

RMCG

Update on GMID water availability scenarios and Irrigated Production across the Southern connected Basin

Prepared for Goulburn Broken CMA

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UPDATE ON WATER USE IN GOULBURN MURRAY IRRIGATION DISTRICT (GMID) AND SOUTHERN CONNECTED BASIN (sMDB)

LESS WATER AVAILABLE FOR IRRIGATION IN THE SOUTHERN CONNECTED BASIN – it's > 20%.

The Basin Plan (BP) has recovered an estimated 27GL of Low Security (LS), 704GL of General Security (GS) and 704 GL of High Security (HS) entitlements from buyback and farm efficiency works. This represents around 20% of the GS (3,600GL) and HS (3,300GL) entitlements across the sMDB. The water recovered reduces sMDB irrigation water by between 900GL and 1,430GL, depending upon seasonal allocations.

Policy changes and irrigator use of carryover mean that irrigation water use is now less than what is permitted under the Murray Darling Basin Cap and is significantly less (could be 500GL) than what was assumed in the development of the Basin Plan Sustainable Diversion Limits (SDL). The MDBA

has not undertaken the modelling to determine the exact impact to date.

WATER PRICES HAVE INCREASED

The price of water varies depending on the level of allocations. This price has almost doubled due to the lower water available to irrigators under the same climate conditions today given buyback etc.

AVAILABLE WATER VARIES WITH SEASONAL CONDITIONS

The last 12 years represent the full range of seasonal conditions that are likely to be experienced across the basin in future. What is unknown is the probable proportion of each scenario in future. The table below provides a summary of the water allocated in this period under each scenario. In any one year the actual water used changes slightly with the use of carryover.

sMDB climate scenarios, water allocation and use and price – post 2006

Climate Scenario	Allocation level	Frequency (last 12 yrs)	Total water allocated (GL)*		Price (\$/ML)		Comment
			Actual	Projected	Actual	Projected	
Very Wet 10/11, 11/12, 12/13	Victorian Low security water available, 100% NSW GS	3	6,200	5,300	20-50	50	Carryover increased
Wet 13/14, 16/17	90% NSW General Security	2	5,400	5,000	65	70	Rice expands
Average 14/15, 17/18	55% NSW General Security	2	4,300	4,000	125	130	Rice sits on allocation
Dry 09/10, 15/16	30% NSW General Security	2	3,500	3,300	150-208	210	Small rice crop as it sells to dairy/cotton
Drought 06/07, 07/08, 08/09	10% NSW GS, 80% NSW HS, and 50% Vic/SA high security	3	2,100	1,700	300-680	600	Horticulture minimises and cotton/dairy sell mostly, rice fails

The "actual" refers to what happened in those particular years, whereas the "projected" refers to what would happen if those years were repeated today given the smaller size of the consumptive pool.

INDUSTRY USE OF WATER HAS CHANGED

Horticulture (excluding almonds) has continued to slowly increase its water use over the last 50 years from 600GL in 1970 to around 800GL in 2015/16 and is likely to continue to slowly increase to 900GL in the foreseeable future.

The next drought may limit perennial horticultural growth as horticultural demand is likely to be capped by the total water available on the market.

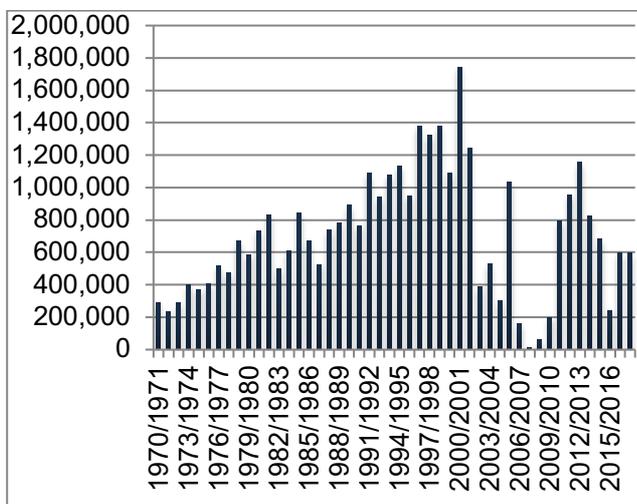
Almond’s water use has increased from almost nothing in 1999/00 to over 400GL in 2015/16 and is predicted to increase to over 600GL in the foreseeable future.

Since 2010, cotton has continued to replace rice in the Murrumbidgee region. Cotton currently uses 450GL and is expected to increase to up to 700GL in the foreseeable future.

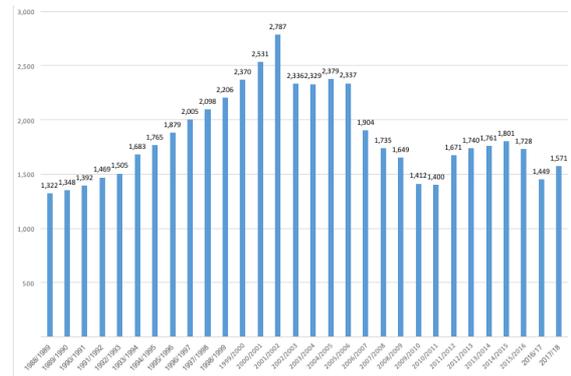
Since peaking in the early 2000s, dairy has reduced its production and water use. This is shown in the attached graph for the GMID. Dairy is now estimated to use 1,000GL in the southern basin but is expected to reduce to 900GL on average in the foreseeable future.

Rice production increased dramatically prior to 1999/00 reaching over 1.4 million tonnes in 2001. However, in recent times production has halved and now varies according to the climate scenario and allocations. This ranges from 0.2 million tonnes to 1 million tonnes. This is shown in the graph below. Rice water use now averages 650GL but ranges from 250GL to 1000GL per year.

sMDB Rice production over time (tonnes)



Dairy production in the GMID (ML)



REGIONAL WINNERS AND LOSERS

Some industries continued to expand and others decline as the water availability has reduced with the Basin Plan and changed irrigator behaviour. Similarly, some regions have also expanded and others declined.

In general terms since 1999/00 when water use across the basin was at its peak, it is observed that:

- SA Riverland region has maintained its overall water use.
- Victorian/NSW Mallee region has expanded its water use significantly.
- NSW Murrumbidgee has maintained its High Security water use but decreased its GS water use. BUT the decrease in water use has been offset by the expansion of cotton which uses less water per ha
- NSW Murray Irrigation has significantly reduced its water use as the rice industry has declined.
- Victorian GMID area has significantly reduced its water use resulting in a large decline in the dairy industry. With 417GL of the buyback and farm efficiency HS entitlements coming directly from the GMID, and additional indirect back trade of water out of the GMID to other regions where water has been recovered, this has resulted in a 500 GL reduction in water use in the GMID. This is almost half of the total reduction (1,169GL) in the sMDB consumptive pool in an average year.
- Over the last twenty years the GMID has had a net decline of 1,000GL/y (almost 50%), with half of this due to the Basin Plan and the other 500GL due to water trade, climate, carryover, new reserve policies and earlier water recovery initiatives such as the Living Murray.

THE FUTURE ESTIMATED WATER USE BY INDUSTRY IN sMDB

The new projected equilibrium (GL) in the sMDB based on current entitlements and no more recovery

Sector	Drought (06/07)	Dry (15/16)	Average (14/15)	Med-wet (16/17)	Wet (12/13)
Mixed grazing	121	286	316	416	474
Rice	72	241	631	943	1,143
Cotton	241	676	676	721	721
Other crops	145	406	541	554	554
Dairy	435	811	901	970	1,067
Horticulture	1,400	1,442	1,442	1,386	1,286
Carryover to next year				554	554
Total (incl. carryover & 500GL of groundwater)	2,414	3,863	4,507	5,545	5,800

IMPACT ON GMID WATER USE

The water managed by the GMID system has already halved and could be as little as 1/3rd in five years' time compared to the turn of the century. This is shown in the table below. It is noted that water use in GMID does not vary nearly as much as it does in NSW as Victoria has predominantly HS entitlements compared to NSW's significant amount of GS entitlements.

THE BASIN PLAN IMPACT ON GMID

The dairy industry in the GMID has already reduced its production level by 1/3rd from the pre-millennium drought level of 2,350ML, to its current level of 1,550ML. This involved a reduction of

800ML in milk production, with an annual farmgate value of \$320 million (at 40c/litre) or a value ex-factory of \$640 million (at 82 cents/litre). The previous economic study attributed \$200M of the farm gate lost annual production and \$360M of the reduced processed milk value to the Basin Plan. It also attributed \$25million/annum of lost mixed farming production to the Basin Plan. In total over 1,000 jobs were estimated to have been lost.

The previous study also recognised the region received over \$2 billion worth of funding for GMID modernisation and \$250 million in farm efficiency grants and \$700 million from buyback. This funding provided 750 jobs in the short term. This previous study also recognised that not all of the water reduction was due to the Basin Plan.

Diversions, deliveries, and losses in the GMID (GL)

Time period	Diversions into GMID	Deliveries (incl. 80GL env, & urbans)	Losses
1990's to 2,000	3,000	2,150 +/- 400	850
Current - 2018	1,450	1,150 +/- 200	300
5 years' time - Almonds/cotton use more	1,250	1,000 +/- 175	250
5 years' time with 450 GL UpWater as well	1,000	800 +/- 150	200
What happens in Drought/floods			
▪ Last time 3 yr drought and/or 10/11 flood	1,100	700+/-200	400
▪ Next drought	800	500+/-100	300
▪ Next drought with UpWater	650	400+/-100	250

ENTERPRISE WATER USE IN GMID HAS CHANGED AND WILL CONTINUE TO DO SO

Water use in the GMID by sector (GL) (incl 70-120GL of Groundwater)

Sector	2000	Current		5 years' time		5 years with 450 GL UpWater	
	average	Average (17/18)	Last drought (06/07)	Average	Drought	Average	Drought
Mixed grazing	283	139	75	110	40	85	30
Crops	160	155	42	108	34	91	29
Dairy	1468	825	615	720	359	595	300
Horticulture	90	131	100	138	137	138	133
Total	2,000	1,250	832	1,075	570	908	491

PROPOSED 450GL UPWATER

The Basin Plan has provision for a further 450GL of water recovery (UpWater) from infrastructure water saving projects provided it meets a socio-economic test. A recent Ernst & Young report identified possible sources of the UpWater and included the possibility of a further savings in GMID operations of 237GL. This is considered to be impractical as GMID has already reduced losses to less than 350GL. It is considered that most of the water will come from on-farm efficiency programs from across the southern basin.

SOUTHERN BASIN FARM EFFICIENCY GRANTS PENALISES THE GMID

Farm efficiency programs provided a better solution than buyback for the GMID because the effective price paid for water was more than a 33% premium and it also assisted farmers coming out of the drought to increase productivity sooner than they otherwise could have. However the water recovered ultimately reduced the consumptive water pool across the southern connected basin. The resulting “back trade” of entitlements, particularly by horticulture meant that the GMID and Murray Irrigation reduced their water use.

Any future farm efficiency grants will continue this process of reducing the available water to the GMID and Murray Irrigation, but will have no impact on the available water to the Riverland, Sunraysia or even Murrumbidgee (because of the cotton

expansion using less water than rice). Some GMID irrigators may obtain a further subsidy to bring forward works that they would have done anyway, the region would lose access to the savings transferred to the environment, which would otherwise have been made available for production with private funding. Outside of the GMID, horticulture and cotton farm efficiency programs subsidise expansion and this expansion can result in trading water out of the GMID. In this way the GMID would effectively give up water on other region’s behalf.

IMPACT OF 450GL ON GMID

The expected water use in the GMID if the 450GL UpWater proceeds via farm efficiency grants is shown in the table above. This suggests that on average the water use in the region will decline by a further 167GL or 18% and in a repeat of the 06/07 drought would see a 79GL reduction. Despite this drop, Horticulture would continue to slowly expand, but dairy and mixed farming would decline even further than they already have.

The resulting drop in dairy production is estimated to be 235ML of milk which represents 15% of current production levels. This would mean nearly \$100mill of dairy farm gate production or \$200 million of dairy factory production within the region would be lost as a result of the UpWater implementation.

Water prices would rise a further \$30 per ML on average and the job losses based on previous modelling would be a further 500 jobs lost to the region.

RECENT MDBA ANALYSIS OF WATER RECOVERY IN THE SOUTHERN BASIN

Analysis underestimates by 178GL - 17%

The MDBA recently released report on the Southern Basin (May 2018) identified that the total recovery was 1,033.9GL in 41 communities (156.73GL from farm efficiency and 877.5GL from purchases). A closer examination of this data indicates that the recovery has been underestimated by a total of 167.6GL, because 77.7GL of recovery was NOT allocated to any community, 40GL of Victorian recovery was not included and 50GL of recovery has occurred since.

