

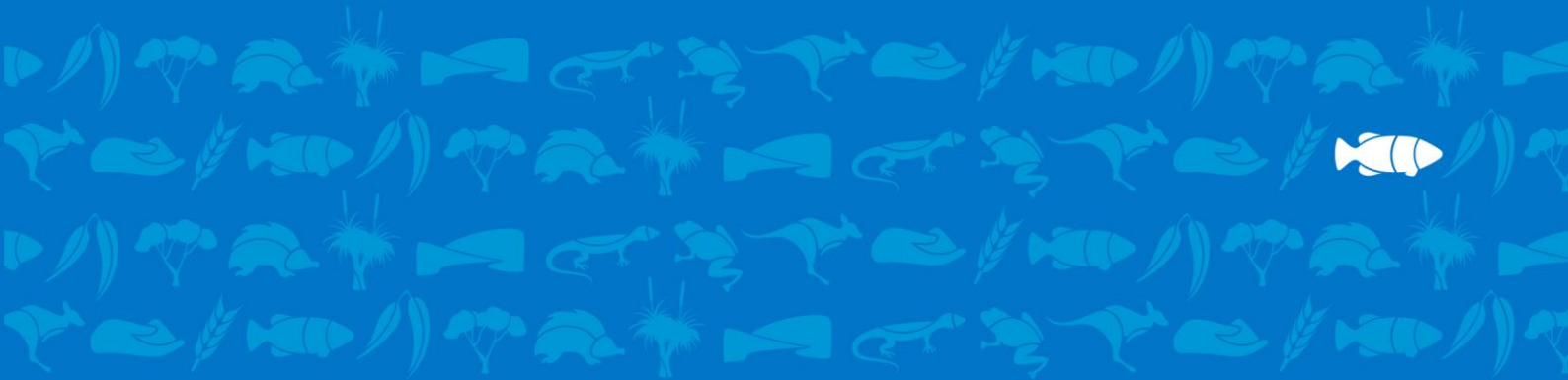


**Government of South Australia**  
South Australian Murray-Darling Basin  
Natural Resources Management Board

**2008-2009**

South Australian Murray-Darling Basin Natural Resources Management Board

# MALLEE PRESCRIBED WELLS AREA ANNUAL WATER USE REPORT





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## ANNUAL WATER USE REPORT

### 2008/2009

**Author**

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**South Australian Murray-Darling Basin Natural Resources Management Board**

February 2010

This Annual Water Use Report 2008/2009 provides a summary of Annual Water Use Report forms submitted by licence holders in the Mallee Prescribed Wells Area (MPWA), pursuant to Section 8 of the *Water Allocation Plan for the Mallee Prescribed Wells Area (2000)*.

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- Licence holders in the MPWA who completed the Annual Water Use Report forms in 2008/2009
- Sarah Kuchel, SA MDB NRM Board, for final editing and distribution.



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## INTRODUCTION

This is the 7th consolidated Annual Water Use Report for the Mallee Prescribed Wells Area (Mallee PWA) and was prepared by the South Australian Murray-Darling Basin Natural Resources Management Board (the Board).

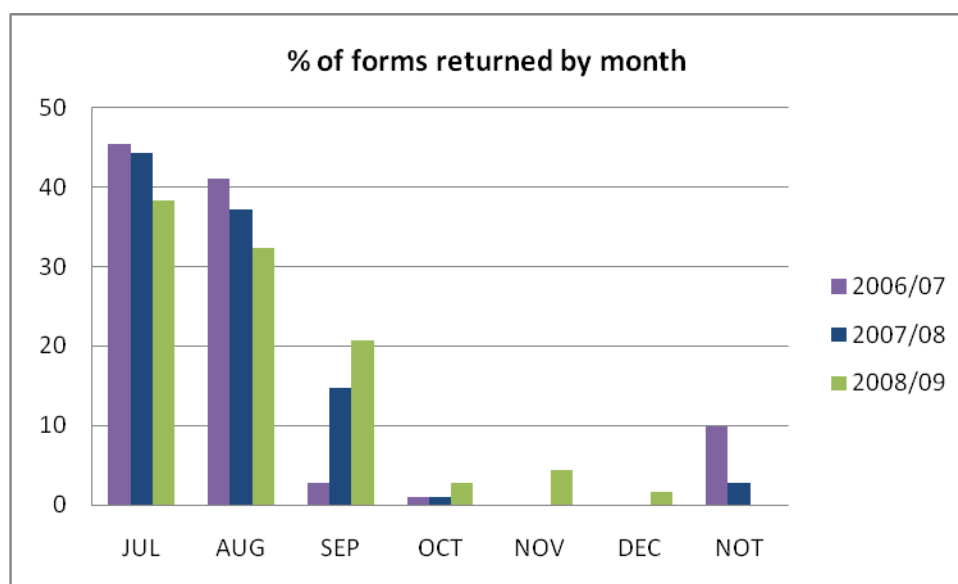
A water licensee holding an allocation for use of the prescribed water resource is obliged as a condition of the licence to complete an Annual Water Use (AWU) Report form **each year**, regardless of the level of usage of the resource. Failure to submit an Annual Water Use Report form constitutes a breach of licence and Section 127 (6) of the *Natural Resources Management Act 2004* provides for the imposition of an Expiation fee (fine) of \$750 in this event.

Water use within the expanded prescribed boundaries in the Hundreds of Bandon, Vincent, Wilson, Hooper, Marmon-Jabuk and Area A (the New Area) is excluded from this report because it is unlicensed as yet and are not required to complete an Annual Water Use Report.

## METHOD

This report provides a summary of the water use information provided by licence holders in the Mallee PWA for the water use year from 1<sup>st</sup> July 2008 to 30<sup>th</sup> June 2009. It includes water licences for the purposes of Irrigation (123), Intensive farming (53), Town Water Supply (4 licences for 7 towns), Industry (3), Schools (4), Sporting Clubs (4) and Local Government (2).

The number of licences, allocations, water usage, and licence purpose may have varied after 30<sup>th</sup> June 2009 and these changes will be reflected in the following year's Annual Water Use Report.



**Graph 1: Rate of returns in 08/09 compared to the previous two years**

Graph 1 shows that the rate of returns has slowed again, for the second year running, with a higher proportion of them not coming in until September (2 months after the due date). Eventually all 2008/2009 forms were returned, although some were too late for their usage figures to be included in the data and this Summary Report.

There were several recurring problems with inadequate information being provided. Licence holders are reminded that it is a licence condition that you return a COMPLETED form each year, regardless of the level of usage. Please be aware of the following:

- If a section is not applicable you may write “nil” or “N/A” or put a line through it
- If your entire allocation is leased out to another user, you will need to obtain details of water usage from them and you both need to sign the form
- If water was used for purposes such as stock and domestic use, crop spraying, fire fighting or other exempt purposes, these should still be reported in the water use section to help explain your meter readings

## RESULTS




### ALLOCATION AND WATER USE

**Table 1: Mallee PWA Total Water ALLOCATION**

Hundred/Zone	Alloc 08/09 (ML)	No. of licences	Alloc 07/08 (ML)	No. of licences	Alloc 06/07 (ML)	No. of licences
9A	3835	4	3835	4	3835	3
10A	9236	44	9237	45	9285	45
11A	6627	15	6627	17	6627	17
ALLEN	2115	14	2115	14	2115	14
ALLENBY	1237	9	1165	8	1167	8
AULD	1902	2	1902	3	1902	3
BEWS	4615	22	4910	24	4910	24
BILLIATT	2233	5	2233	5	2233	5
CHESSON	1283	7	1283	7	1283	7
COTTON	2520	16	2591	17	2591	17
DAY	1494	6	1199	6	1199	6
KEKWICK	1914	6	1914	6	1914	6
KINGSFORD	2832	6	2832	6	2832	6
MCPHERSON	1556	9	1555	9	1555	9
MINDARIE	2324	6	2324	6	2324	6
MOLINEUX	1404	6	432	6	432	6
PARILLA	3944	14	3946	15	3944	15
PRICE	1834	11	1834	11	1834	11
	<b>52,904</b>		<b>51,935</b>		<b>51,982</b>	

*Note: Allocations per Hundred vary slightly from Table 3 due to town water supply licences being reported separately in Department of Water, Land and Biodiversity Conservation (DWLBC) records. Data relating to the Border Zones only refers to those parts within the Mallee PWA.*


**The following variations have been made to the number of licences in each Hundred since the previous year:**


-  This year eight licences were surrendered, either because they have had zero allocation for a number of years or because the licence holder had multiple licences and has rolled their allocations onto another licence number. This resulted in changes in the numbers of licences in 10A, 11A, AULD, BEWS, COTTON and PARILLA.
-  Changes in allocation between BEWS and DAY result from one transfer between these Hundreds.
-  There was one new licence granted in ALLENBY, part of whose allocation was transferred from a licence in COTTON, which still retained part of the allocation and hence, the number of licences in COTTON remained static.

## ALLOCATION AND WATER USE


**Table 2: Mallee PWA Total Water USE**

Hundred/Zone	08/09 (ML)	% of alloc	07/08 (ML)	% of alloc
9A	1923	50	3220	84
10A	11505	122	14651	159
11A	4338	66	5766	87
ALLEN	898	43	783	37
ALLENBY	280	23	594	51
AULD	0	0	0	0
BEWS	5187	105	5924	121
BILLIATT	1520	68	1214	54
CHESSON	229	18	162	13
COTTON	2215	93	2677	103
DAY	1936	130	1057	88
KEKWICK	33	2	33	2
KINGSFORD	1487	55	1841	65
MCPHERSON	137	9	122	8
MINDARIE	2287	98	1231	53
MOLINEUX	2	1	0	0
PARILLA	7926	194	9700	246
PRICE	909	50	923	50
	<b>42,812</b>		<b>49,901</b>	

 Table 2 shows metered usage for the 2008/09 water use year. This figure includes 32.82 ML on 10 licences that were only used for stock and domestic purposes. This usage has been included in the 2250 ML in Table 4.

