitor Report. Victoria. Annual Report 2015/16. Dairy Australia and Agriculture Victoria, p6.

DEDJTR (2017). Analysis of data collected for the Regional Irrigation Land and Water Use Mapping in the Goulburn Murray Irrigation District project.

GB CMA (2017) Goulburn Broken Catchment Management Authority & Partners (2017). 'Regional Irrigated Land and Water Use Mapping in the GMID 2015/16' Technical Report, Goulburn Broken CMA and partners.

GB CMA (2017a). Goulburn Broken Catchment Management Authority (source 16 January 2017) Farm Water Program Evaluations **IN** GB CMA (2017) Goulburn Broken Catchment Management Authority & Partners (2017). 'Regional Irrigated Land and Water Use Mapping in the GMID 2015/16' Technical Report, Goulburn Broken CMA and partners.

GMW (2006). 'Irrigation Farm Survey 2004/2005. Final Date: 5/12/06.' Report by Goulburn Murray Water, Goulburn Broken Catchment Management Authority, North Central Catchment Management Authority, with contribution from Department of Primary Industries and Australian Bureau of Statistics.

HMC Property Group (2010). 'Changing land use in the GMID 2006-2010. Where have all the dairies gone? Report for Northern Victoria Irrigation Renewal Project and the Department of Primary Industries, by HMC Property Group. July 2010.

DAIRY AUSTRALIA

Locked Bag 104, Flinders Lane
Melbourne VIC 8009

T. (03) 9694 3777
F. (03) 9694 3733

www.dairyaustralia.com.au

MURRAY DAIRY

255 Ferguson Road
Tatura VIC 3616

T. (03) 5833 5312
F. (03) 5833 5929
E. admin@murraydairy.com.au

www.murraydairy.com.au