Therefore, the total recovery in the southern basin is considered to be 1,169 GL with a further 39GL for the Lachlan/Hillston/Lower Darling areas.

Analysis suggest impact is 1,208GL not 810GL, i.e. 2/3rds of the real impact!

The MDBA analysis creates a net impact figure for the 41 communities of only 810GL (including 31GL for Hillston). This was calculated by ignoring the 156 GL farm efficiency water transferred to the environment and suggesting that 67GL of water that was retained on-farm offsets an equivalent buy-back volume. The farm efficiency program has provided additional funds to individual irrigators, which has assisted the expansion of the horticulture/cotton industries, and brought forward development for the rice/dairy/cropping industries. Whilst the additional funds have a short term benefit, ultimately the water recovered is no longer available to the irrigation industries for their own private investment to enable increased production. Thus the MDBA analysis underestimates the impact of water recovery considerably.

The analysis ignores actual water use by the communities

The MDBA analysis focusses on where the entitlement was purchased from. However, subsequent trade often means that the water recovery affects a different community from where the entitlement was purchased from. For example, the analysis indicates that 44% of entitlements (47.7GL) were recovered in Robinvale and only 18% (64.6GL) in Kerang-Cohuna. Despite the large apparent recovery in Robinvale, actual water use has increased due to the expansion of almonds. This has been achieved by the associated trade of allocations from elsewhere. A significant part of that back trade has come from Kerang Cohuna

resulting in a much greater reduction in water use than the MDBA analysis would indicate. Thus the impact of the water recovery on communities is very different to that reported in the MDBA analysis.

LTAAY numbers hide the range of allocation impacts

The MDBA analysis refers to LTAAY volumes ie Long Term Annual Yield. Of more interest is the range of allocation impacts that happens in most years, which ranges from 900 – 1,450GL being unavailable for irrigation use.

Impact on the GMID communities is much greater than indicated

MDBA suggest that the water recovered is a net 305GL in the 7 communities within the GMID region. However, the total recovery from these communities is 417GL (346GL of buyback and 71GL of farm efficiency). The total impact after allowing for back trade to offset recovery from areas downstream of the GMID (Riverland and Sunraysia) is actually more than 500GL/y reduction from the GMID. The MDBA estimate the impact on the GMID at only 60% of what we believe is the real impact.

Missed the real impact on regions and industries

When change in actual water use is examined as opposed to “net” LTAAY water recovery impacts, it is observed that the water use in SA is relatively unchanged, Sunraysia has increased its overall water use, Murrumbidgee has decreased its water use but only in proportion to the expansion of the cotton industry at the expense of the rice industry. By contrast, the GMID and Murray Irrigation water use has declined significantly. In practical terms nearly 1,200GL of total recovery has resulted in a reduction in water use of 500GL in the GMID, 300GL in Murray Irrigation and 300GL in Murrumbidgee (offset by cotton expansion).

Therefore, the reduction in water use has mostly been felt in the dairy and rice industries and not at all in horticulture or cotton. Yet the analysis by MDBA suggests that horticulture regions of Sunraysia/Riverland have also been affected by the same proportion as the GMID and Murray Irrigation.

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1 Water availability for the GMID

1.1 PROJECT OBJECTIVE

The GMID faces a severely reduced total volume of water. This reduction has been triggered by water trade to high-value horticulture downstream, broader water reforms such as the introduction of carry over, changing drought reserves, the Living Murray and from the introduction of the Murray Darling Basin Plan (Basin Plan).

RMCG undertook to assess future water availability scenarios for the GMID. This involved updating work previously completed in 2016 for the Committee for Greater Shepparton and for the Goulburn Broken Catchment Management Authority. The study considers both the southern connected Murray Darling Basin (SMDB) and the GMID.

1.2 BASIN PLAN IMPACTS

- The Basin Plan requires the return of 2,750 GL to the environment from the consumptive pool. The GMID and Murray Irrigation have been disproportionately affected by this exercise, with the majority of the transfer coming from water purchases from these two irrigation districts (346GL from direct purchases in the GMID alone).
- The transfer occurs in two ways: either from direct trade of water to the Commonwealth or as a second stage 'back-trade' whereby water users elsewhere sell water to the Commonwealth at a premium and then buy an equivalent volume out of the GMID to restore their prior water holdings.
- GMW has to manage its business in the light of the Basin Plan and the reduced level of water use in the GMID. It is developing a new strategic approach and already implementing changes to its operations and capital programs to manage this.
- The GMID is also competing with other regions for access to water and new development - in particular, expanding cotton and horticulture developments elsewhere in the SMDB, which are adversely affecting the GMID's access to water. This too is affecting GMW's long term strategic direction.
- The Basin Plan includes a proposal for the recovery of a further 450GL through 'efficiency measures', provided the exercise can be achieved with neutral or improved socio-economic outcomes. This is commonly referred to as the UpWater initiative. Ernst and Young (EY) were asked to assess the practical implementation of this exercise.
- The EY report proposes that the additional 450GL recovery can be implemented and that 239GL could come from further efficiencies within the delivery system of the GMID, with the remainder from further on-farm efficiencies, of which 52GL could come from the GMID:
 - The proposed 239GL saving is questionable given that current losses are only around 300GL
 - The extension of the on-farm efficiency program will impact on the GMID. The efficiency program is supported by individual farmers as they receive funds in return for giving up water - but it reduces the overall volume of the consumptive pool and thus adversely affects the GMID.

1.3 METHOD

In undertaking this work RMCG has:

- Reviewed the latest ABS data for 2015/16 irrigation water use (not available in 2016)
- Updated this data to take account of groundwater use across the GMID
- Updated current water use by industry across the SMDB
- Updated the water pricing data
- Considered higher use of carryover
- Considered more recent data on volumes from Commonwealth water recovery programs.
- Considered new limits of trade within SMDB
- Considered future demand from horticulture, cotton and the consequences on other industries.
- Considered the MDBA data on community profiles
- Considered the latest land use information in GMID

This data has then been used to update the previous water availability scenarios, which have also been modified to allow for the 450 GL UpWater initiative.

This document details the findings of the updated scenarios and the impact for GMW's future water use.

2 DATA REVIEW

2.1 WATER USE IN 2015/16

The industry shares of total water use for the 2015/16 dry year scenario are presented below for the SMDB and the GMID itself (source ABS).

Table 2-1: Water use for 2015/16 by sector - SMDB (ML)

Industries	NSW Bidgee	NSW Murray/L'wer Darling	Vic Mallee	Vic GMID	Vic North East	SA	Total	% of total
Dairy	-	115,754	396	802,949	19,515	30,504	969,118	26.0%
Fruit & nut trees	75,550	23,475	321,844	77,249	1,167	127,368	626,651	16.8%
Other crops	250,580	176,548	6,876	142,079	518	565	577,166	15.5%
Other horticulture	83,258	65,376	143,022	41,831	6,351	205,270	545,109	14.6%
Cotton	320,271	97,792		766		-	418,829	11.2%
Rice	221,318	77,262		231			298,810	8.0%
Mixed grazing	93,302	100,119	3,560	83,280	7,596	3,311	291,168	7.8%
Total	1,044,278	656,327	475,696	1,148,384	35,148	367,018	3,726,851	100%
% of total	28%	18%	13%	31%	1%	10%	100%	

This shows horticulture as the largest overall sector across the SMDB, with 31.4% of the total water use.

Table 2-2: Water use for 2015/16 by sector - GMID (ML)

Industries	Vic GMID	% of total
Dairy	802,949	70.0%
Other crops	142,079	12.4%
Mixed grazing	83,280	7.3%
Fruit & nut trees	77,249	6.7%
Other horticulture	41,831	3.6%
Cotton	766	0.07%
Rice	231	0.02%
Total	1,148,384	100%

By contrast Dairy is by far the predominant water user within the GMID.

Notes: ABS does not distinguish between dairy and other pastures. This split has been derived for the above table assuming:

- Murrumbidgee - negligible dairying
- NSW Murray - 50% of hay, 100% silage and 50% grazed pasture is dairying, which gives 54% of pasture water usage as dairying
- Vic Mallee - 10% of hay, 100% silage and 10% grazed pasture is dairying, which gives 10% of pasture water usage as dairying
- GMID - 90% of hay, 100% silage and 90% grazed pasture is dairying, which gives 91% of pasture water usage as dairying. Some of this may be on mixed farms that supply dairy farms.
- Vic North East - 70% of hay, 100% silage and 70% grazed pasture is dairying, which gives 72% of pasture water usage as dairying. Some of this may be on mixed farms that supply dairy farms.
- SA - 90% of hay, 100% silage and 90% grazed pasture is dairying, which gives 90% of pasture water usage as dairying. Some of this may be on mixed farms that supply dairy farms.

Water use for the Almond sector is included in the 'Fruit and nut tree' category. The percentage of almond sector water use has been estimated below at 11% of total water use across the SMDB.

Table 2-3: Almond sector water use 2015/16 - SMDB (ML)

	NSW Bidgee	NSW Murray/L'wer Darling	Vic Mallee	Vic GMID	Vic North East	SA	Total	% of SMDB
Fruit & nut trees	75,550	23,475	321,844	77,249	1,167	127,368	626,651	17%
Almonds	21,076	6,830	293,699	-	-	86,243	407,849	11%

2.2 WATER RECOVERY

The following table reproduces the report from the Commonwealth on 'Progress towards Bridging the Gap to the SDLs as at 30 November 2017'. This records a volume of 1,723.9GL as having been recovered from across the SMDB to-date.

Progress of Water Recovery towards
Bridging the Gap to the SDLs
As at 30 November 2017

Surface Water Summary	
Target:	2750 GL
Recovered:	2107.7 GL 76.6%
Remaining:	642.3 GL

Groundwater Summary	
Target:	40.4 GL
Recovered:	2.7 GL 6.7%
Remaining:	37.7 GL

SDL Resource Unit (or Shared Zone)	Sustainable Diversion Limit (SDL) Reduction Amount			Recovery Progress					Remaining			
	Local Target (GL)	Shared Target (GL) ⁽¹⁾	Total Target (GL)	Commonwealth ⁽²⁾				Total Recovery (GL)	Local recovery remaining (GL)	Shared recovery remaining ⁽⁷⁾ (GL)	Total recovery remaining ⁽⁸⁾ (GL)	
				Included in 1500 Limit	Exempt from 1500 Limit ⁽³⁾	Infrastructure (GL) ⁽⁴⁾	Gifted (GL) ⁽⁵⁾					State Government Recoveries ⁽⁶⁾ (GL)
Condamine-Balonne	100.0			78.9		9.1			88.0	12.0		
Moonie	0.0					1.4	1.1		2.5	0.0		
Nebine	1.0						3.8		3.8	0.0		
Paroo	0.0								0.0	0.0		
QLD Border Rivers	8.0			3.9		9.3	0.5		13.8	0.0		
Warrego	8.0			10.1		0.4	9.5		20.1	0.0		
Northern Basin QLD Zone	117.0			93.0	0.0	20.3	15.0	0.0	128.3	12.0		
Barwon-Darling	6.0			24.9		6.2	1.5		32.6	0.0		
Gwydir	42.0			35.5		5.1	6.2		46.9	0.0		
Intersecting Streams ⁽⁹⁾	0.0			8.1					8.1	0.0		
Macquarie-Castlereagh	65.0			24.6		37.3	20.6		82.5	0.0		
Namoi	10.0			4.8		6.8			11.5	0.0		
NSW Border Rivers	7.0					3.3			3.3	3.7		
Northern Basin NSW Zone	130.0			97.9	0.0	58.7	0.0	28.4	184.9	3.7		
Northern Basin Zone Total	247.0	143.0	390.0	190.9	0.0	79.0	15.0	28.4	313.2	15.7	61.2	76.8
Lower Darling	8.0			18.8		1.3			20.0	0.0		
NSW Murrumbidgee	320.0			134.7		247.4	19.0		401.1	0.0		
NSW Murray	262.0			219.5		134.0			353.5	0.0		
Southern Basin NSW Zone	590.0	458.0	1048.0	372.9	0.0	382.7	0.0	19.0	774.7	0.0	273.3	273.3
ACT Murrumbidgee	0.0			4.9					4.9	0.0		
Southern Basin ACT Zone	0.0	4.9	4.9	4.9	0.0	0.0	0.0	0.0	4.9	0.0	0.0	0.0
Broken	0.0			0.0		0.5			0.5	0.0		
Campaspe	18.0			6.3		0.2	22.6		29.1	0.0		
Goulburn	344.0			232.5		94.0	35.4		361.9	0.0		
Kiewa	0.0								0.0	0.0		
Loddon	12.0			2.8		0.6	8.6		11.9	0.1		
Ovens	0.0			0.1		0.1			0.1	0.0		
VIC Murray	253.0			270.9		95.9	30.1		396.9	0.0		
Southern Basin VIC Zone	627.0	425.3	1052.3	512.6	0.0	191.2	0.0	96.7	800.5	0.1	251.8	251.8
Eastern Mount Lofty Ranges	0.0								0.0	0.0		
Marne Saunders	0.0								0.0	0.0		
SA Murray	101.0			86.3	2.9	48.3	6.4		143.9	0.0		
SA Non-Prescribed	0.0								0.0	0.0		
Southern Basin SA Zone	101.0	82.8	183.8	86.3	2.9	48.3	0.0	6.4	143.9	0.0	39.9	39.9
Southern Basin Total	1318.0	971.0	2289.0	976.8	2.9	622.2	0.0	122.1	1723.9	0.1	565.0	565.1
Lachlan ⁽¹⁰⁾	48.0	N/A	48.0	35.0		1.5	11.4		48.0	0.0		
Wimmera-Mallee	23.0	N/A	23.0	22.6					22.6	0.4		0.4
Total Basin	1636	1114.0	2750.0	1225.3	2.9	702.7	15.0	161.9	2107.7	16.2	626.2	642.3