 Usage decreased in the majority of active Hundreds since the 2007/2008 year. This follows some significant increases last year, so the figures now resemble closer to former levels of usage. Some of the factors contributing to the decreases were:

- Smaller areas of the higher water use crops in 9A, 10A, BEWS, PARILLA and PRICE such as carrots, onions and potatoes (seed and commercial)
- Reduced megalitre (ML) per hectare (Ha) rates applied to certain crop types including olives and pistachios, compared to last year, which resulted in decreased extraction in KINGSFORD and 11A
- Significant changes in the mix of crop types grown in COTTON, together with reduced application rates on commercial potatoes in this Hundred
- A much smaller area being irrigated in ALLENBY, as compared to the 2007/2008 season

 Increases in usage in Hundreds were contributed to by:

- A significant increase in usage by Australian Zircon in MINDARIE under the Section 128 authorisation, as production increased
- Greater areas of higher water use crops in DAY and CHESSON (such as commercial potatoes, onions and lucerne hay)
- Activation of a previously unused licence in ALLEN



## ALLOCATION AND WATER USE


**Table 3: Permissible Annual Volume (PAV) in ML per Hundred and Border Zone**


Hundred / Zone	Orig PAV (100%)	Min PAV (80%)	Max PAV (150%)	Current licensed alloc.	Licensed alloc. as % base PAV
9A	3840	3840	3840	3835	100
10A	8519	8519	8519	9036	106
11A	6862	6862	6862	6627	100
ALLEN	2590	2072	3885	2111	81
ALLENBY	1740	1392	2610	1237	67
AULD	2390	1912	3585	1902	80
BEWS	3170	2536	4755	4461	150
BILLIATT	2410	1928	3615	2233	93
CHESSON	1470	1176	2205	1283	87
COTTON	3150	2520	4725	2520	82
DAY	1490	1192	2235	1494	80
KEKWICK	2420	1936	3630	1908	79
KINGSFORD	1860	1488	2790	2832	152
MCPHERSON	1930	1544	2895	1555	81
MINDARIE	1549	1239	2323	2312	149
MOLINEUX	2150	1720	3225	1404	20
PARILLA	2440	1952	3660	3928	161
PRICE	2320	1856	3480	1805	78
TOWN SUPPLY	500			423	85
<b>Total PAV (ML)</b>	<b>52,800</b>	<b>55,209</b>	<b>78,365</b>	<b>52,907</b>	<b>100</b>

Notes: Slight variations in allocations per Hundred occur between Table 1 and Table 3 due to town water supply licences being reported separately in DWLBC allocation. Data for the Border Zones only refers to those areas within the Mallee PWA.

**Table 4: Mallee PWA Water Extractions per Category of Water User**

WATER USE	08/09 (ML)	% of Use	% of PAV	07/08 (ML)	% of Use	% of PAV	06/07 (ML)	% of Use	% of PAV
Town Water Supply	306.7	0.7	0.6	308.7	0.6	0.6	324.7	0.9	0.6
Sports Clubs	82.7	0.2	0.1	106.1	0.2	0.2	82.4	0.2	0.2
Local Government	178.1	0.4	0.3	216.3	0.4	0.4	199.3	0.5	0.4
Schools	106	0.2	0.2	111.6	0.2	0.2	93.9	0.3	0.2
Stock and Domestic	2250	5.0	4.3	2250	4.3	4.3	600	1.7	1.1
Irrigated Crops	40,118.1	89.1	75.8	48,096.8	92.2	91.1	34,504.2	95.7	66.3
Intensive farming	188.6	0.4	0.4	214.8	0.4	0.4	252.1	0.7	0.5
Industrial	1799.5	4.0	3.4	846.7	1.6	1.6	40.8	0.1	0.1
<b>TOTAL USE ML</b>	<b>45,030</b>	<b>100%</b>	<b>85.1%</b>	<b>52,151</b>	<b>100%</b>	<b>98.8%</b>	<b>36,097.4</b>	<b>100%</b>	<b>69.4%</b>
<b>PAV</b>	<b>52,907</b>			<b>52,781</b>			<b>51,995</b>		

 Stock and Domestic use does not require a water licence in the Mallee PWA, however, metered usage of 32.8ML for this and other exempt purposes was included in the respective Hundreds in Table 2 and has been absorbed into the DWLBC estimate of 2250ML in this table.








 The addition of 'taking industrial' as a purpose to 2 existing licences (and subsequent usage) contributed to the increase in this category. Usage in all other categories decreased this year.

## IRRIGATION WATER USE

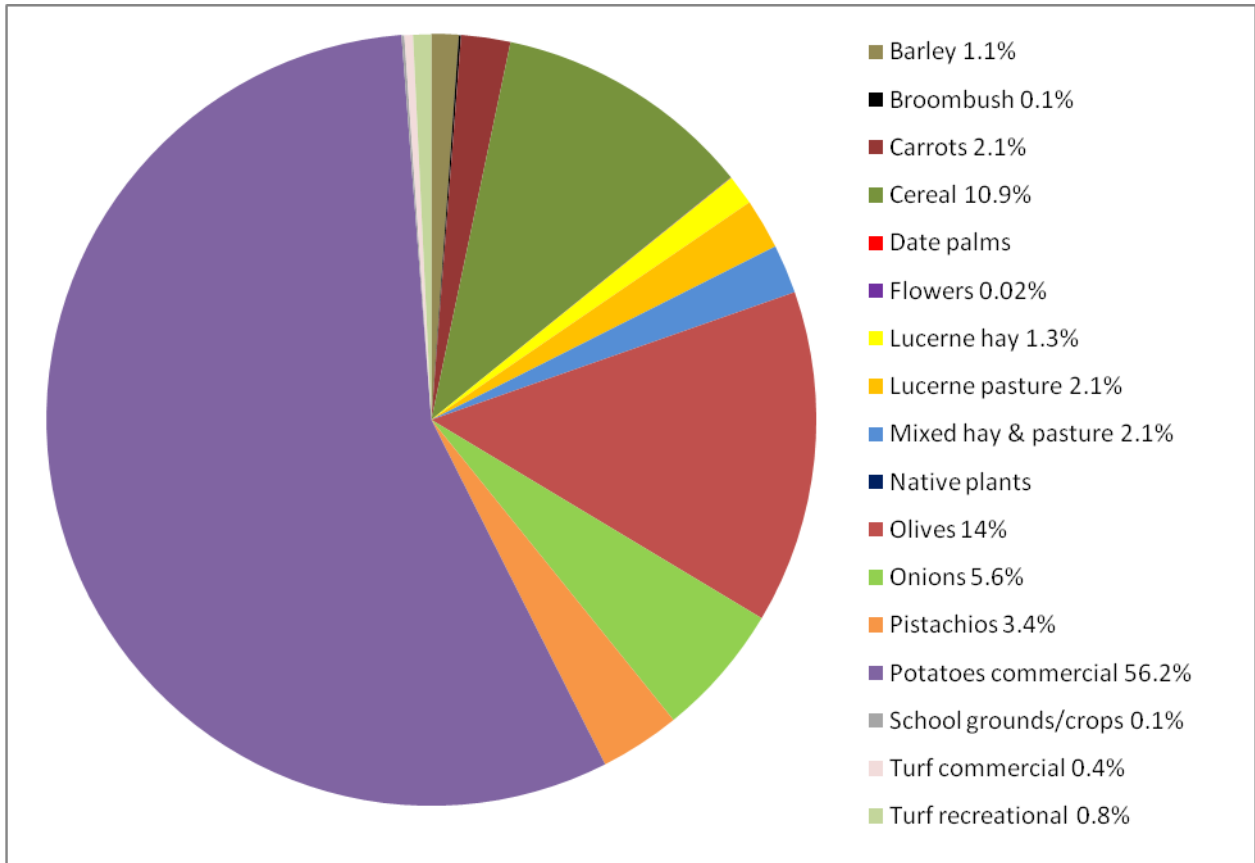
**Table 5: Total Area and Volume Applied (ML) per Crop Type**

No. of crops	Mallee PWA	Area (Ha)	Volume (ML)	Avg ML/Ha	Max ML/Ha	Min ML/Ha
2	Barley	76	48.2	0.6	0.7	0.6
1	Broombush	6	17	2.8	2.8	2.8
4	Carrots	138	1193.8	15.1	24.9	9
19	Cereal	727	1097.3	1.8	5	0.1
1	Date palms	0.12	0.1	1	1	1
1	Flowers	1.5	4.3	2.8	2.8	2.8
6	Lucerne hay	83.8	500.5	5.5	10.5	0.2
11	Lucerne pasture	141.1	616.8	6.1	12.3	2.3
6	Mixed hay and pasture	137	382.2	3.4	13	0.1
1	Native plants	0.25	0.9	3.4	3.4	3.4
8	Olives	933	1993.4	2.4	4.6	0.2
9	Onions	373	4615.5	11.9	15.9	7
3	Pistachios	225	792.5	2.8	4.4	0.6
91	Potatoes commercial	3753.2	25518.1	6.7	22.7	0.9
3	School grounds/crops	7.8	106	13.1	26.2	1.2
2	Turf commercial	24	211.1	8.8	9.4	8.2
11	Turf recreational	50.8	260.8	10.7	29	1.7
-	*Unknown	-	3126.5	-	-	-
	<b>Total</b>	<b>6,677.5</b>	<b>40,484.8</b>			

Note: 1 Ha = 2.47 acres. 1 ML = 1,000 KL.