SDL Resource Unit (or Shared Zone)	Sustainable Diversion Limit Reduction Amount			Recovery Progress		Remaining
	Local Target (GL)	Shared Target (GL)	Total Target (GL)	Purchase (GL)	Total Recovery (GL)	Total recovery remaining (GL)
Upper Condamine Alluvium (Central Condamine Alluvium)	35.4	N/A	35.4	2.7	2.7	32.7
Upper Condamine Alluvium (Tributaries)	5.0	N/A	5.0	0.0	0.0	5.0
Total Basin	40.4	N/A	40.4	2.7	2.7	37.7

Notes

For total water recoveries allow for minor rounding.

All water recoveries figures are expressed in long term average annual yield (LTAAY) terms. Water recovery amounts are calculated using the current long-term diversion limit equivalent factors (v2.05) agreed to by Ministerial Council in November 2011 or are consistent with accredited Water Resource Plans. All Overland Flow water recoveries have their factors individually modelled by the Murray-Darling Basin Authority. Water Resource Plans (WRPs) must be prepared by Basin states for accreditation under the Basin Plan by 30 June 2019. These plans may change the long-term diversion limit equivalent factors, affecting the final value of entitlements held in an SDL resource units.

Amendments to the Basin Plan that commenced in law and were tabled in Federal Parliament on 14 November 2017 to reduce the water recovery target from 390 GL to 320 GL as a result of the Northern Basin Review (Basin Plan Amendment Instrument 2017 (No.1)), were disallowed by the Senate on 14 February 2018. Therefore, these amendments to the Basin Plan were repealed on 14 February 2018.

- The Basin states have yet to apportion shared reduction targets to SDL resource units as required by the Basin Plan.
- Water recovery is reported at the point at which water savings or purchase have been received, estimated or agreed in signed contracts. Until water transfer contracts have been exchanged however, these figures may be subject to change over time.
- Consistent with the Water Act 2007 (Cth) (685B, C and D), the 2.9 GL LTAAY of water secured from the SA Government in May 2016 is exempt from the 1500 GL limit on water purchases.
- Includes Commonwealth water recoveries funded through SRWUIP Infrastructure projects, the South Australian River Murray Sustainability Program (SARMSIP) and the Water Smart Australia Program.
- Water gifted to the Commonwealth by the Queensland Government.
- State Recovery figures are as at 30 September 2017.
- Shared targets in a zone can be met using water recoveries from any SDL resource units within that zone, provided an SDL resource unit's local and shared targets have been reached and there are additional recoveries available. Apportionment subject to Basin States nominating a value by 30 June 2018.
- In an SDL resource unit where the Local target and the Shared target for the zone are met there may be surplus water recoveries. Until all contracted water is registered and the WRPs are finalised, water recoveries are subject to change.
- Water recovery in the Intersecting Streams SDL Resource Unit includes water recovered from the purchase of Toorale Station. An additional new entitlement - unregulated river special additional high flow entitlement for 9,720GL is part of the Intersecting Streams Unregulated and Alluvial water sharing plan, has been issued to the Commonwealth. This recovery is not shown in the table because there is currently no long-term diversion limit equivalent factor available to estimate the LTAAY recovery volume for this entitlement. This is expected to be resolved no later than when NSW finalises their water resource plan for this SDL resource unit.
- Water recovery in the Lachlan SDL resource unit exceeds the local component by 1,707 GL. This additional environmental recovery does not contribute towards the shared downstream component as the Basin Plan identifies the Lachlan as a disconnected catchment.
- Groundwater recovery does not contribute to the surface water recovery target of 2750 GL.

Additional notes on the SDLAM

The Sustainable Diversion Limit Adjustment Mechanism amendment instrument commenced in law on the 13 January 2018. It is required to be tabled for 15 sitting days in each House of Parliament as a disallowable instrument. More information about the Adjustment Mechanism Draft Determination is available at www.mdba.gov.au/SDLAM

The water recovery table for 30/11/2017 shows that across the SMDB the surface water recovery as LTAAY is 1,721 GL, as outlined below.

Table 2-4: Reduction in SMDB consumptive pool (GL)

<i>SMDB</i>	<i>Buyback</i>	<i>SRWUIP</i>	<i>State</i>	<i>Total</i>
<i>NSW</i>	372.9	382.7	19.0	774.7
<i>VIC</i>	512.6	191.2	96.7	800.5
<i>SA</i>	86.3	48.3	6.4	141.0
<i>ACT</i>	4.9			4.9
<i>Total</i>	976.7	622.2	122.1	1,721.0

Some of this recovery is from the consumptive pool and other amounts are from water authority conveyance losses, which do not impact on the consumptive water available. The impact on the SMDB consumptive pool is derived below by totalling buyback and farm irrigation efficiency projects. It is difficult to ascertain what is farm purchases and what is farm efficiency associated recovery. For example, the Victorian buyback includes 102GL of water purchased as part of NVIRP stage 2.

The SRWUIP includes farm efficiency projects which are listed below.

Table 2-5: Reduction in SMDB consumptive Pool by Farm efficiency (GL) - LTAAY

<i>Scheme</i>	<i>Reduction in pool</i>
<i>SRWUIP OFIEP Rounds 1 -5¹</i>	152
<i>SRWUIP SA SARMS</i>	36
<i>SRWUIP Victorian (NVIRP, VOSP, VFMP)</i>	33
<i>SRWUIP NSW or SA other</i>	?
<i>Total</i>	221

The SRWUIP also includes some direct Victorian State initiated farm purchases associated with NVIRP/connections. Similarly, Victoria's State component includes some purchases associated with stage 1 of NVIRP.

This total reduction in the consumptive pool was initially estimated in a draft report as 1,205 GL/y as LTAAY but has since been revised to 1,169GL following the release of the MDBA community profile data. (See Chapter 4 for a explanation of a revised estimate of 1169GL from the southern connected basin)

The impact of this water recovery on the consumptive pool for different water availability scenario years is estimated below. The proportion of high security and low security entitlements is derived from data supplied by Phil Townsend, MDBA.

Table 2-6: Impact of reduction on consumptive pool by climate scenario (GL)

	<i>Entitlements</i>	<i>LTAAY factor</i>	<i>LTAAY</i>	<i>Drought allocation</i>	<i>Dry allocation</i>	<i>Average allocation</i>	<i>Wet allocation</i>	<i>Extreme wet allocation</i>
<i>General Security</i>	704 (plus 27 LS)	0.7	492	5%	30%	55%	80%	100% plus low
<i>High Security</i>	704	0.95	669	50%	100%	100%	100%	100%
<i>Total</i>	1,472		1,169	388	915	1,091	1,280	1434
<i>% of LTAAY</i>				33%		93%	109%	

Of the 669ML (LTAAY) of HS entitlements recovered it is estimated that 505GL came from Victoria, 134 from SA and 30 from NSW. It is difficult to ascertain exactly where the water in Victoria came from because a significant part was unattached to land or came as back trade to the GMID from the downstream regions of Sunraysia and Riverland.

¹ Website <http://www.agriculture.gov.au/water/mdb/programs/basin-wide/ofiep>. Assumes all southern Basin

However, by examining the change in total water use over time (see Section 2.3 for cap figures) it can be seen that SA has not decreased its water use and thus any buyback or farm efficiency purchases must have resulted in back trade (either permanent or temporary). Similarly, Sunraysia has increased its water use and has done so by net positive trade despite selling water under both the buyback program and the farm efficiency grants.

Therefore, it is estimated that a net impact of more than 500GL of water has been removed from the GMID district as a result of the Basin Plan to date.

2.3 SMDB WATER USE – CAP FIGURES

The following table records the actual level of water use by region over time.

Table 2-7: MDBA Cap Register: Annual diversions - 1997-2016 (GL)

System	1997-98	1998-99	1999-00	2000-01	2001-02	2002-03	2003-04	2004-05	2005-06	2006-07	2007-08	2008-09	2009-10	2010-11	2011-12	2012-13	2013-14	2014-15	2015-16
Intersecting Streams	3.31	3.31	3.31	3.31	3.31	3.31	3.31	3.31	3.31	3.31	3.31	3.31	3.31	3.31	3.31	3.31	3.31	3.31	3.31
Border Rivers	211.34	191.79	206.40	256.79	207.62	146.80	128.85	133.87	161.75	154.94	140.77	146.02	130.85	191.81	157.10	220.60	192.40	62.66	114.58
Gwydir	565.82	339.55	481.43	458.00	495.57	271.50	202.93	198.61	263.76	173.47	123.13	187.20	90.96	271.44	242.93	424.63	420.66	140.56	120.62
Namoi/Peel	340.02	357.22	384.96	389.67	398.40	328.78	208.07	225.08	269.03	200.92	176.68	223.05	204.77	269.90	245.49	399.81	405.49	188.34	164.31
Macquarie/Castlereagh/Bogan	442.28	395.76	437.44	521.53	596.73	411.20	218.66	102.47	224.15	252.16	74.54	105.61	112.06	182.52	266.65	456.43	292.12	114.49	131.47
Barwon-Darling/Lower Darling	269.53	431.75	263.64	492.87	204.32	126.90	292.40	186.07	199.41	17.17	221.20	159.26	150.28	124.06	166.37	283.94	180.01	73.58	84.16
Lachlan	428.97	293.22	300.59	423.16	457.15	252.99	58.89	36.45	127.66	66.01	46.30	40.23	25.74	90.14	204.51	343.23	240.73	187.79	166.53
Murrumbidgee	2,585.48	2,505.33	1,874.87	2,747.39	2,347.98	1,793.12	1,775.49	1,618.07	2,200.29	960.15	514.77	602.07	909.94	1,461.47	1,719.77	2,282.61	1,833.60	1,688.61	1,321.03
Murray	1,889.58	1,999.66	1,233.74	2,069.66	2,113.39	879.03	1,311.51	1,240.75	1,867.22	601.53	243.62	341.01	439.32	689.09	1,424.79	1,905.27	1,494.28	1,272.42	714.38
Total New South Wales	6,736.34	6,517.60	5,186.38	7,362.38	6,624.47	4,213.64	4,200.10	3,744.68	5,116.57	2,429.64	1,544.31	1,807.74	2,067.23	3,283.72	4,430.93	6,319.81	5,062.60	3,731.75	2,620.38
Goulburn/Broken/Loddon	1,909.00	1,698.51	1,553.46	1,568.79	1,700.32	1,075.63	1,595.59	1,552.81	1,592.39	651.32	684.46	628.26	803.65	544.46	1,009.77	1,235.48	1,165.29	1,124.88	1,080.56
Campaspe	104.76	83.37	79.84	112.43	128.78	84.81	79.66	41.10	21.34	13.46	23.62	26.64	26.43	18.36	28.48	42.55	25.87	35.06	39.29
Wimmera-Mallee	184.07	159.47	103.15	67.87	83.85	60.48	66.41	49.69	80.19	18.68	44.79	11.45	9.02	9.72	14.21	17.68	15.52	19.34	19.82
Murray/Kiewa/Ovens	1,742.98	1,803.74	1,555.38	1,712.00	1,916.38	1,754.69	1,477.67	1,492.91	1,577.87	1,406.28	800.53	837.39	970.57	563.00	1,292.36	1,674.26	1,310.70	1,399.81	1,341.75
Total Victoria	3,940.81	3,745.09	3,291.82	3,461.09	3,829.33	2,975.61	3,219.34	3,136.51	3,251.80	2,089.74	1,553.40	1,503.74	1,809.66	1,135.55	2,344.83	2,969.95	2,517.38	2,579.09	2,481.41
Metro-Adelaide & Associated	153.09	152.88	138.71	103.63	82.45	164.70	82.07	71.61	73.90	203.08	89.45	149.50	56.90	56.44	59.03	81.67	42.14	73.19	153.34
Country Areas	91.90	91.32	90.19	89.81	90.39	89.30	67.72	55.47	61.22	28.77	14.67	10.17	14.30	13.60	13.99	18.03	15.58	15.67	17.18
Lower Murray Swamps	35.23	36.38	36.53	37.93	35.50	39.20	35.38	38.52	40.29	40.88	37.00	37.00	37.60	34.16	35.73	37.38	35.37	35.81	36.13
All Other Purposes	384.20	409.19	377.22	430.62	412.55	443.21	422.54	453.32	416.99	355.15	281.52	288.20	371.41	257.03	314.67	385.01	349.76	376.20	390.82
Combined ACP + Swamps	476.10	500.51	487.41	520.43	502.94	532.51	490.26	508.79	478.21	383.92	296.19	298.37	385.71	270.64	328.68	403.04	365.34	391.88	408.00
Total South Australia	654.42	689.77	642.85	661.99	620.89	736.41	607.71	618.92	592.40	627.88	422.64	484.87	480.21	361.24	423.42	522.09	442.85	500.87	597.47
Condamine/Balonne	544.92	467.13	366.38	360.40	161.63	123.06	575.04	166.96	186.16	57.42	775.75	189.86	1,049.32	1,063.50	765.16	1,004.77	611.07	354.08	265.17
Border Rivers	185.67	123.18	162.70	288.14	163.29	77.95	203.74	191.65	124.66	70.78	209.71	156.72	122.30	420.84	209.68	378.37	145.71	102.90	89.45
Moonie	8.33	8.09	8.16	30.64	5.65	6.06	25.83	23.20	2.28	9.36	41.46	29.00	42.60	29.21	18.60	33.62	12.86	3.72	0.78
Nebine	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.09	0.17	0.11	0.09	1.00	0.15	1.00	0.00	0.00	0.08	1.40
Warrego	1.96	10.16	3.48	9.18	10.48	7.17	10.77	10.54	3.06	20.58	23.10	6.02	15.37	11.42	13.71	2.67	0.80	7.27	2.92
Paroo	0.04	0.04	0.03	0.03	0.00	0.00	0.10	0.06	0.04	1.99	4.01	1.02	1.57	0.06	0.03	0.03	0.04	0.01	0.00
Total Queensland	740.92	608.60	540.76	688.38	341.04	214.25	815.47	392.40	316.28	160.29	1,054.14	382.70	1,232.16	1,525.17	1,008.19	1,419.46	770.48	468.06	359.72
Australian Capital Territory	44.21	29.40	26.47	33.74	36.52	40.11	27.82	27.12	27.80	25.06	15.59	18.66	17.61	6.55	8.49	18.66	18.78	16.99	20.10
Total Basin	12,126.71	11,890.45	9,688.08	12,207.89	11,652.26	8,180.02	8,870.45	7,919.63	9,304.86	5,332.60	4,590.08	4,197.71	5,606.86	6,312.22	8,215.85	11,249.97	8,812.07	7,296.76	6,279.08

Table 4 details the actual diversions that occurred in each year for each Cap valley. Diversions are defined by the diversion formula register.

Diversions (before conveyance losses) in the SMDB for 2015/16 (a dry year) were:

- NSW 2,119 GL (SMDB minus the Lachlan)
- Vic 2,462 GL (SMDB minus the Wimmera-Mallee)
- SA 597 GL
- **Total 5,178 GL**

Assuming 32% losses (which is higher than a typical year due to it being a dry year), gives an estimated 2015/16 usage of 3,521 GL, which is similar to the allocated water available in section 2.1 of 3,500 GL.

Groundwater usage is estimated at around 489 GL giving total diversions of 4,010 GL. This compares reasonably well with 3,727 GL including groundwater usage that was derived from ABS data for 2015/16, as ABS is generally a lower estimate than metered usage from water authorities.

Therefore, a value of 4,010 GL has been adopted for 2015/16 as representing the total estimated irrigation usage across the SMDB.

2.4 GROUNDWATER USAGE IN THE GMID

Groundwater use across all of the GMW area and for the Lower Campaspe, Katunga and SIR groundwater management areas, which is within the GMID is shown below (source B. Cossens, GMW 2017).

Median usage in the GMID has been derived from the Lower Campaspe, Katunga and SIR aquifers. This is 101 GL, but varies from 36 GL to 176 GL. However, much of the water usage from the shallow SIR system is generally local recirculation of surface irrigation water, which has already been counted. Adjusting for a 50% reduction factor on the SIR shallow system to avoid double counting gives a median usage of 74 GL (with a range of 28 to 122). This is graphed and tabulated below.

Table 2-8: Groundwater usage GMID (GL/yr)

Water year	Use
2004/05	32
2005/06	54
2006/07	122
2007/08	102
2008/09	89
2009/10	79
2010/11	28
2011/12	49
2012/13	71
2013/14	69
2014/15	98
2015/16	119
2016/17	74
Min	28
Max	122
Average	76
Median	74

A usage value of 75 GL of groundwater has been assumed for future scenarios, but historic usage has been used to inform the development of those scenarios.

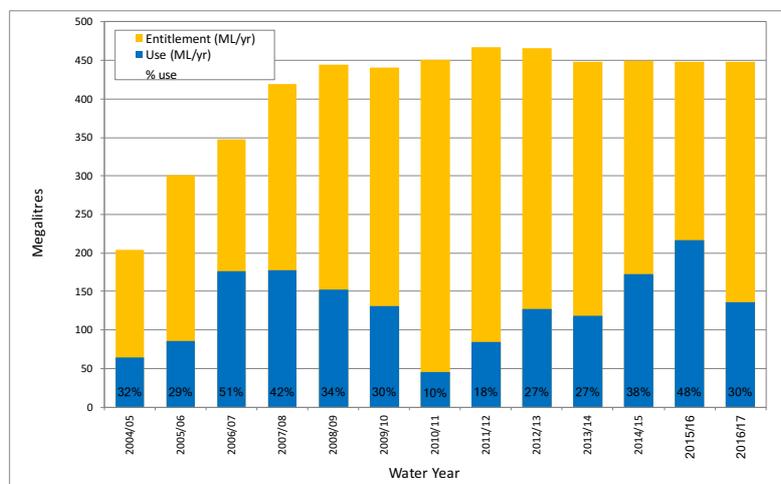


Figure 2-1: Shallow Groundwater use within the GMID region

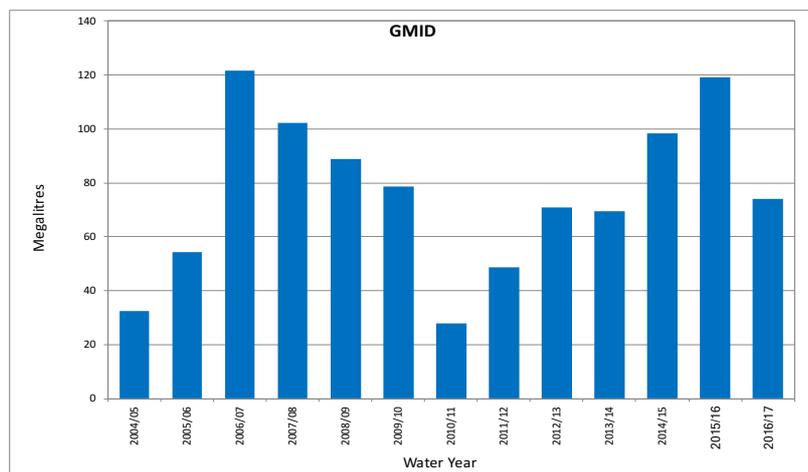


Figure 2-2: Deep Lead groundwater use within the GMID

2.5 CARRYOVER

The volume of carryover is significant and is used by irrigators to provide a buffer for the next drought. The volume of carryover held by private irrigators within the SMDB at the start of this season (17/18) was at an all-time high of 2,000GL. This is equivalent to the total volume of water used in each of the seasons during the last 3 year drought. The impact of this change in behaviour by irrigators is yet to be fully understood, however it is expected that some of this carryover is being held to protect irrigators against risks of very low allocations. But the cost of carryover includes losing access to the volume when dams spill. The level of carryover has resulted in a significant reduction in average annual use.

Another form of increased carryover has also occurred since the millennium drought where 06/07 inflows were at record lows. Within the SMDB, high security allocations are safeguarded by ensuring that the next year's allocations are guaranteed before any General Security (NSW) or Low Security (Vic) allocations are made. By using a more conservative approach, following the data for the 2006/07 inflow records, the amount of water held as a reserve to safeguard high security allocations has also been increased.

This increased level of carryover and reserves has a number of impacts which should be taken into consideration when calculating future water availability:

- Considerably more water is being held in storage throughout the system.
- As a result there are increased spills from the storages and less overall water available for the consumptive pool. This increase in water for the environment or reduction in the consumptive pool has not yet been determined but is of the order 2-300GL on average in Victoria alone.
- The availability of carryover may result in horticulture's growth being less constrained by a future drought as growers will still be able to access significant volumes on the allocation market.

2.6 CONSTRAINTS ON TRADE IN SMDB

The following constraints on water trade may temporarily limit transfers to downstream horticulture. These include:

- 200GL limit on trade out of the Goulburn to the Murray
- Trade limits from NSW to Victoria
- Barmah Choke trade limits
- 100GL trade limits out of the Murrumbidgee.
- The next drought, when there may be insufficient water available on the market to meet horticulture's demand.

The impact on the current temporary market is illustrated by the current temporary prices in early March 2018. (source Waterfind) viz.:

- **NSW Murray | Zone 10** ~\$105/ML ↓
- **NSW Murray | Zone 11** ~\$105/ML -
- **NSW Murrumbidgee** | ~\$150/ML ↑
- **VIC Goulburn 1A** | ~\$85/ML ↓
- **VIC Murray | Zone 6** ~\$108/ML ↓, **Zone 7** ~\$108/ML -
- **SA Murray** | ~\$108/ML -

The temporary price of water along the Murray is effectively constant at \$105-108/ML, as water is able to move relatively easily along the Murray (through knock-on trade). However, in the past the Barmah choke restrictions has resulted in trade variation between upstream and downstream.

In contrast the Murrumbidgee which has lower allocations and high seasonal demand has been unable to trade into the GMID and thus the price is almost double that of the Goulburn system which has had very high allocations but been unable to trade out of the region.

The permanent market is likely to react differently as the major demand for permanent entitlements is from horticulture along the Murray downstream of the Barmah choke. This demand is likely to put additional pressure on entitlements being sourced from the Torrumbarry system of the GMID to meet horticulture's growing demand.

Thus, it is expected that 2/3rds of the increased horticulture demand will be sourced from the higher reliability products, used for the lower value dairying and mixed farming, which is water out of the GMID.

2.7 FUTURE DEMAND FROM HORTICULTURE

This section reviews the data on the projected future growth of the horticulture sector across the SMDB.

Table 2-9: Demand projections for horticulture - SMDB (ML)

<i>Industries</i>	<i>NSW Bidgee</i>	<i>NSW Murray Lwer Darling</i>	<i>Vic Mallee</i>	<i>Vic GMID</i>	<i>Vic North East</i>	<i>SA</i>	<i>Total</i>
<i>2000/2001 all horticulture</i>	125,022	33,035	254,933	85,112	3,504	240,240	741,847
<i>2012/13 all horticulture</i>	155,208	94,789	417,920	108,233	4,540	292,786	1,073,475
<i>2015/16 all horticulture</i>	158,807	88,851	464,865	119,080	7,518	332,638	1,171,760
<i>Average annual increase 2000/01 to 2015/16</i>	2,252	3,721	13,995	2,265	268	6,160	28,661
<i>Expected future all horticulture 2025 (10 years same increase)</i>	181,330	126,062	604,820	141,725	10,194	394,236	1,458,368

The increase in horticulture demand over the last 5 years has been double that of the previous 10 years and horticulture demand from current plantings would maintain this rate of growth.

This results in an increased demand of 250GL/yr by 2025 on the current levels of ~1,200GL for 2015/16. The projected increased demand is estimated at 50GL per annum, and of this around 40GL is predicted to come from the GMID. Thus the reduction in water use within the next 5 years within the GMID due to the continued growth of horticultural demand is expected to be of the order of 200GL as only a small proportion of that growth is expected to be located within the GMID, with most occurring downstream in Sunraysia or the Riverland.