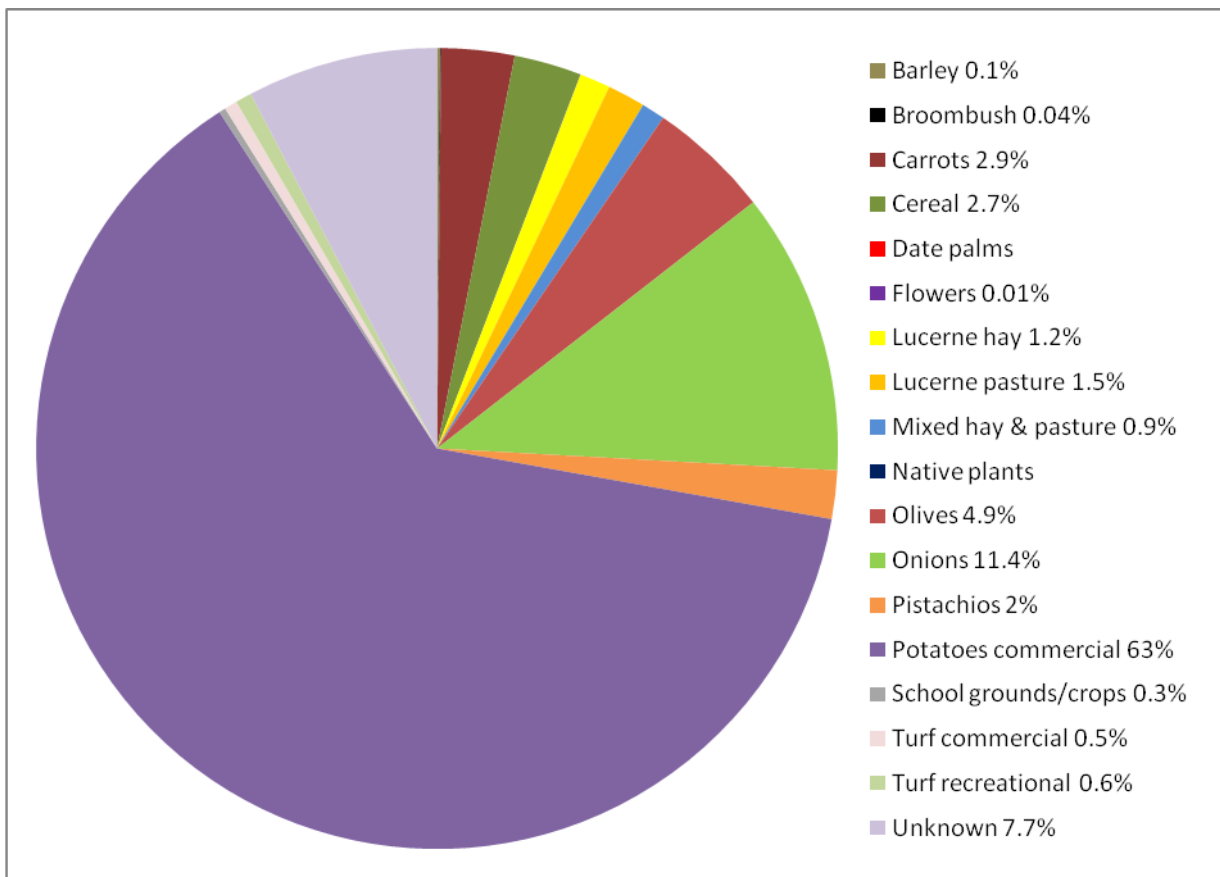
-  Table 5 refers to all 'Taking Irrigation' licences, including water use by Sports Clubs, Local Council, Schools and Irrigated crops. Refer to Table 4 for water use by Town Water Supply, Intensive Farming and Industrial Licences.
-  \*Unknown refers to the metered use for licences for which there was not enough information provided, or whose forms were still outstanding at the time of producing this report. Details of crop types and areas were as such, not available.
-  Changes in crop types included the addition of native plants as a new crop this year and the omission of Seed potatoes, as none were grown in 2008/2009.
-  Crops for which there were significant increases in area since the previous year were: barley, cereal, lucerne pasture and onions. As is to be expected, volumes applied increased for these crops also.
-  Another increase in volumes applied was experienced in pistachios, while the area of these crops stayed the same. This indicates a greater ML/Ha rate of application in this season, which has been expected for some time, given historical application rates lower than 'Net Irrigation Requirements' for this crop.
-  Decreases in area and subsequently volumes applied, were observed in; carrots, mixed hay and pasture, olives and commercial potatoes.
-  Interestingly, volumes applied to flowers, lucerne hay and recreational turf also decreased, despite the areas of these crops being static. This indicates lower ML/Ha application rates for these crop types.

## IRRIGATION WATER USE



**Graph 2: Total Irrigated Area in 2008/2009**

\*The graph above excludes the crop types and areas that were “unknown” at the time of producing this Report (see note under Table 5)





**Graph 3: Volume Applied to Irrigated Crops 2008/2009**

## IRRIGATION WATER USE

**Table 6: Types of Irrigation Systems Used for Irrigated Crops**

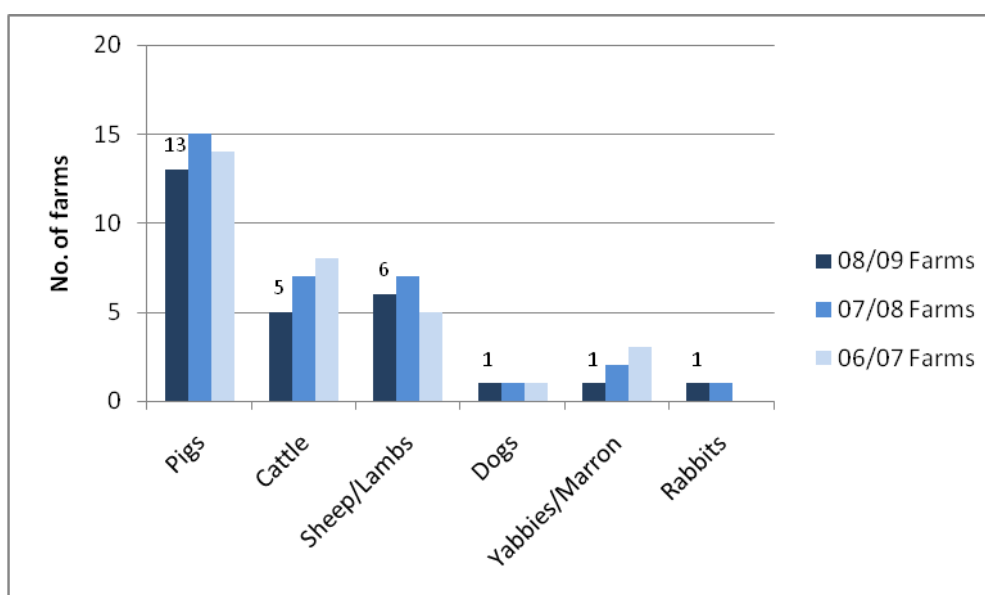
No of Growers 2008/2009	Irrigation System	Compared to 2005/2006	Types of Crops Grown
46	Centre Pivot	40	Barley, Carrots, Cereal, Lucerne hay, Lucerne pasture, Mixed hay and pasture, Onions, Potatoes commercial, Turf commercial
10	Drip	6	Broombush, Native plants, Olives, Pistachios
2	Hand line	0	Lucerne Hay, Lucerne pasture
7	Sprinklers	6	Lucerne hay, Lucerne pasture, Olives, Turf recreational
1	Micro Sprinklers	2	Olives
2	Traveling Irrigator	3	Lucerne pasture
1	Bubblers	0	Date palms
<b>69</b>		<b>57</b>	

-  When we compare these figures to three years ago we see that overall, there are more irrigation systems in use now, which is to be expected given that a number of previously unused licences have been activated over this period.
  
-  While over time we might expect to see the more ‘traditional’ systems such as handlines and travelling irrigators being phased out, this has not actually been observed.

## INTENSIVE FARMING WATER USE

**Table 7: Summary of 2008/2009 Intensive Farming**

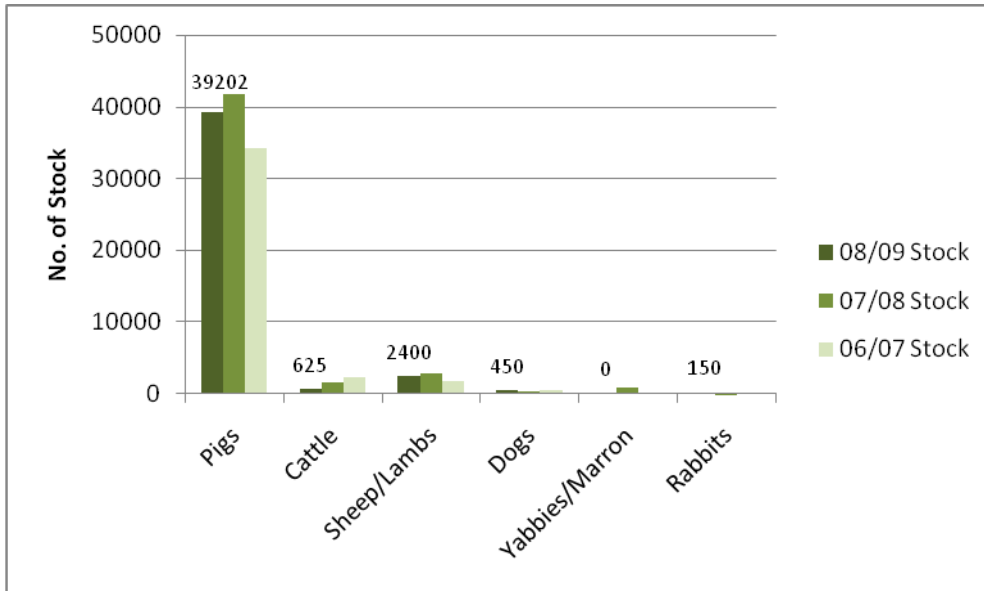
No. of farms	Stock type	No. of stock	KL used	% Total use
13	Pigs	39202	144901	76.83
5	Cattle	625	17043	9.04
6	Sheep/Lambs	2400	10114	5.36
1	Dogs	450	912	0.48
1	Yabbies/Marron	-	3228	1.71
1	Rabbits	150	1614	0.86
-	Unknown	-	10579	5.61
	<b>Total</b>	<b>42,827</b>	<b>188,610</b>	



**Graph 4: No. of FARMS in Intensive Farming in 2008/2009 compared to previous two years**

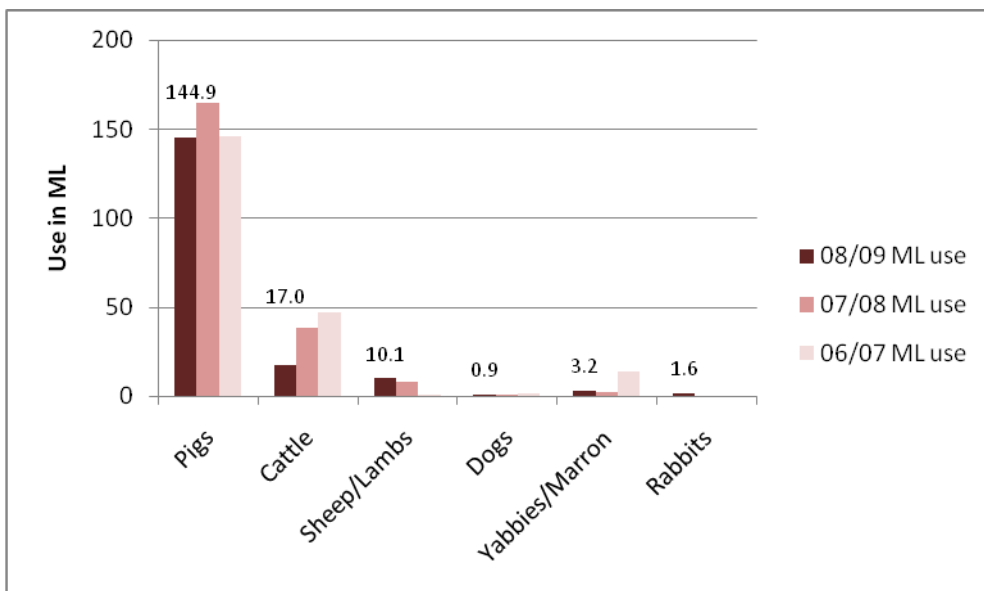
- 💧 The number of farms decreased for all stock types except dogs and rabbits, which were stable. Piggeries continue to be the dominant intensive farming operation in the Mallee PWA.
- 💧 Quite a number of intensive farming licence holders reported keeping stock under normal conditions i.e. not farmed intensively, but this use is exempt from requiring a licence. It is included in the 2250 ML estimated for Stock and Domestic use in Table 4 and is not reported separately.