2.8 WATER MARKET PRICING

The addition of a further two years' data has provided the following update on the impact of the Basin Plan on the level of prices in the water markets.

2.8.1 PERMANENT ENTITLEMENT PRICES

The price of entitlements over time is shown in Figure 3.

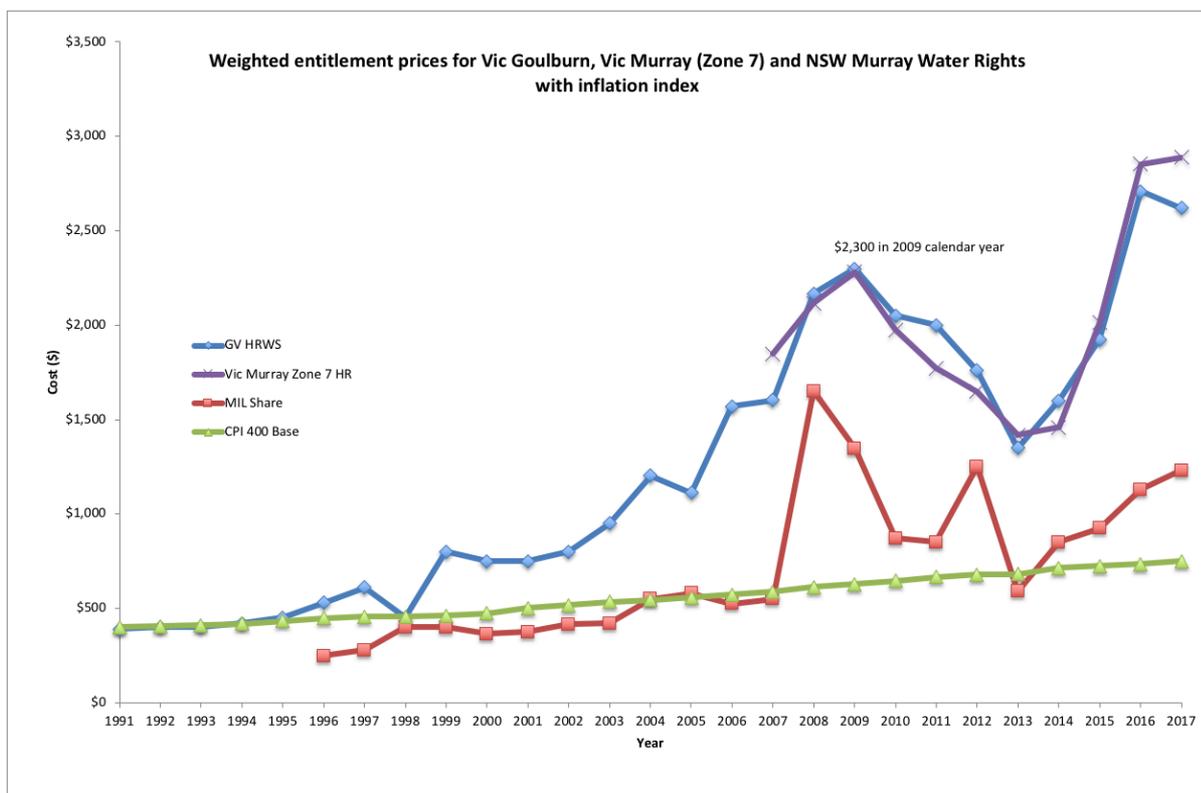


Figure 2-3: Permanent Water Market Prices (2016/17 price base for calendar years)

The amount of buyback and water purchases through farm efficiency over time is shown below.

Table 2-10: Water transfers to the Environment (ML) - for financial years

Year	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
Volume	3,458	62,655	327,254	188,921	257,593	123,865	43,970	50,808	33,350	53,018

The water transfers to the environment therefore total 1,145GL over the ten year period. This figure is similar to the value of 1,205 GL LTAAY in section 2.2. above. It can be seen that 16% of this recovery occurred from 2014 onwards. The volume associated with the 16% has been deducted from 15/16 ABS water use figures to derive future water use scenarios adjusted for different allocations.

From this table it can be seen that most of the water recovered occurred in the period following the peak price of the 2008/9 drought. Water recovery put a floor in the entitlement price.

2.8.2 TEMPORARY PRICE

The relationship between the level of allocation and the temporary price in the water market continues to hold with considerable accuracy and is shown in the figures below.

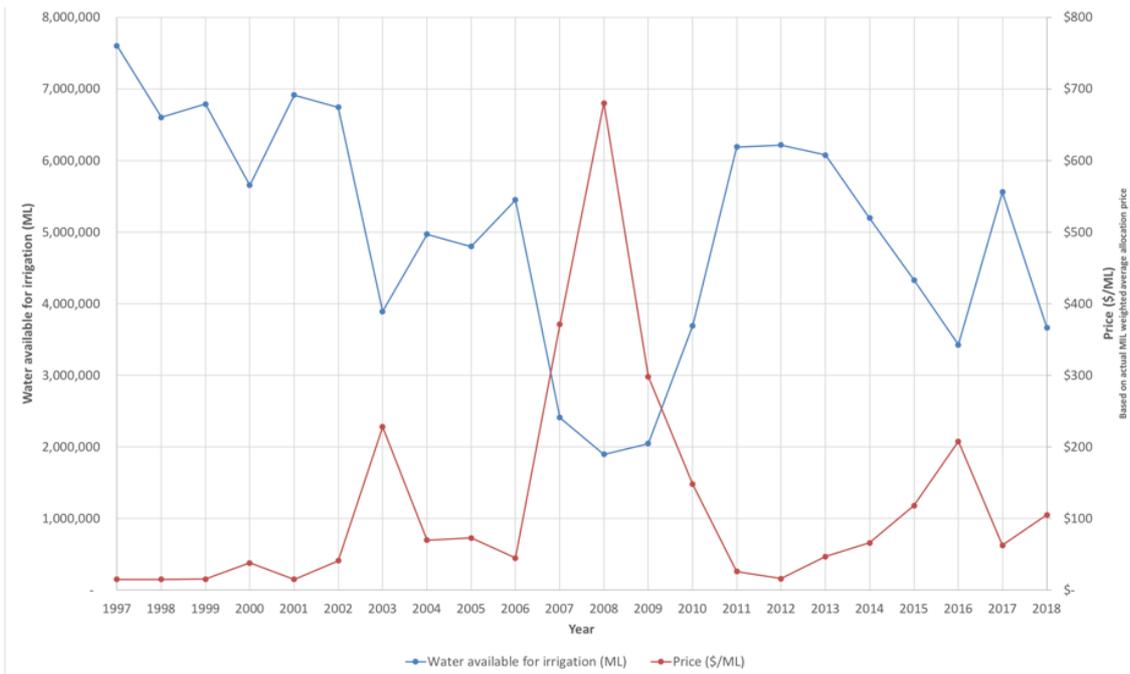


Figure 2-4: Water allocation and average price

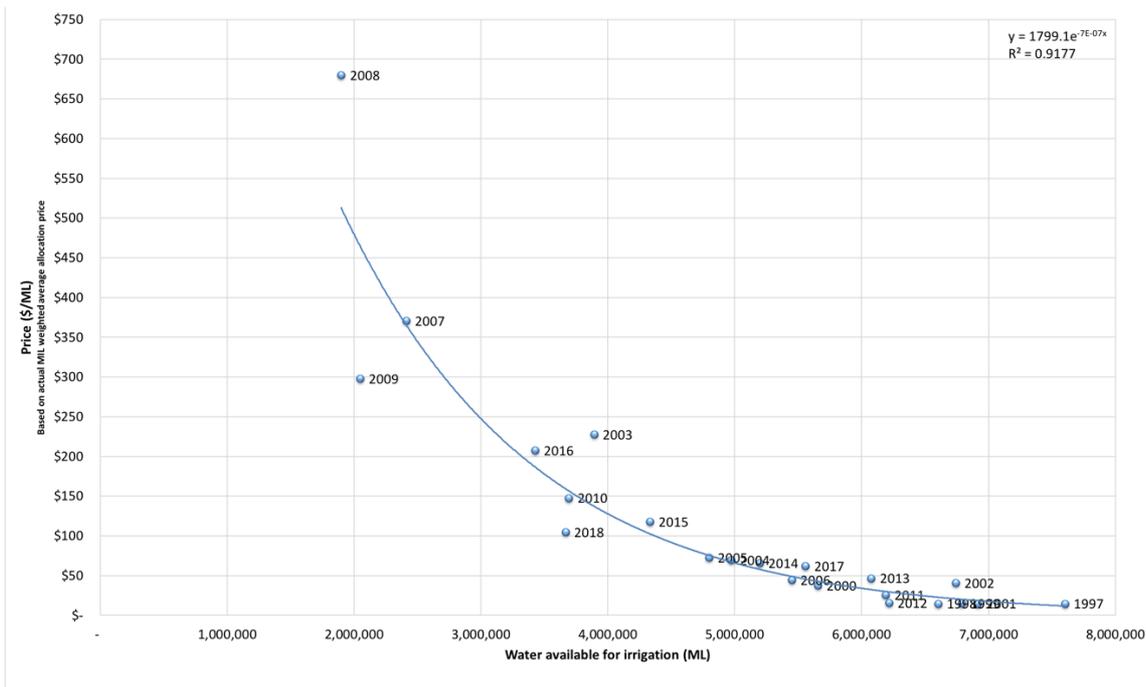


Figure 2-5: Correlation between water allocation and average price: 1997-2018

The value for 2018 appears to be slightly cheaper than the standard curve would indicate. However, 2018 had a very high level of carryover across the SMDB (at ~ 2,000GL) which effectively provided a greater allocation, ie it shifts the effective point to the right on the graph, closer to the standard fit.

The temporary price is shown below. From this it can be seen that over the last 6 years the temporary price has been relatively consistent between regions and has ranged from \$120 +/- \$100 per ML.

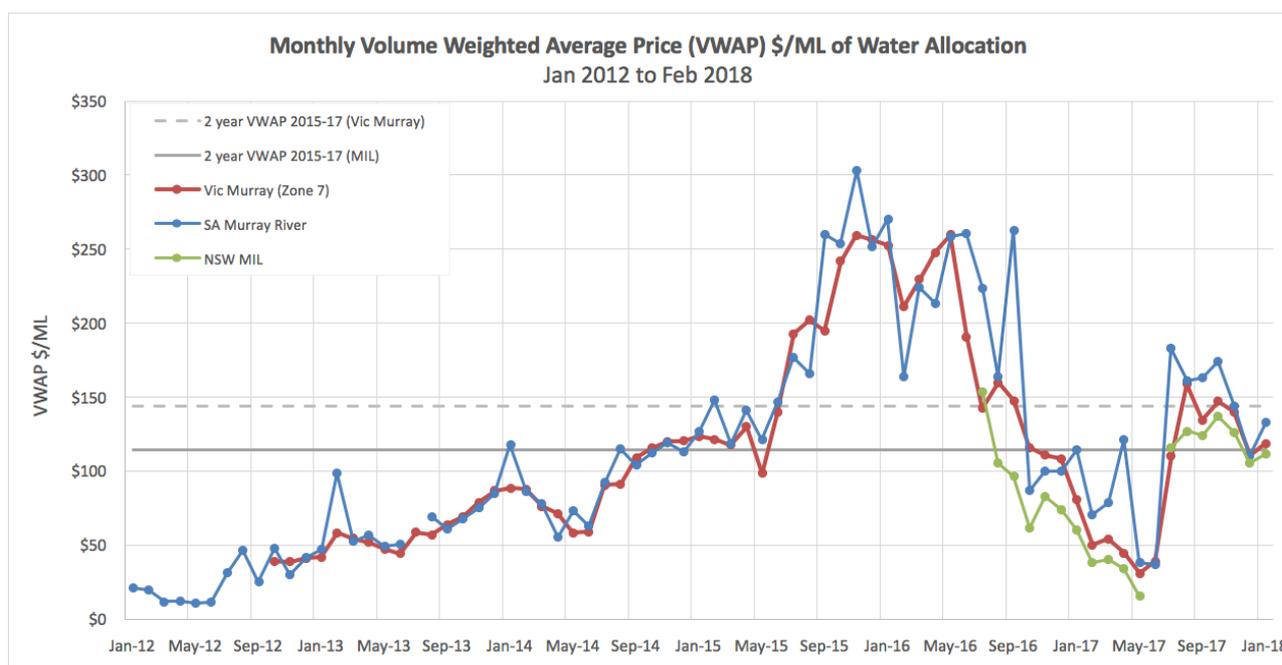


Figure 2-6: Monthly volume weighted average price (WAP) \$/ML of water allocation

2.8.3 LAST 12 YEARS – POST 2006

The last 12 years has seen:

- An extraordinary 3 year drought – 1 in 100 year event with allocations of 2,100GL
- 9 years of dry to very wet years - ranging in allocations from 3,500GL to 6,200GL

Within the basin there is approximately 500GL of groundwater available which has not been included. Carryover can alter the water available e.g. 17/18 had a large volume coming into the season and thus it has been classified as an average year. These 12 years can be categorised as shown in the table below:

Table 2-11: Climate scenarios, water allocation and use and price – post 2006

Scenario	Allocation level	Frequency (last 12 yrs)	Total water available (GL)* Actual - repeated		Price (\$/ML) Actual - repeated		Comment
Very Wet 10/11, 11/12, 12/13	Victorian Low security water available, 100% NSW GS	3	6,200	5,300	20-50	50	Carryover
Wet 13/14, 16/17	90% NSW General Security	2	5,400	5,000	65	70	Rice expands
Average 14/15, 17/18	55% NSW General Security	2	4,300	4,000	110	130	Rice sits on allocation
Dry 09/10, 15/16	30% NSW General Security	2	3,500	3,300	150-208	210	Small rice crop as it sells to dairy/cotton
Drought 06/07, 07/08, 08/09	10% NSW GS, 80% NSW HS, and 50% Vic/SA high security.	3	2,100	1,700	300-680	600	Horticulture minimises and cotton/dairy sell mostly, rice fails

The “actual” refers to what happened in those particular years, whereas the “projected” refers to what would happen if those years were repeated today

This suggests that the price of water will typically range from \$130 +-\$80 per ML, with the drought resulting in extreme prices.