## INTENSIVE FARMING WATER USE



**Graph 5: No. of STOCK in Intensive Farming in 2008/2009 compared to previous two years**

- 💧 As with the number of farms, numbers of stock for pigs, cattle, sheep and lambs decreased slightly this year.
- 💧 While yabbies/marron have been reported as being farmed for the last three years, it is more difficult to obtain useful data on stock numbers for this stock type. We do not expect to be able to make meaningful comparisons of these from year to year.







**Graph 6: VOLUME used in Intensive Farming in 08/09 compared to previous two years**

- 💧 The volumes used for pigs and cattle did decrease, with stock numbers in 2008/2009. However, usage for sheep and lambs increased slightly despite a fall in stock numbers.
- 💧 Usage for rabbits was too small to register on the graph in 2007/2008. Numbers of rabbits increased this year, hence the usage did too but the rate per head stayed the same. Therefore, this increase in usage for rabbits is directly in-line with the increase in stock numbers.

## PROBLEM AREAS

**Table 8: Reported cases of Problem Areas**

Water Use Year	Perched Water Table	Water Logging	Soil Salinity	Poor Water Quality	Iron Bacteria	Drawdown
08/09	0	4	4	8	27	6
07/08	1	5	2	8	31	16
06/07	1	3	3	5	23	11
No. of Licencees with continued problem.	0	2	2	5	25	4

-  Water logging continues to be a problem for several licence holders and each year for the past few years, there have been several new reports of it. This problem generally occurs when water is applied to the soil at a faster rate than it can absorb. Investigations into soil types and irrigation application rates in those areas may be required to resolve the problem.
-  Soil salinity seems to be a problem at some sites and there were two new cases reported this year. Leaching irrigations may well be required to ensure that salts do not concentrate in the soil, especially for perennial crops. Further advice on leaching requirements can be obtained from the Improving Irrigation Efficiency Coordinator, phone: 08 8582 4477.
-  It is encouraging that drawdowns were less of a problem this year. The Hundreds where problems were experienced were: 10A, 11A, CHESSON, PRICE and PARILLA. Regular monitoring of depth to water levels at Obswell sites continues to provide information on these drawdowns, for adaptive management of the resource.
-  Reports of iron bacteria problems have decreased from the previous year but are higher than two years ago. There were two new cases reported this year, which is of concern. In regions such as the Mallee, where iron bacteria are known to be present, care must be taken by anyone accessing bores, not to transmit the bacteria to other bores.

### IRON BACTERIA TEST


Licence holders who suspect they may have an iron bacteria problem can perform the following simple test: Collect a sample of the discoloured water and leave it overnight. Rust deposits will settle to the bottom, where as iron bacteria will stay suspended.


Continued and regular treatment can control bacteria levels, but there is currently no known cure for the problem once a bore is infected.


## SOIL MOISTURE MONITORING EQUIPMENT

**Table 9: Number of Irrigators Using Soil Moisture Monitoring**

Soil Moisture Monitoring Equipment	No of Irrigators	07/08 results
Tensiometer	10	14
Capacitance	8	7
Gypsum Blocks	1	3
Neutron Probe	1	1
"Dig hole n check"	35	47
<b>Total</b>	<b>55</b>	<b>72</b>

 The use of soil moisture monitoring equipment appears to have decreased since the previous season. However this is a direct result of many irrigators not completing this section of their form, compared to the previous year. Seventeen licence holders who reported using SMM last year, either said they were not using it at all this year, or did not complete this section of the form.

 Of the complete responses that were received, there have been some changes in the types of systems used. In this season, nine irrigators have taken up the use of some equipment and another nine have stopped using a 'system' and gone back to doing just the 'dig hole and check' method.

 The Assessing Crop Water Use project ran from August 2006 to August 2008 and included the aim of evaluating the effectiveness of different Soil Water Monitoring (SWM) systems for Mallee crops and conditions. Some general observations of the project were:

- Preference has been shown for equipment which is easy to download and maintain, as well as being able to be removed and re-installed with annual cropping.
- SWM equipment was only one of the tools employed by participants to monitor crop water use requirements. General observations of plant health, digging the soil, and using agronomy support were also found to be important, when used in conjunction with SWM equipment.
- Soil types within a crop were often quite variable, so having more than 1 site per crop increased the chances of obtaining valuable information from the equipment. Soil types and crop varieties also varied from paddock to paddock, so equipment really needed to be placed in each crop to provide useful data for scheduling irrigations for that crop.
- Growers who are already using new technology in other areas of crop production are the most keen to use the soil water monitoring equipment and data.
- For the first season growers tend to use soil water monitoring data derived from the equipment to review the impacts of rainfall and watering events on their crops. Basing irrigation scheduling decisions on the data generally comes later, once they gain confidence in it.

The full project report, which details the types of equipment used, crop types and other project findings, can be downloaded from the Board's website:

[http://www.samdbnrm.sa.gov.au/Our\\_Plans/Water\\_Allocation\\_Planning/Mallee\\_PWA.aspx](http://www.samdbnrm.sa.gov.au/Our_Plans/Water_Allocation_Planning/Mallee_PWA.aspx). Once there, click on the link *Assessing Crop Water Use In the Mallee* under the heading "Related Projects".

The equipment used throughout the project is now available for loan through the Board. Growers interested in trialling the equipment on their property should contact the Improving Irrigation Efficiency Project Coordinator on 08 8582 4477.



## FUTURE WATER USE PLANS




**Table 10: Future Plans for Irrigated Area and Water Use**

No. reports	Year	Area (in Ha) <sup>#</sup>	ML <sup>#</sup>	Usage may reach (ML)
26	2009/2010	610.6	5617.3	46,102.2
8	2010/2011	47.4	496.9	46,599.1
5	2011/2012	32	375.2	46,974.3
4	2012/2013	12	214.1	47,188.4
2	2013/2014	0	19.2	47,207.6

*# Increasing area and/or water use*

*\* Next year plans are additional to current figures*

*^ Subsequent plans are additional to the previous year, so are cumulative over time*

-  The plans indicated are for actual area of crops, not Hectare Irrigation Equivalent (HaIE).
-  Crops for which increases in area are expected include lucerne (hay and pasture), potatoes (commercial and seed), date palms, saltbush and turf (commercial).
-  Crops for which increases in volume only (ie. increased ML/Ha application rates) are expected include olives and pistachios.



*There is no proven commitment to these plans; hence these figures are only used as 'rough' estimates. Many of the plans for increased production are dependent upon constraining factors such as seasonal factors, economics and available water.*

**Table 11: Intensive Farming Plans for Future Stock Numbers and Water Use**

No. reports	Farm type	Next year Stock numbers <sup>*</sup>	Next year Volume (KL) <sup>*</sup>	No. additional reports	5 year plan Stock numbers <sup>#</sup>	5 year plan Volume (KL) <sup>#</sup>
5	Pigs	1670	23088	-	-	-
2	Unspecified	200	1870	-	-	-
	<b>Total</b>	<b>1870</b>	<b>26,188</b>			

*\* Next year plans are additional to current figures but show the net change after any decreases have been taken into account*

*# 5 year plans are net changes taking the details provided for the 4 preceding years into account. These are additional to current figures and "next year" figures.*

-  There were very few reports for intensive farming future use plans this year.
-  Based on the above table, usage for intensive farming may reach the following levels next year:  
188,610 KL (2008/2009 use) + 26,188 KL = 214,798 KL

*There is no proven commitment to these plans; hence these figures are only used as 'rough' estimates. Many of the plans for increased productions are dependent upon constraining factors such as seasonal factors, economics and available water.*

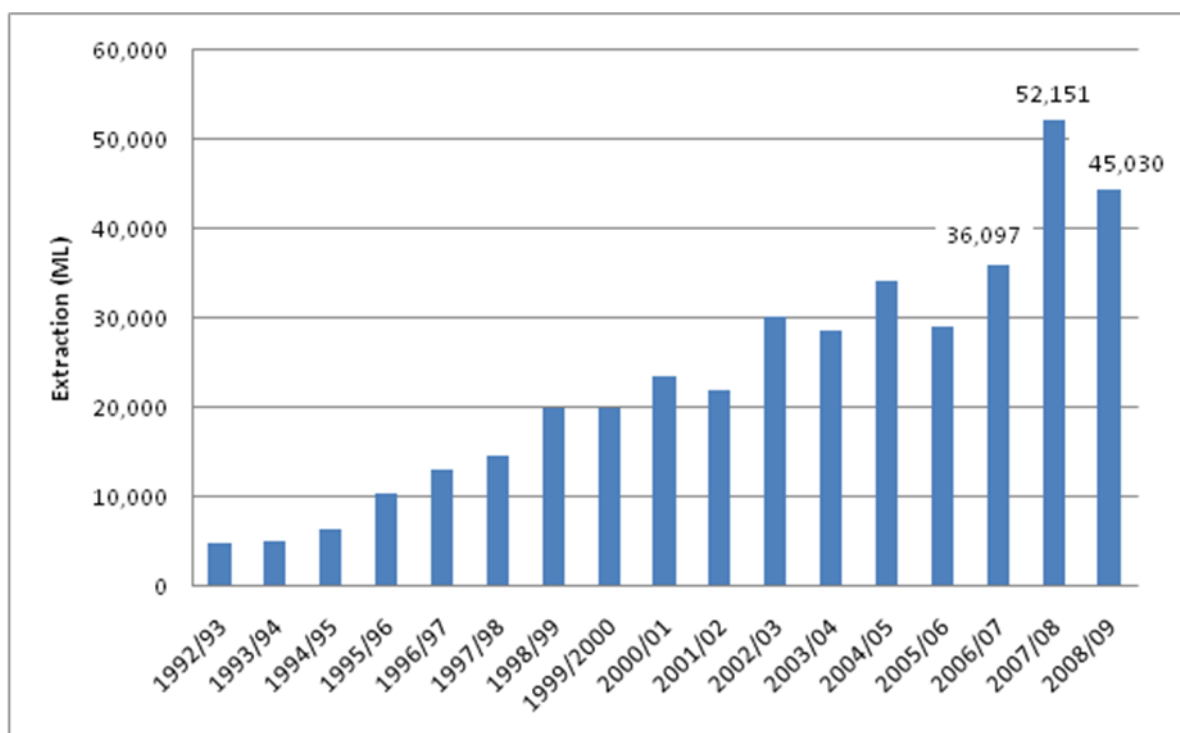
## SUMMARY OF WATER RESOURCES MANAGEMENT IN THE MALLEE PWA

### Allocations

Rectification of an error that was made in allocations last year has returned the volume of water allocated on licences in the Mallee PWA to the same as it was in the 2005/2006 water use year. The current allocations remain within the 52,800 ML Permissible Annual Volume (PAV) stated in the Mallee Prescribed Wells Area Water Allocation Plan (WAP) 2000.

### Usage

The volume of water used by Licence holders in the Mallee PWA in the 2008/2009 water use year was 45,030 ML, a decrease of 7121 ML from 2007/2008. The inclusion of water for sand mining, an increase in the volume of water used for stock and domestic purposes and a drier rainfall year than average caused a large jump from 2006/2007 to 2007/2008. Usage decreased in the majority of categories in 2008/2009, with the irrigated crops usage falling the most. There was significant decrease in irrigation usage in the Border Zones, along with a few other Hundreds. These decreases were created several factors including; less area grown of the crops which generally use higher ML/Ha (this may be due to market pressures), generally less ML/Ha applied to the crops that were grown as compared to last year, timing of some rainfall events can contributed to this decrease in ML/Ha water use and, the change of management to a property can create less water used.



**Graph 7: Extraction history in the Mallee PWA**

### Water Flow Meters

During the 2008/2009 Water Use Year (1 July 2008 to 30 June 2009) 230 meter readings were taken per quarter from 120 licensees in the Mallee Prescribed Wells Area.

The Department of Water, Land and Biodiversity Conservation (DWLBC) undertook 4 meter reads during 2008/2009 covering all meter installations on each read. This increased level of readings provided the opportunity to; a) ensure that the Department was fully conversant with meter installations prior to volumetric conversion, b) monitor metering compliance and c) assist in notifying water users of their use periodically during the year. There was a final reading at the end of the Water Use Year to ascertain the volume of water used for the water use year but only records of meter readings until April were available at the time the Annual Water Use Report forms were sent out.

A full meter reading process will continue in 2009/2010, with monitoring of compliance with meter specifications being an ongoing focus, including the sealing of all meters in the Mallee PWA.

## Automatic Weather Stations

Data from the Board's weather monitoring network is accessible from the Board's website: <http://www.samdbnrm.sa.gov.au>. Click on the 'NRM Weather' button.

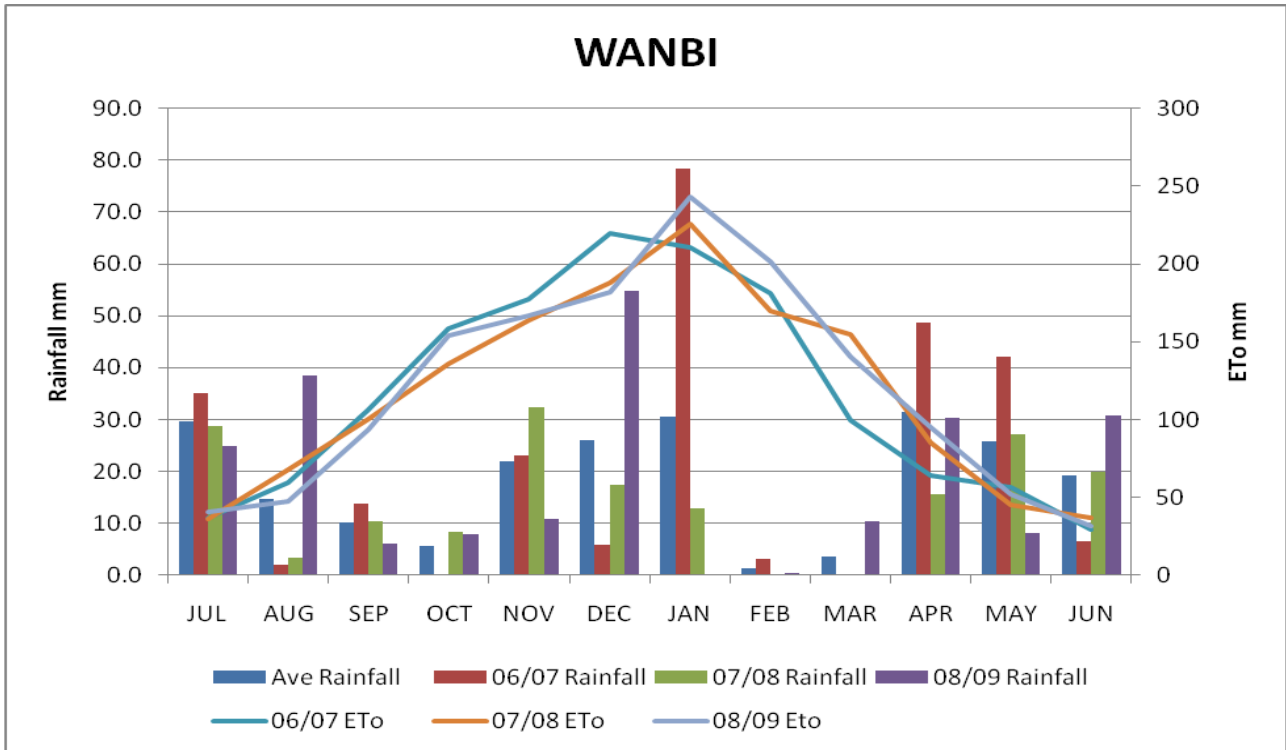
To access daily data for a particular Automatic Weather Station simply click on the desired site from the map or from the list to the left hand side of screen. Note the menu is split into five sections – Riverland, Lower Murray, Mallee, Adelaide and Upper South-East.

Graphs 8 to 11 on the following pages show comparisons of rainfall and evapotranspiration (ETo) using some of this data, recorded by the four Automatic Weather Stations (AWS) in the Mallee. The location of these sites is shown on the Map of the Mallee Prescribed Wells Area (Appendix 3, Figure 1).

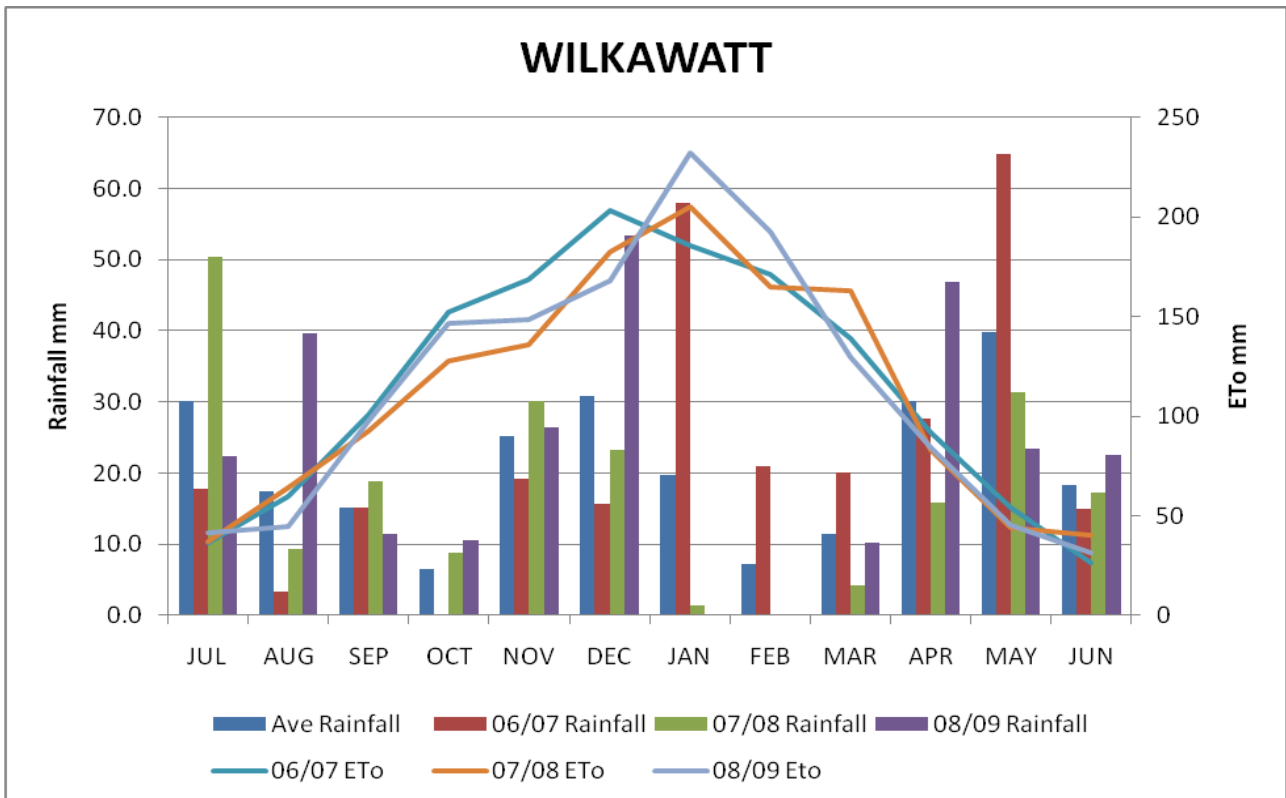
Water use for irrigated crops in the Mallee was generally lower in 2008/2009 than 2007/2008. Some of this can be contributed to less area of crops grown, but in some cases the ML/Ha used was less in 2008/2009 than 2007/2008. The AWS network in the Mallee highlights that above average rainfall and reduced ETo during specific periods can have positive influence on irrigation, storage and harvesting activities by reducing the requirement to extract and utilise groundwater for related purposes.