If a further 450GL was removed from the SMDB system then the price of water would increase by \$30 per ML under all climate scenarios except a drought where it would have a greater impact. It is counter intuitive that

the increase is constant across scenarios, but this is because the 450GL UpWater reduction is expressed in LTAAY and so in wet years it is likely to be closer to a 600GL reduction while in a drought it will a reduction of only around 100GL. The projected \$30/ML impact would be a significant impost for GMID dairy farmers and mixed farmers.

2.9 COTTON PRODUCTION OVER TIME

The cotton industry has only emerged in the SMDB since 09/10 following the millennium drought. This was due to the advent of new varieties enabling cotton to move south to the Murrumbidgee valley. The plantings rapidly increased over the two seasons of 2009/10 and 2010/11 reaching 50,000ha in 2011/12.

The industry maintained plantings of around 50,000ha for the six seasons 11/12 till 16/17 regardless of the level of water availability. In the Murrumbidgee, the advent of cotton has compensated for the loss of water from buyback, as cotton uses less water per ha than the rice crop which it has replaced. Thus whilst there has been less water used overall in the Murrumbidgee region, the planted crop area and income generated has remained relatively stable at pre Basin Plan levels.

The 17/18 season has seen a significant further increase in the cotton area planted in the Murrumbidgee to more than 65,000ha and it is expected to even increase further.

Table 2-12: Cotton production southern NSW (ha)

	Murray	Lachlan	Murrumbidgee	Total
2016/17	3,000	12,000	42,000	57,000
2017/18	4,000	18,200	66,800	89,000

2.10 RICE PRODUCTION OVER TIME

The following graph shows the rice production in the Riverina over time.

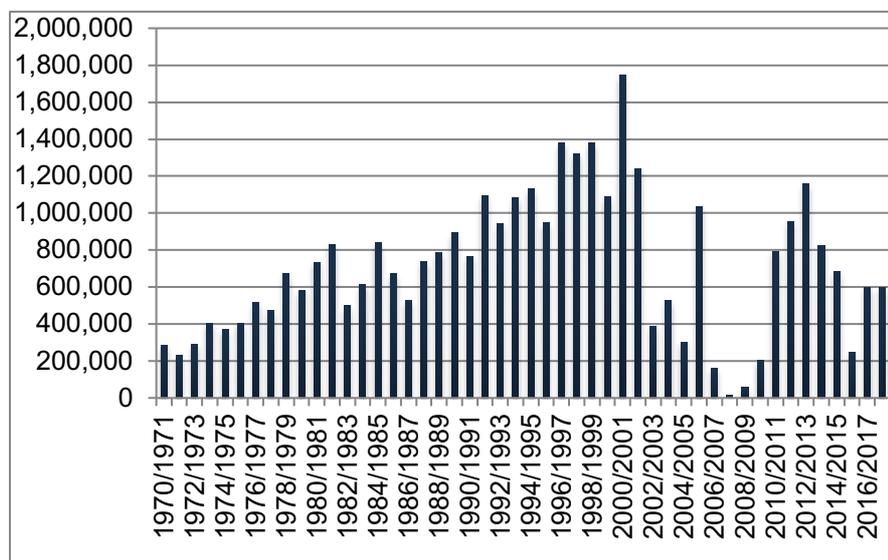


Figure 2-7: SMDB Rice production over time (tonnes) – source Rice-Growers

From this graph and by applying the data from Table 11 in section 2.8.3 it can be seen that the expected tonnage of rice is currently 200,000 to 900,000 tonnes with a typical season being 600,000 tonnes. However, given the likely increase in the area allocated to cotton, rice production area is expected to be nearer to 500,000 tonnes/yr on average in the future. This is about half of the production levels pre-drought and Basin Plan.

2.11 DAIRY PRODUCTION OVER TIME

The following graph shows the dairy production across the GMID over time. This suggests that current levels of production are around 1,600ML or around 2/3 of the production levels before the millennium drought and the buyback program.

It is likely that this production will decline further as horticulture expands by around 10% to 1,450ML.

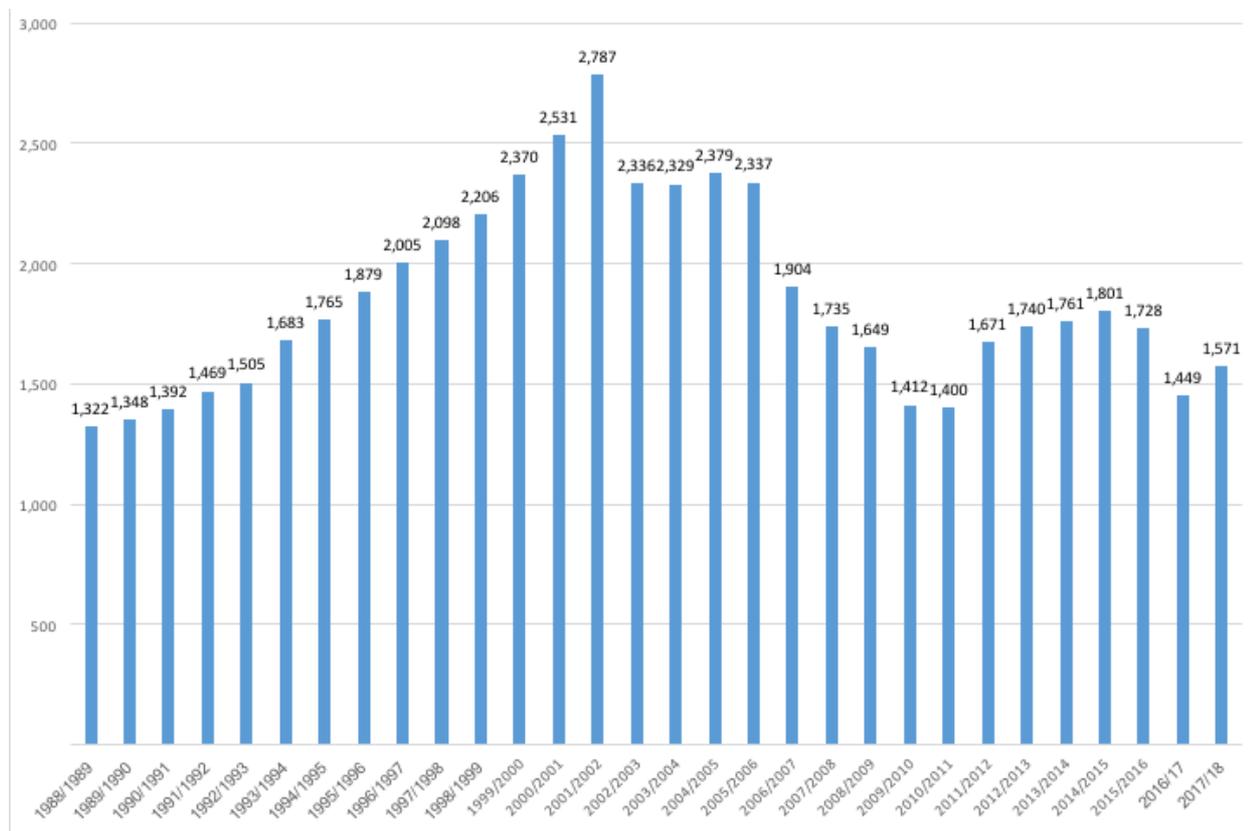


Figure 2-8: Dairy production in the GMID (ML)

2.12 WATER USE OVER TIME

The following table summarises the water use in the Southern Connected Basin over the last 50 years.

Table 2-13: Water use in the Southern Connected Basin over the last 50 years

GL per industry (includes up to 500GL GW)	Dams and growth continued		Cap, trade & salinity impact	Following First (02/03) drought	Millenium drought	buyback and wet	recovery
	1970	1985	2001	2002-2006	2006 - 2010	2010 - 2011	2011 - 2016
mixed grazing	1853	2642	1319	1268	453	593	835
rice	576	1123	2024	757	119	775	979
Cotton	0	0	149	104	26	117	202
Other crops	375	567	730	520	364	469	506
dairy	1275	1275	1739	1613	729	782	1223
horticulture	610	693	902	935	911	1173	1316
carryover							
total	4689	6300	6862	5196	2602	3909	5062

3 Updated future water availability scenarios (with and without 450GL)

3.1 SMDB

3.1.1 SMDB WITHOUT 450 UPWATER IMPLEMENTED

The following table show the revised projected “new equilibrium” of water use by sector across the SMDB under different climate scenarios (including ~500GL of groundwater).

Table 3-1: The new equilibrium over the next 15 years under different climate scenarios (GL)

Sector	Drought (06/07)	Dry (15/16)	Average (14/15)	Med-wet (16/17)	Wet (12/13)
Mixed grazing	121	286	316	416	474
Rice	72	241	631	943	1,143
Cotton	241	676	676	721	721
Other crops	145	406	541	554	554
Dairy	435	811	901	970	1,067
Horticulture	1,400	1,442	1,442	1,386	1,286
Carryover to next year				554	554
Total (incl carryover)	2,414	3,863	4,507	5,545	5,800
Rounded total excluding groundwater	1,900	3,300	4,000	5,000	5,300

The above table is based on actual historical deliveries in the SMDB from the ABS with adjustments that take account of:

- Lower system efficiencies in drought years (greater proportional conveyance losses).
- Carryover adding 200GL to the consumptive pool in drought years but deducting in wet years (554 GL as above).
- Horticultural growth to 1,400GL in average years as per Section 2.7.
- Cotton growth as per Section 2.9.
- Dairy has relatively constant use except for extreme droughts and is expected to decline as horticulture continues to expand to 1,400GL in the next five years and thus dairy reduces by 200GL from its current levels.
- Rice, mixed grazing and other industry water use responding to expected water availability and water market prices in a manner consistent with previous years and their production and water use efficiency (in terms of production per ML). They generally use what is left over.

3.1.2 SMDB WITH 450 UPWATER IMPLEMENTED

The relative impacts of the 450GL UpWater initiative by industry sector are shown in the following table.

Table 3-2: SMDB water usage by sector with 450GL UpWater impacts

Sector	With 450GL UpWater			Net Reduction		
	Drought	Average	Med-wet	Drought	Average	Med-wet
Mixed grazing	108	278	401	13	38	15
Rice	71	464	722	1	167	221
Cotton	213	651	696	29	25	25
Other crops	130	520	496	14	21	59
Dairy	370	734	799	65	167	172
Horticulture	1,379	1,442	1,386	21.6	0	0
Total	2,270	4,089	5,054	144	418.5	490.5
Rounded total ex g-water	1,770	3,600	4,500			

This shows that the major impact of the 450GL UpWater initiative will be on the Dairy and Rice sectors, with little impact on horticulture except in drought conditions.

3.2 GMID

A key feature of the GMID is that the water entitlements are almost all high security and thus, unlike NSW, the available water does not vary much year-by-year (except in an extreme drought). This makes it important to examine the allocation levels for different climate scenarios for the SMDB but not for the GMID. Any variation in water use in the GMID is primarily related to the season ie a wet/dry spring, summer or autumn.

3.2.1 GMID WITH HORTICULTURE GROWTH INTO THE FUTURE

Water use within the GMID is shown in the table below both for the current situation and as projected for five years' time assuming that current horticulture growth rates continue. This includes 70-120GL of groundwater.