Groundwater use by crops may have been reduced due to weather related events such as;

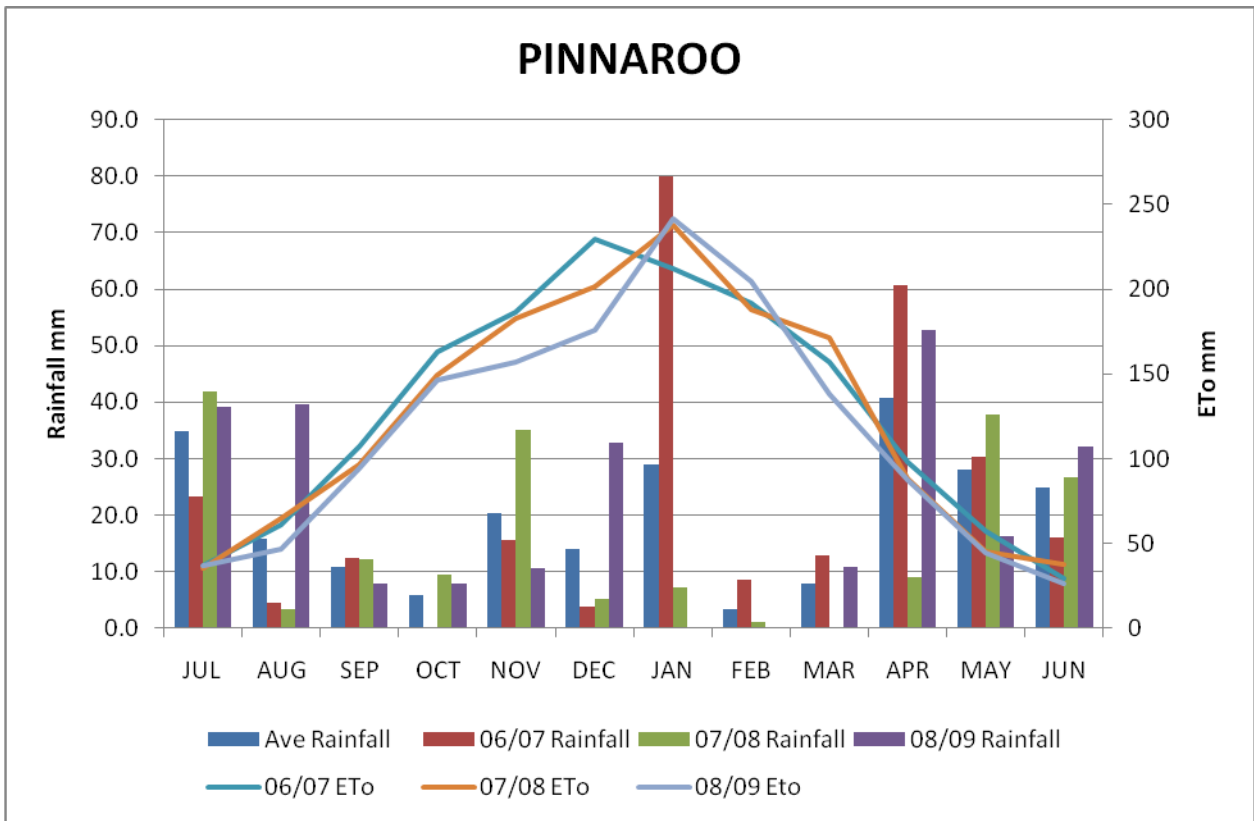
- Significant August 2008 rainfall across the Mallee would have assisted to wet up soil for spring/summer growing crops (September 2008 to January 2009).
- August 2008 rainfall may have also reduced winter growing cereal crops reliance on supplementary irrigations
- April 2009 rainfall was above average in the south and may have reduced water use of crops growing into winter (January 2009 to July 2009). Along with low ETo (mainly in southern areas) during autumn, reducing net irrigation requirements of crops growing over autumn.
- December 2008 rainfall may have reduced the number of irrigations required toward the end of the spring/summer growing season (September 2008 to January 2009) and for finishing off crops.
- December 2008 rainfall would have increased moisture levels in the soil, which could have potentially reduced water use for storing crops (e.g. potatoes) in the ground and reduced water application for harvesting.
- December 2008 rainfall contributes to increased stored soil water which may have been utilised for crops planted in January/February 2009.



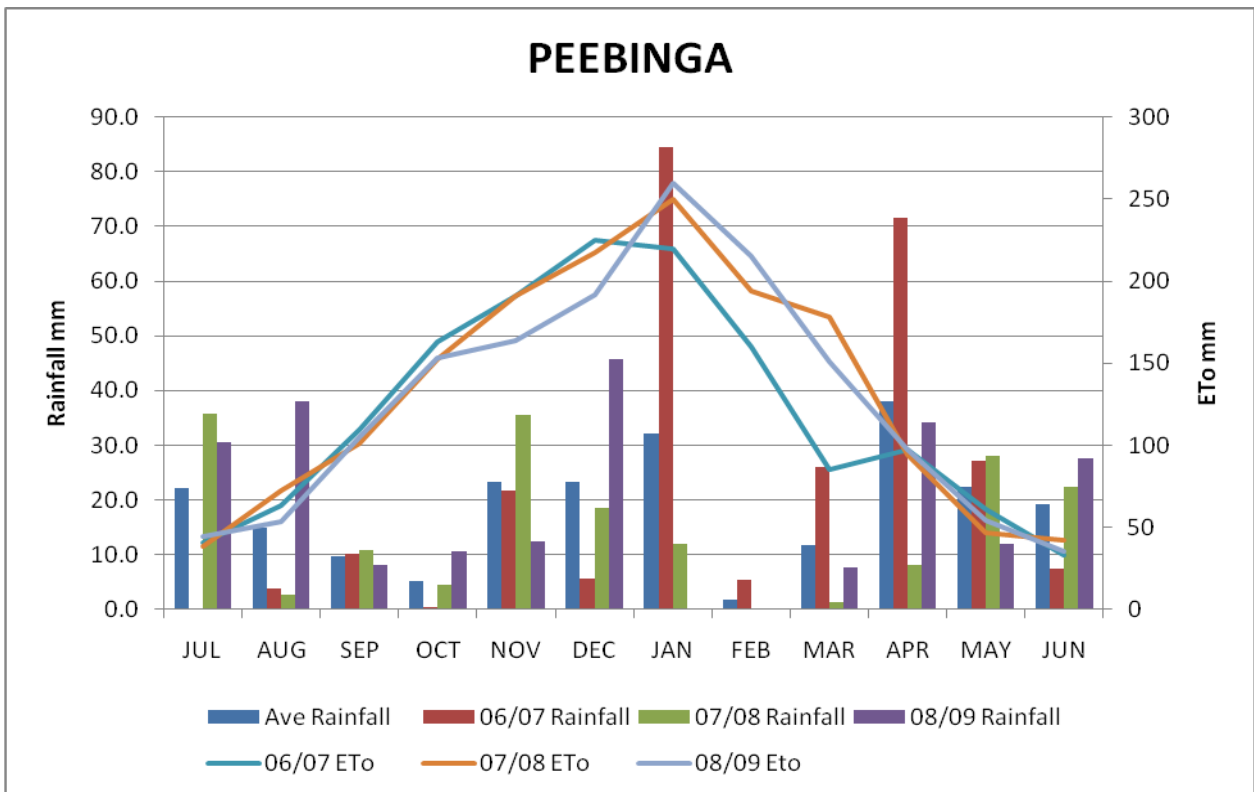
**Graph 8: Comparison of rainfall and evapotranspiration recorded at Wanbi**



**Graph 9: Comparison of rainfall and evapotranspiration recorded at Wilkawatt**



**Graph 10: Comparison of rainfall and evapotranspiration recorded at Pinnaroo**



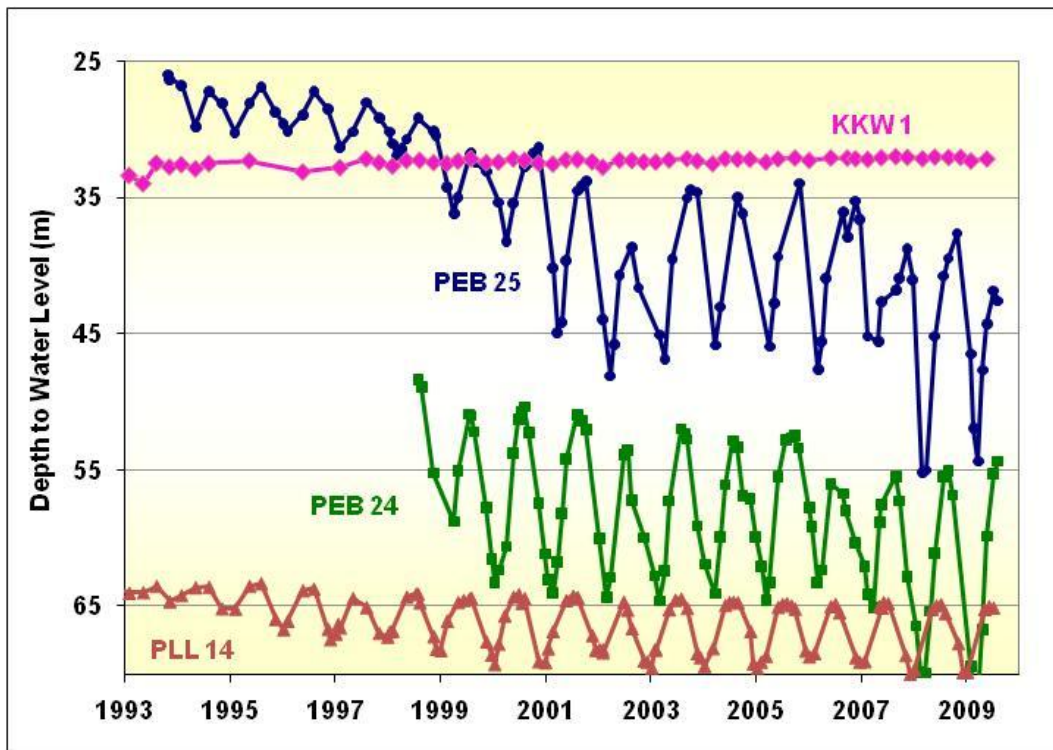
**Graph 11: Comparison of rainfall and evapotranspiration recorded at Peebinga**

## Groundwater Monitoring

### Drawdown

An extensive network of observation wells monitors the three aquifers in the Mallee Prescribed Wells Area. Most wells are monitoring the Murray Group Limestone aquifer, which is widely developed for irrigation.

Graph 12 below shows some typical groundwater level hydrographs from across the Mallee PWA. KKW1 is at Paruna where there is no irrigation, hence it does not show any drawdown impacts. The general trend at three sites in irrigation areas (PEB24 in Zone 10A, PEB 25 in Zone 11A, and PLL 14 in Hundred Parilla) was stable, indicating a state of equilibrium. However in 2007, increasing demand as a result of greatly reduced allocations in the Riverland, has led to changing pumping regimes and increased drawdowns in Zones 10A and 11A. The introduction of volumetric allocations will more than likely reduce these drawdowns.

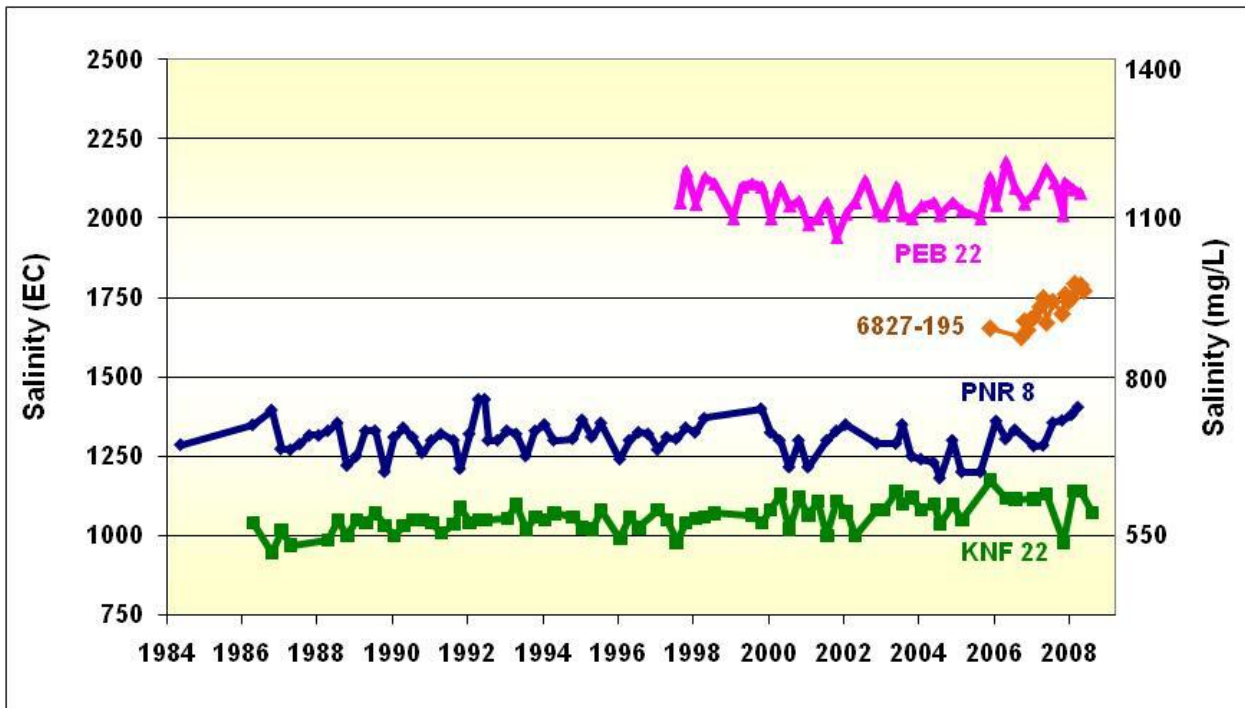


**Graph 12: Monitored drawdowns**

The location of these monitoring sites is shown on the Map of the Mallee Prescribed Wells Area (Appendix 3, Figure 1).

### Salinity

The salinity monitoring has shown little change over the years in the confined portion of the aquifer where most extractions are occurring, as shown by which is not surprising given the slow movement of groundwater (about 1m/yr). Of interest though, is the rising trend in well 6827-195. This well is located in the unconfined portion of the limestone aquifer near Mindarie and is showing the impacts of land clearing where the increased recharge is flushing unsaturated zone salt down into the aquifer. The network is continually being extended to include more sites and monitoring of some areas is occurring more frequently.



**Graph 13: Monitored salinity**

The location of these monitoring sites is shown on the Map of the Mallee Prescribed Wells Area (Appendix 3, Figure 1). The most current Monitoring Status Report for the Mallee PWA can be accessed at [http://www.dwlbc.sa.gov.au/assets/files/dwlbc\\_report\\_2006\\_28\\_web.pdf](http://www.dwlbc.sa.gov.au/assets/files/dwlbc_report_2006_28_web.pdf). Monitoring data for all observation wells can be accessed online through OBSWELL by using the following link and entering “Mallee” in the network name box. <https://obswell.pir.sa.gov.au>

### **Development of a new Water Allocation Plan for the Mallee Prescribed Wells Area**

Development of the Mallee Water Allocation Plan (the Plan) has been a lengthy process involving many discussions and negotiations between the Board, the Mallee Water Resources Committee, all relevant sections of the DWLBC and the Border (Groundwater Agreement) Review Committee. The aims of these discussions were to gain advice and a better understanding on the ability to implement suggested principles in the draft Plan.

Due to continuing development pressure and increased water use in the Mallee, there have been some alterations to some of the original allocation proposals. Many River Murray water users have moved to the Mallee in search of alternative water sources to continue their irrigation businesses. This has required a robust and adaptive management style to identify and meet current requirements and provide a sustainable water supply for future need.

The Plan has been reviewed, amended and will now be presented to the Board. Principles to determine allocations have been formulated for each management zone. The science that underpins our principles has been re-examined to alleviate perceived concerns with the Plan. Once the Board has approved the Plan, we will work in collaboration with all relevant sections of the DWLBC as we seek to fast-track support, before requesting the Minister’s approval to commence public consultation.

The Board will be endeavouring to begin public consultation on the draft Plan by the mid part of 2010. All licence holders and stakeholders will be notified of meetings and forums that will be held to explain the contents of the draft Plan.



## APPENDIX 1

### CROP AREA RATIOS

These may be a useful reference for you when filling out your next Annual Water Use Report form, as we don't always attach them to the form each year.

Crop Area Ratios (CAR's) are based on the Irrigation Requirements of the crop (Desmier, 1991). The following CAR's are the ratios used for the original allocations of Mallee PWA water licences. These are the current ratios, which irrigators should be referring to when identifying the area of crops to be grown under their HaE (Hectare Irrigation Equivalent) allocation.

Crop	Northern Area		Southern Area	
	Irrigation Requirement (mm)	Crop Area Ratio (CAR)	Irrigation Requirement (mm)	Crop Area Ratio (CAR)
Reference crop	1052	1.0	868	1.0
Recreation Areas	1052	1.0	868	1.0
Lucerne Hay/Pasture	916	1.1	742	1.1
Lucerne Start/Finish	297	3.5	195	4.5
Onions	644	1.6	526	1.6
Pistachios	662	1.6	536	1.6
Potatoes, summer harv. <sup>#</sup>	561	1.9	472	1.8
Potatoes, winter harv. <sup>*</sup>	331	3.2	281	3.1
Summer fodder	573	1.8	488	1.8
Medic/Vetch Seed	433	2.4	307	2.8
Garlic	393	2.7	285	3.0
Sunflower/Safflower	337	3.1	272	3.2
Broombush/Geraldton wax	300	3.5	150	5.8
Cereal Hay & Grain	161	6.5	103	8.4
Carrots (Autumn sown) <sup>+</sup>	138	7.6	76	11.4
Almonds	662	1.6	536	1.6
Woodlots	300	3.5	150	5.8
Saltbush/Fodder trees	300	3.5	150	5.8
Glasshouses	715	1.5	586	1.5
Vines	380	2.8	299	2.9
Field Peas	161	6.5	103	8.4
Olives – Fresh & Oil	916	1.1	742	1.1

#### **Using the HaE system:**

1. The appropriate Crop Area Ratio (CAR) for the area in which the property is located must be used, i.e. the Northern or Southern zone.
2. When converting areas of crops to Irrigation Equivalents (I.E.s) the areas must be divided by the appropriate CAR e.g. 50 Ha onions ÷ by 1.6 = 31.2 HaE
3. When converting I.E.s to crops the I.E. must be multiplied by the appropriate CAR e.g. 78.0 HaE x 8.4 CAR = 655.2 Ha cereal grain

Note: A review of Desmier's rates, Crop Area Ratios and Net Irrigation Requirements has been undertaken by Rural Solutions, SA and gave rise to the following report:

*Skewes. M. (2004) Definition of Irrigation Requirements in the Mallee Prescribed Wells Area*

Options for determining a Volumetric Conversion formula have been developed, but discussions are still taking place as to how this will proceed. One of these options includes taking into account the revised Net Irrigation Requirements and the new Crop Area Ratios, as determined in the review by Skewes. However, the Volumetric Conversion formula has not yet been confirmed and so the above crop ratios must still be used at this point in time.

<sup>#</sup> Summer Harvested potatoes: Majority of crop growth and development between September and January.

<sup>\*</sup> Winter Harvested potatoes: Majority of crop growth and development between February and July.

<sup>+</sup> Carrots (Autumn sown): Majority of crop growth and development between March and August.