Table 3-3: Water use in the GMID by sector (GL)

Sector	2000	Current		5 years' time	
	Average	Average	Last drought (06/07)	Average	Drought
Mixed grazing	283	139	75	110	40
Crops	160	155	42	108	34
Dairy	1468	825	615	720	359
Horticulture	90	131	100	138	137
Total	2,000	1,250	832	1,075	570

This sees an overall reduction of 176GL (or 14%) in total water use for the GMID as a whole. The largest volumetric impact is on the dairy sector at 105GL but the largest percentage impact is on the lower-value mixed grazing and cropping sectors, at 30-32%.

3.2.2 GMID WITH 450GL IMPACT

The projected impact if the 450GL UpWater initiative is also implemented is show in the table below.

Table 3-4: Water availability by sector in GMID with 450GL impact (GL)

Sector	Future with 450GL impact		Volume reduction	
	Average	Drought	Average	Drought
Mixed grazing	85	30	25	10
Crops	91	29	17	6
Dairy	595	300	126	59
Horticulture	138	133	0	4
Total	908	491	167	79

This analysis identifies that the major impact of the proposed UpWater initiative would be to reduce dairy production across the GMID, with little impact on horticulture except in drought seasons. The proportional impact on the dairy sector is higher than the initial water recovery under the Basin Plan, because there is little 'surplus' left in other less productive industries eg grazing or cropping and thus the dairy industry is the prime industry to give up the water, particularly for high security entitlements.

3.3 THE GMW DELIVERY SYSTEM

3.3.1 CHANGE IN DIVERSIONS OVER TIME

In summary the change in water use within the GMID delivery system over time is summarised in the table below. Note that this does not include 70-120GL of groundwater used within the GMID which is included in the previous tables.

Table 3-5: Diversions, deliveries, and losses in the GMID (GL)

Time period	Diversions into GMID	Deliveries (incl 80GL env, & urbans)	Losses
1990s	3,000	2,150 +/- 400	850
Current	1,450	1,150 +/- 200	300
5 years (60GL/yr horticulture expansion in SMDB)	1,250	1,000 +/- 175	250
5 years horti growth plus 450GL UpWater	1,000	800 +/- 150	200
Drought/floods			
▪ Last 3 yr drought and/or 10/11 flood	1,100	700+/-200	400
▪ Next drought with horti expansion	800	500+/-100	300
▪ Next drought with 450GL as well	650	400+/-100	250

This table shows that the volume delivered annually has reduced to under a half since the 1990s and could reduce to a third as horticulture continues to expand and if the 450GL UpWater proceeds.

3.3.2 REASONS FOR THE CHANGE IN DIVERSIONS

The level of diversions into the GMID has already reduced by 1,550 GL even without the UpWater initiative, due to the following factors:

- 50GL net of the 150GL water savings allocated to Melbourne urban water companies or returned to irrigators used by downstream irrigators
- 350GL infrastructure water savings provided to environment (includes the 100GL Living Murray savings)
- 500GL entitlement purchases (buyback and farm efficiency) under the Basin Plan including back-trade from other regions
- 100GL from climate change
- 250GL from extra carryover spills, but this has not been recognised or calculated to date as a benefit to the river
- 300GL from net trade out of the district

This effectively means that the GMID has contributed 1,100GL for river flows (Basin Plan and Living Murray) to date (=350+500+250). If the 450GL UpWater initiative proceeds then the GMID alone will have contributed over 1,250GL (including increased carryover spills and Living Murray).

3.4 FUTURE OF THE REGION

The dairy industry in the GMID has already reduced its production level by one third from the pre-millennium drought level of 2,350ML, to its current level of 1,550ML. This involved a reduction of 800ML in milk production, with an annual farmgate value of \$320 million (at 40c/litre) or a value ex-factory of \$640 million (at 82 cents/litre). The previous economic study attributed \$200M of the farm gate lost production and \$360M of the reduced processed milk value to the Basin Plan. This update of the data continues to support that estimate.

This section reviews the further additional impact on regional production under two scenarios:

- Firstly, assuming continued horticulture expansion within the region over the next five years
- Secondly, with the additional impact of the 450GL UpWater over that same period.

3.4.1 HORTICULTURE GROWTH

Table 3-3 confirms that continued horticultural growth across the SMDB will see an overall reduction of water use in the GMID of 175GL (or 14%). The impacts differ widely by sector:

- The horticultural sector is expected see a 14% expansion in water use
- The dairy industry will see a loss of 105 GL or 12.5%. Therefore, production is expected to decline over time to 1,350ML ie a further reduction of \$78 million in the value of farm-gate milk production.
- The grazing and cropping industries within the GMID are now relatively small at under 300GL of water used and are expected to decline even further to 200GL.

3.4.2 450GL UPWATER IMPACT

Table 3-4 confirms the projected impact of implementing the 450GL UpWater initiative within the GMID in terms of lost water use. This shows an additional reduction in the level of water availability in the average season by 18% or 167GL. In addition, the price of allocation water will increase typically by \$30/ML as a result, ie a 25% increase in the temporary price of water.

Once again the impacts vary considerably by sector:

- The dairy sector is projected to lose a further 126GL of water. This would reduce milk production by 235ML, representing a 15% drop in dairy production in the region. The value of the lost production from the region is estimated at \$94 million annually (at the current farm-gate price of 40c/litre), or at \$188 million at factory gate prices of 80 c/L. The increase in the average water market price will reduce farm viability as most dairy producers now rely on accessing the allocation market in all years.
- Horticulture in the GMID is unlikely to experience any significant impact from the 450GL UpWater initiative except from the rise in water market prices.
- Cropping/Grazing will be less able to compete, these industries are now relatively small but there will still be an impact of 40GL less and considerably higher cost pressures as water prices increase by \$30/ML
- Hobby/part timer/rural living will be relatively unaffected however the change in regional production will affect the population in the region.

The lost jobs associated with this change in production is assumed to be a further 500 jobs based on the modelling done previously and that the impact will be about half of the impact of the Basin Plan on the GMID.

4 Recent MDBA analysis of Water recovery in the Southern Basin

4.1 RECONCILIATION WITH MDBA NUMBERS

On 3 May 2018 the MDBA published Southern Murray Darling Basin Community profiles. These profiles documented water recovery in forty irrigation dependent communities. One of which included Hillston that is on the Lachlan and outside of the connected Basin. This section compares the water recoveries used in the profiles (excluding Hillston) with that used in this report to identify any significant differences.

4.1.1 MDBA FIGURES

The MDBA figures are shown below in Table 4-1 for period up until Oct 2016.

Table 4-1: MDBA published water recovery from Southern Community Profiles (GL/y) May 2018

MDBA REGION	TOTAL RECOVERED	PURCHASED	INFRASTRUCTURE EFFICIENCY	NET REDUCTION IMPACT ON PRODUCTION	AVAILABLE PRIOR BP AS LONG TERM DIVERSION LIMIT GL	TOTAL RECOVERED AS % OF WATER AVAILABLE PRIOR TO BP
Lower Lakes	4.7	4.1	0.5	3.9	38.2	12%
Tallem Bend	1.7	1.7	0	1.7	14.9	11%
Murray Bridge	5.5	4.4	1.1	3.9	27.4	20%
Mannum	4.6	4.2	0.4	4	14.1	33%
Swan Reach	4.3	4.1	0.2	4.1	5.4	80%
Blanchetown	0.5	0.5	0	0.5	3	17%
Morgan	2.1	1.7	0.4	1.5	24.8	8%
Waikerie	20.7	16.4	4.2	14.6	64.2	32%
Cobdogla-Barmera	22	17.6	4.4	15.7	41.4	53%
Loxton	14.2	11.6	2.6	10.5	64.1	22%
Berri	12.9	10.6	2.3	9.6	41.4	31%
Renmark	27.8	22.7	5.2	20.5	118.3	23%
Cullulleraine	2.4	2.3	0.1	2.3	6.6	36%
Wentworth	4.1	3.9	0.2	3.9	35.5	12%
Coomealla	6.5	6.3	0.2	6.2	88.4	7%
Merbein	6.2	6.1	0.1	6.1	30.3	20%
Mildura	11	10.9	0.1	10.8	64.1	17%
Red Cliffs	9.4	9.3	0.1	9.2	42.6	22%
Colignan	10.7	10.5	0.2	10.4	68.6	16%
Robinvale	44.7	43.1	1.6	42.4	101.3	44%
Swan Hill	20	17.5	2.6	16.4	98.1	20%
Wakool	97.9	91	6.9	88	258	38%
Kerang Cohuna	64.6	59.8	4.8	57.8	350.7	18%
Pyramid Hill-Boort	40.8	36.8	4.1	35	229.7	18%

MDBA REGION	TOTAL RECOVERED	PURCHASED	INFRASTRUCTURE EFFICIENCY	NET REDUCTION IMPACT ON PRODUCTION	AVAILABLE PRIOR BP AS LONG TERM DIVERSION LIMIT GL	TOTAL RECOVERED AS % OF WATER AVAILABLE PRIOR TO BP
Deniboota	49.5	44.2	5.3	41.9	175	28%
Denimein	16.1	11.2	4.9	9.1	72.7	22%
West Berriquin	31.9	24.1	7.8	20.7	130.8	24%
Berrigan Finlay	64.3	41.5	22.8	31.7	621	10%
Cobram	70.1	61.3	8.8	57.5	284.8	25%
Shepparton	30.8	27.5	3.3	26.1	211.6	15%
Kyabram-Tatura	82.7	75	7.7	71.7	400.1	21%
Rochester	51	43.7	7.2	40.6	218.7	23%
Coleambally	25.1	14.5	10.6	9.9	316	8%
Hay	70.7	54.3	16.4	47.2	247.2	29%
Yanco	17.5	12.7	4.8	10.6	378	5%
Mirrool	18.1	14	4.2	12.2	478.1	4%
Benerembah	25	16.6	8.4	13	206.5	12%
Tabbita	0.4	0.4	0	0.4	23.5	2%
Wah Wah	9.8	8.8	1	8.4	119.7	8%
Total² from MDBA reports	1002.3	846.9	155.5	780	5714.8	18%

4.1.2 THE MISSING FIGURES

In a previously provided spreadsheet the MDBA provided a breakdown of the Water recovery figures up until October 2016. This spreadsheet included the water recovery figures provided in the above tables but also included water recovered that could not be allocated to communities as follows.

Table 4-2: Other water purchases

Description	Recovery by purchases	
Kooba	0.256	
Murrumbidgee other	11.8	
Northern Vic non-land	10	
NSW Murray	8.4	
NSW Murray non-land a/c	2.425	
NSW Murray unknown	1.766	
SA unknown	4.137	
SA other	2.889	
Victoria other/unknown	18.264	
Other Coleambally	0.3	
Total southern connected		60.237
Hillston	31.3	
Lachlan excl Hillston	4.136	
Lower Darling above Pooncarrie	2.2	
Total southern not connected		37.6

² (excludes total of 31.3 GL from Hillston excluded as Lachlan not in connected Basin)

Table 4-3: Other recoveries included in the Farm infrastructure data

Description	Recovery included in farm infrastructure data	
Murrumbidgee other	1.866	
Northern Vic non-land	2.6	
NSW Murray	7.986	
NSW Murray non-land a/c	0.158	
NSW Murray unknown	3.023	
SA unknown	0.201	
SA other	0.652	
Victoria other/unknown	0.971	
Total southern connected		17.457
Lachlan excl Hillston	1.592	
Total southern connected		1.592

The above data suggests that the water recovered within the southern connected basin is 77.7GL (60.2 +17.5) greater than the published data.

4.1.3 RECONCILING THE FIGURES

The table in section 2.2 provides the November 2017 recovery data for the basin.

This table can be compared with the December 2016 data (copy is provided below) and the September 2016 data which indicate that there was a further approx. 50GL of recovery in the southern basin and all of that occurred in the NSW zone as purchases or infrastructure savings.

Determining the exact source of water in terms of water purchases or by on farm efficiency programs is not straightforward from the DAWR published data. Examples of this are:

- i. Purchases include 100GL of NVIRP/Connections water savings that were originally considered to the farmers proportion which was purchased by the Commonwealth.
- ii. Some of the NVRIP water savings included some direct purchase from the farmers e.g. the shut down of the Campaspe system. This was included in the State Government recoveries.
- iii. The infrastructure listed items include the farm efficiency programs which were conducted both by the state and the Commonwealth and are not separately listed.

Therefore, MDBA has undertaken considerable work to identify the water recovered.