## APPENDIX 2

### CROP SUMMARY per Hundred / Border Zones

*“Unknown” indicates a metered volume for which other details (crop type and area for example) had not been provided at the time of producing this report.*

<b>ZONE 9A</b>	<b>Area (Ha)</b>	<b>Volume (ML)</b>	<b>ML/Ha</b>
Mixed hay/pasture	62	60	1
Potatoes commercial	222	1863.4	8.4
<b>Total Irrigation</b>	<b>284</b>	<b>1923.4</b>	

<b>ZONE 10A</b>	<b>Area (Ha)</b>	<b>Volume (ML)</b>	<b>ML/Ha</b>
Carrots	14	126	9
Cereal	175	394.5	2.3
Flowers	1.5	4.3	42.6
Lucerne pasture	16.5	40.9	2.5
Native plants	0.3	0.9	3.4
Olives	472	25.0	0.1
Onions	26	182.4	7
Potatoes commercial	1407	9843.5	7
Turf recreational			
Turf commercial			
Unknown	-	391.8	-
<b>Total Irrigation</b>	<b>2149.1</b>	<b>11306.2</b>	

<b>ZONE 11A</b>	<b>Area (Ha)</b>	<b>Volume (ML)</b>	<b>ML/Ha</b>
Olives	138	471.2	3.4
Onions	33	253.4	7.7
Pistachios	225	792.5	3.5
Potatoes commercial	338.2	1622.3	4.8
Unknown	-	1196.6	-
<b>Total Irrigation</b>	<b>734.2</b>	<b>4336</b>	

<b>ALLEN</b>	<b>Area (Ha)</b>	<b>Volume (ML)</b>	<b>ML/Ha</b>
Cereal	142	159.2	1.1
Lucerne hay	33.6	334.2	10
Lucerne pasture	26.2	107.5	4.1
Mixed hay/pasture	22	285.9	13
<b>Total Irrigation</b>	<b>223.8</b>	<b>886.8</b>	

<b>ALLENBY</b>	<b>Area (Ha)</b>	<b>Volume (ML)</b>	<b>ML/Ha</b>
Lucerne pasture	6	40.3	6.7
Potatoes commercial	28	211	7.5
<b>Total Irrigation</b>	<b>34</b>	<b>251.3</b>	

***No crops were grown in Auld***

## APPENDIX 2 (continued)

### CROP SUMMARY per Hundred / Border Zones

BEWS	Area (Ha)	Volume (ML)	ML/Ha
Lucerne pasture	50	115.4	2.3
Potatoes commercial	614	4373.5	7.1
School grounds/crops	2.8	30.4	10.9
Turf recreational	27	121.1	4.7
Unknown	-	419.1	-
<b>Total Irrigation</b>	<b>693.8</b>	<b>5059.4</b>	

BILLIATT	Area (Ha)	Volume (ML)	ML/Ha
Lucerne hay	1.2	9	7.5
Potatoes commercial	217	1510.8	7
<b>Total Irrigation</b>	<b>218.2</b>	<b>1519.9</b>	

CHESSON	Area (Ha)	Volume (ML)	ML/Ha
Broombush	6	17	2.8
Date palms	0.12	0.1	1
Lucerne hay	17	15.1	0.9
Lucerne pasture	2	23.9	12
Potatoes commercial	24	137.7	5.7
School grounds/crops	2.5	35.1	14
<b>Total Irrigation</b>	<b>51.6</b>	<b>228.9</b>	

COTTON	Area (Ha)	Volume (ML)	ML/Ha
Cereal	160	260.3	1.6
Potatoes commercial	280	1821.6	6.5
<b>Total Irrigation</b>	<b>440</b>	<b>2081.9</b>	

DAY	Area (Ha)	Volume (ML)	ML/Ha
Lucerne hay	26	109.8	4.2
Onions	40	597.6	14.9
Potatoes commercial	227	1219.8	5.4
<b>Total Irrigation</b>	<b>293</b>	<b>1927.2</b>	

KEKWICK	Area (Ha)	Volume (ML)	ML/Ha
School grounds/crops	1	1.2	1.2
Turf recreational	5	25.3	5.1
<b>Total Irrigation</b>	<b>6</b>	<b>26.4</b>	

KINGSFORD	Area (Ha)	Volume (ML)	ML/Ha
Olives	320	1486.7	4.7
<b>Total Irrigation</b>	<b>320</b>	<b>1486.7</b>	

## APPENDIX 2 (continued)

### CROP SUMMARY per Hundred / Border Zones

<b>McPHERSON</b>	<b>Area (Ha)</b>	<b>Volume (ML)</b>	<b>ML/Ha</b>
Lucerne pasture	22.4	109.5	4.9
Turf recreational	3	5	1.7
Unknown	-	13	-
<b>Total Irrigation</b>	<b>25.4</b>	<b>127.5</b>	

<b>MINDARIE</b>	<b>Area (Ha)</b>	<b>Volume (ML)</b>	<b>ML/Ha</b>
Cereal	132	215	1.6
Lucerne pasture	12	147.1	12.2
Mixed hay/pasture	53	36.3	0.7
Potatoes commercial	16	120.8	7.6
<b>Total Irrigation</b>	<b>213</b>	<b>519.2</b>	

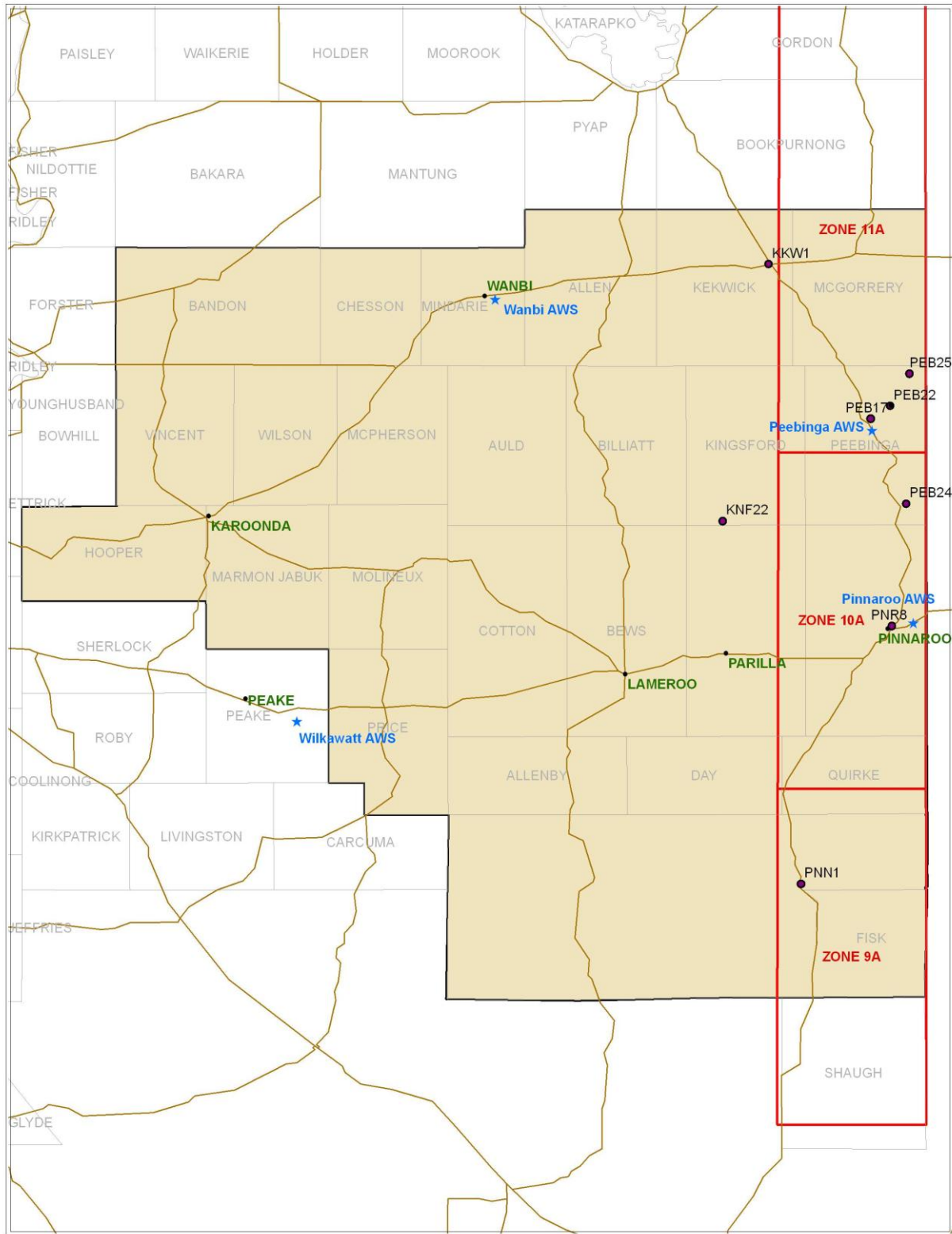
*No crops were grown in Molineux*

<b>PARILLA</b>	<b>Area (Ha)</b>	<b>Volume (ML)</b>	<b>ML/Ha</b>
Barley	76	48.2	0.6
Carrots	124	1067.8	8.6
Cereal	118	68.3	0.6
Olives	3	10.6	3.5
Onions	274	3582.2	13.1
Potatoes commercial	380	2793.7	7.4
Turf recreational	2.2	10.3	4.7
Unknown	-	325	-
<b>Total Irrigation</b>	<b>977.2</b>	<b>7905.9</b>	

<b>PRICE</b>	<b>Area (Ha)</b>	<b>Volume (ML)</b>	<b>ML/Ha</b>
Lucerne hay	6	32.3	5.4
Lucerne pasture	6	32.3	5.4
School grounds/crops	1.5	39.4	26.3
Turf recreational	0.7	13.3	18.3
Unknown	-	781	-
<b>Total Irrigation</b>	<b>14.2</b>	<b>898.3</b>	

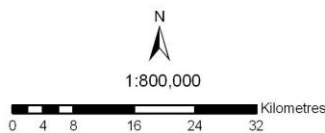
## APPENDIX 3

**Figure 1: Map of the Mallee Prescribed Wells Area**



**Legend**

- Towns
- Roads
- Obswells
- ★ AWS - Automatic weather Stations
- Border Zones
- MPWA
- Hundreds



**Government of South Australia**  
 South Australian Murray-Darling Basin  
 Natural Resources Management Board

Map produced on 2 December 2008  
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## APPENDIX 4.

### ABBREVIATIONS AND MEASUREMENTS

#### Abbreviations:

<b>AHD</b>	Australian Height Datum, or approximate mean sea level, measured in metres (m).
<b>The Act</b>	The <i>Natural Resources Management Act 2004</i> , which supersedes the <i>Water Resources Act 1997</i> .
<b>AWU</b>	Annual Water Use Report
<b>The Board</b>	South Australian Murray-Darling Basin Natural Resources Management Board
<b>CAR</b>	Crop Area Ratio
<b>DWLBC</b>	Department of Water, Land and Biodiversity Conservation.
<b>ETo</b>	Evapotranspiration
<b>IR</b>	Irrigation requirement (as determined by Desmier, 1991)
<b>The Minister</b>	The Minister responsible for the administration of the NRM Act.
<b>PAV</b>	Permissible Annual Volume
<b>PWA</b>	Prescribed Wells Area
<b>Mallee PWA</b>	The Mallee Prescribed Wells Area.
<b>NIR</b>	Net irrigation requirements (as determined by Skewes, 2004)
<b>No.</b>	Number
<b>TDS</b>	Total dissolved solids, a measure of water salinity, measured in milligrams per litre (mg/L).

#### Measurements:

Ha	hectare(s)
HaIE	Hectare Irrigation Equivalents
km	kilometre(s)
km <sup>2</sup>	square kilometre(s)
m	metre(s)
mm	millimetre(s)
m <sup>2</sup>	square metre(s)
mg/L	milligram(s) per litre
KL	Kilolitre(s)
ML	megalitre(s)
ML/year	megalitres per year
ML/Ha	megalitres per hectare