**Progress of Water Recovery towards
Bridging the Gap to the SDLs**

As at 31 December 2016

Surface Water Summary

Target: 2750 GL
Recovered: **2027.6 GL 73.7%**
Remaining: 722.4 GL

Groundwater Summary

Target: 40.4 GL
Recovered: **2.7 GL 6.7%**
Remaining: 37.7 GL

Surface Water SDL Resource Unit (or Shared Zone)	Sustainable Diversion Limit Reduction Amount ⁽²⁾			Recovery Progress					Remaining			
	Local Target (GL)	Shared Target (GL) ⁽¹⁾	Total Target (GL)	Commonwealth ⁽³⁾			State Government Recoveries ⁽⁵⁾ (GL)	Total Recovery (GL)	Local recovery remaining (GL)	Shared recovery remaining (GL)	Total recovery remaining (GL)	
				Included in 1500 Limit	Exempt from 1500 Limit ⁽⁴⁾	Infrastructure (GL) ⁽⁴⁾						Gifted ⁽⁵⁾ (GL)
Condamine-Balonne	100.0			52.7		9.2	0.0	0.0	61.9		38.1	
Moonie	0.0			0.0		1.4	1.1	0.0	2.5		0.0	
Nebine	1.0			0.0		0.0	1.0	0.0	1.0		0.0	
Paroo	0.0			0.0		0.0	0.0	0.0	0.0		0.0	
QLD Border Rivers	8.0			3.9		11.9	0.5	0.0	16.4		0.0	
Warrego	8.0			0.0		0.3	8.0	0.0	8.3		0.0	
Northern Basin QLD Zone	117.0			56.6	0.0	22.8	10.6	0.0	90.0		38.1	
Barwon-Darling	6.0			24.9		6.2	0.0	1.5	32.6		0.0	
Gwydir	42.0			35.5		5.1	0.0	6.2	46.9		0.0	
Intersecting Streams ⁽⁷⁾	0.0			8.1		0.0	0.0	0.0	8.1		0.0	
Macquarie-Castlereagh	65.0			24.6		37.3	0.0	20.6	82.5		0.0	
Namoi	10.0			4.8		6.8	0.0	0.0	11.5		0.0	
NSW Border Rivers	7.0			0.0		3.3	0.0	0.0	3.3		3.7	
Northern Basin NSW Zone	130.0			97.9	0.0	58.7	0.0	28.4	184.9		3.7	
Northern Basin Zone Total	247.0	143.0	390.0	154.5	0.0	81.5	10.6	28.4	275.0	41.8	73.2	115.0
Lower Darling	8.0			1.0		1.3	0.0	0.0	2.2		5.8	
NSW Murrumbidgee	320.0			129.2		241.3	0.0	19.0	389.5		0.0	
NSW Murray	262.0			219.5		121.5	0.0	0.0	341.0		0.0	
Southern Basin NSW Zone	590.0	458.0	1048.0	349.6	0.0	364.1	0.0	19.0	732.8	5.8	309.5	315.2
ACT Murrumbidgee	0.0			4.9		0.0	0.0	0.0	4.9		0.0	
Southern Basin ACT Zone	0.0	4.9	4.9	4.9	0.0	0.0	0.0	0.0	4.9	0.0	0.0	0.0
Broken	0.0			0.0		0.2	0.0	0.0	0.2		0.0	
Campaspe	18.0			6.3		0.1	0.0	22.6	29.0		0.0	
Goulburn	344.0			232.6		94.3	0.0	35.4	362.3		0.0	
Kiewa	0.0			0.0		0.0	0.0	0.0	0.0		0.0	
Loddon	12.0			2.8		0.6	0.0	8.6	11.9		0.1	
Ovens	0.0			0.1		0.0	0.0	0.0	0.1		0.0	
VIC Murray	253.0			271.0		96.0	0.0	30.1	397.0		0.0	
Southern Basin VIC Zone	627.0	425.3	1052.3	512.7	0.0	191.2	0.0	96.7	800.5	0.1	251.7	251.8
Eastern Mount Lofty Ranges	0.0			0.0		0.0	0.0	0.0	0.0		0.0	
Marne Saunders	0.0			0.0		0.0	0.0	0.0	0.0		0.0	
SA Murray	101.0			86.3	2.9	48.3	0.0	6.4	143.9		0.0	
SA Non-Prescribed	0.0			0.0		0.0	0.0	0.0	0.0		0.0	
Southern Basin SA Zone	101.0	82.8	183.8	86.3	2.9	48.3	0.0	6.4	143.9	0.0	39.9	39.9
Southern Basin Total	1318.0	971.0	2289.0	953.6	2.9	603.5	0.0	122.1	1682.1	5.8	601.1	606.9
Lachlan ⁽⁸⁾	48.0	N/A	48.0	35.0		1.5	0.0	11.4	48.0		0.0	
Wimmera-Mallee	23.0	N/A	23.0	22.6		0.0	0.0	0.0	22.6		0.4	
Total Basin	1636.0	1114.0	2750.0	1165.6	2.9	686.6	10.6	161.9	2027.6	48.1	674.3	722.4

Groundwater ⁽⁹⁾ SDL Resource Unit (or Shared Zone)	Sustainable Diversion Limit Reduction Amount			Recovery Progress		Remaining
	Local Target (GL)	Shared Target (GL)	Total Target (GL)	Purchase (GL)	Total Recovery (GL)	Total recovery remaining (GL)
Upper Condamine Alluvium (Central Condamine Alluvium)	35.4	N/A	35.4	2.7	2.7	32.7
Upper Condamine Alluvium (Tributaries)	5.0	N/A	5.0	0.0	0.0	5.00
Total Basin	40.4	N/A	40.4	2.7	2.7	37.7

Notes on the above Tables

All water recovery figures are expressed in long term diversion limit equivalent (LTDLE) terms.
Surface water long-term diversion limits are calculated using the current long-term diversion limit equivalent factors (v2.05) agreed to by Ministerial Council in November 2011.
All Overland Flow water recoveries have their factors individually modelled by the Murray-Darling Basin Authority.
For total water recoveries allow for minor rounding.

- The states have yet to apportion shared reduction targets to SDL resource units as required by the Basin Plan. This includes the split across the Queensland and Northern New South Wales Zones.
- Water recovery is reported at the point at which water savings or purchase have been received, estimated or agreed in signed contracts. Until water transfer contracts have been exchanged however, these figures may be subject to change over time.
- Consistent with the Water Act 2007 (s85B, C and D), the 2.9 GL LTDLE of water secured from the SA Government in May 2016 is exempt from the 1500 GL limit on water purchases.
- Includes Commonwealth water recoveries funded through the Sustainable Rural Water Use and Infrastructure Program (SRWUIP) infrastructure projects, the South Australian River Murray Sustainability Program (SARMSIP) and the Water Smart Australia Program.
- Water gifted to the Commonwealth by the Queensland Government.
- State Recovery figures are as at 31 December 2016.
- Water recovery in the Intersecting Streams SDL Resource Unit includes water recovered from the purchase of Toorale Station. An additional new entitlement - unregulated river special additional high flow entitlement for 9.720GL is part of the Intersecting Streams Unregulated and Alluvial water sharing plan, has been issued to the Commonwealth. This recovery is not shown in the table because there is currently no long-term diversion limit equivalent factor available to estimate the LTDLE recovery volume for this entitlement. This matter is expected to be resolved no later than when NSW finalises their water resource plan for this SDL resource unit.
- Water recovery in the Lachlan SDL Resource Unit exceeds the local component by 1.707GL. This additional environmental recovery does not contribute towards the shared downstream component as the Basin Plan identifies the Lachlan as a disconnected catchment.
- Groundwater recovery does not contribute to the surface water recovery target of 2750 GL.

Additional Notes

On 22 November 2016, the Murray Darling Basin Authority recommended reducing the Northern Basin recovery target from 390 GL to 320 GL as part of a suite of amendments to the Basin Plan.
These proposed amendments are currently out for public consultation. Submissions close 10 February 2017. For more information <http://www.mdba.gov.au/publications/mdba-reports/basin-plan-amendments>.

Table 4-4: A reconciliation of the total water recovery

ITEM	WATER RECOVERED (GL)
Source - DAWR recovery table total 2, 108GL as at Nov 2017	
State water recovery (total basin)	162
Gifted	15
Exempt	3
Wimmera	23
Northern Basin	301
Nimmie-Caira	132
NVIRP – direct purchase	100
Purchases/infrastructure between Oct 16 and Nov 17	50
MDBA community impact data	
Purchase	
– Southern connected communities	– 846.9
– Hillston/Lachlan/lower Darling	– 37.7
Farm efficiency	
– Southern connected communities	– 155.3
– Hillston/Lachlan	– 2.6
Unallocated	
– Purchases	– 60.2
– Farm efficiency	– 17.5
Other infrastructure	
– NSW metering	– 7.4
– Murrumbidgee irrig. infrastructure	– 13.2
Conveyance	
– Colleambally	– 8.7
– Hay Irrigation	– 1.9
– LMW	– 7.00
– Murrumbidgee Irrig	– 14.96
– Northern Victoria	– 140.4
– NSW Murray	– 9.40
Total	2,108

4.1.4 VICTORIAN ADDITIONAL RECOVERIES

In the above reconciled table based on the MDBA data, it is observed that some purchases and farm efficiency recoveries undertaken by the state of Victoria have not been included ie

- Victoria's state recoveries of the water recoveries in the State Water of 96.7 include approx. 10GL of purchases
 - The northern Victoria conveyance of 140GL includes stage 2 NVIRP, Sunraysia and farm efficiency (28GL)
- This suggests that the volume recovered is underestimated in the reconciled table above by approx. 40GL.

4.1.5 CONCLUSIONS ON THE MDBA NUMBERS

The MDBA recently released report identified that the total recovery was 1033.9GL (156.73GL from farm efficiency and 877.5GL from purchases) in 41 communities (including Hillston). A closer examination of this data indicates that the recovery has been underestimated by a total of 167.6 (because 77.7GL of recovery was not allocated to any community, 40GL of Victorian recovery was not included and 50GL of recovery has occurred since). Therefore the total recovery in the southern basin is considered to be 1,169 GL with a further 39GL for the Lachlan/Hillston/Lower Darling areas.

4.2 MDBA ANALYSIS SUGGEST 810GL NOT 1208GL IE 2/3 OF THE REAL IMPACT!

The MDBA analysis creates a net impact figure for the 41 communities of only 810GL (including 31GL for Hillston). This was calculated by ignoring the 156 GL farm efficiency water transferred to the environment and also suggesting that 67GL of water that was retained on farm offsets an equivalent buy back volume. The farm efficiency program has provided additional funds to individual irrigators, which has assisted the expansion of the horticulture/cotton industries, and brought forward development for the rice/dairy/cropping industries. Whilst the additional funds have a short term benefit, ultimately the water recovered is no longer available to the irrigation industries for their own private investment to enable increased production. Thus the MDBA analysis underestimates the impact of water recovery considerably.

4.3 IMPACT ON ALLOCATIONS

The MDBA data identified that the split of entitlements (in GL and LTAAY) was as follows:

Ent type	MDBA recovery
NSW HS	29
NSW GS	522
Vic HRWS	446
Vic LRWS	8
SA HR	129
Total	1,134

Based on this it is estimated that the split of the revised 1,169GL of total water recovery is:

GL	LTAAY	Entitlements
Low	8	27
GS	492.5	704
HS	669	704
Total	1,169	1,472

The likely impact on allocations therefore has been estimated as ranging from 915GL in a dry year with reduced allocations to 1,434GL in an extreme wet year with full allocations.

4.4 IMPACT ON GMID AND VICTORIA

The MDBA reports that the impact on the GMID communities totals 360GL of recoveries comprising 321.6GL of purchases and 38.5GL of farm infrastructure works. It also suggests that the net impact is 305.4 GL when farm efficiency savings are excluded and 42% of the on-farm infrastructure works are deducted assuming that they were retained on farm.

However the total direct recovery from these communities is estimated at 417GL (346GL of purchases and 71GL of farm efficiency).

The total impact post back trade from areas downstream of the GMID (Riverland and Sunraysia) is that at least 500GL of allocation has been recovered from the GMID. The MDBA analysis therefore estimates the impact on the GMID at 60% of the real impact.

The total recovery in Victoria is 500GL comprising:

- Buyback which is estimated to be 428.6 GL – comprising 410.6GL direct Commonwealth buyback and 28GL from purchases associated with NVIRP/Connections.
- Farm efficiency which totals 70.7GL –
 - 38GL from the On-Farm Irrigation Efficiency Program (OFIEP),
 - 4.5GL from the Northern Victoria Irrigation Renewal Project (NVIRP),
 - 10.8GL from the Victorian On Farm State Priority Projects (VOSP), and
 - 17.4GL from the Victorian Farm Modernisation Program (VFMP).

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