

Angas Bremer Irrigation Management Zone 2015 – 2016 Annual Report



Project Coordinator: Leah Hunter
Angas Bremer Water Management Committee Inc

Supported by



**Government
of South Australia**



Natural Resources
SA Murray-Darling Basin

2015-16 Annual Irrigation Report

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Angas Bremer Water Management Committee

Members 2015-2016

Acting Presiding Member – Nick McDonald
Treasurer – Michael Clements

Committee Members

David Kohl, Darren Aworth, George Borrett, Mac Cleggett,
Loene Furler, Barry Potts and Dale Wenzel

Non-elected members of the Committee

Secretary - Barbara Blaser

Program/Project Coordinator – Leah Hunter

*Natural Resources SA Murray-Darling Basin - Michael Cutting and
Brett Ibbotson*

Report of the Activities of the Committee 2015-2016

25th Anniversary Landcare Grant – Angas and Bremer Rivers and Wetlands, Enhancing Corridor Biodiversity.

The Angas Bremer Water Management Committee was successful in their bid for a 25th Anniversary Landcare Grant, receiving funding for the Angas and Bremer Rivers and Wetlands – Enhancing Corridor Biodiversity Project. The aim of this project was to restore vegetation to improve and link biodiversity corridors, along the Angas and Bremer Rivers as well as associated swamps and wetlands within the Langhorne Creek area. The project focused on sites involved in the Biodiversity Project (see below).

In November 2015 a seed collection workshop was held for local landholders of Langhorne Creek to learn native seed collection techniques, resources and location of species. This workshop was run by Jeff Whittaker from Habitats SA Revegetation Specialists who helped the group collect over 2 kilograms of native seed to be used for propagation. The propagation workshop was held in December 2015 at the Clayton Bay Community Nursery run by Phil Collins from Australian Native Plants Consultancy Services. Participants of the workshop helped sow several species and transplant over 1,000 plants needed for tube stock revegetation in 2016. A Green Army team hosted by the Goolwa to Wellington Local Action Planning Association (GWLAP) transplanted the remainder of plants in January 2016.

During July 2015 750 plants grown by the Milang Community Nursery were distributed to five properties for planting by the landholder. A further 3,027 plants were distributed in

June 2016 to 12 sites for planting by the landholder. This brings the total tube stock planting to 3,777 plants, well over our target of 3,000. In August 2015 four kilometres of direct seeding was undertaken on two sites along the Bremer River by Jeff Whittaker. Jeff Whittaker and the Green Army team hosted by the GWLAP undertook site preparation works and woody weed control on all of the sites involved in the Landcare Grant Project. This project was completed on June 30th with great results on all sites involved. Thank you to all landholders for taking part in this project and volunteering your time to make this project a success.

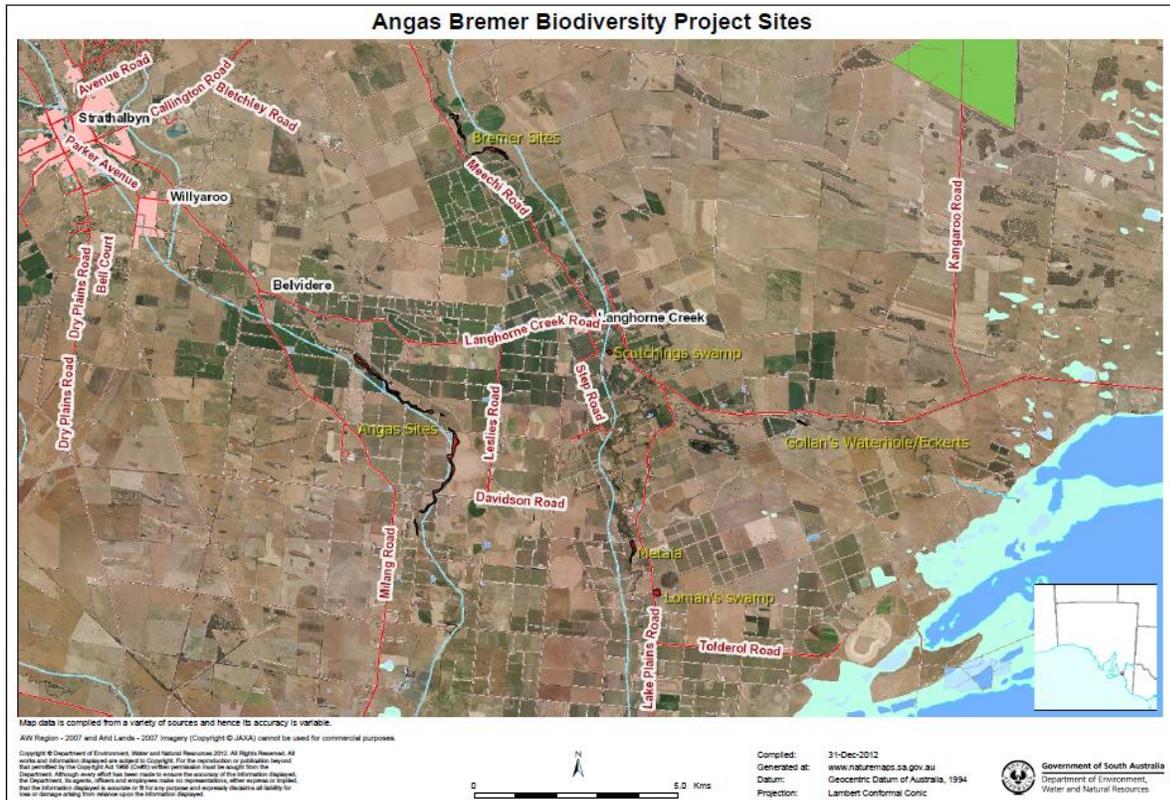


Figure 1. Landcare Grant Project sites, coloured red, with yellow labels.



Figure 2. Landcare Grant Project sites showing new plantings.

Cover Crops Trial

In April 2014 the Angas Bremer Water Management Committee was awarded an Alexandrina Council Rural Initiatives grant, which enabled 4 landholders in the district to become part of a Cover Crops project run by Chris Penfold from the University of Adelaide. The grant covered the cost of the seed for the landholders and contributed to the successful Viticulture Innovation Day held at Bleasdale Vineyard in Langhorne Creek on the 16th of October 2014.

Unfortunately results were very patchy at best after the 2014 sowing due to lack of rainfall. In 2015 there were sufficient funds to re-sow two of the sites involved in this trial. New seed was sown on the 2 properties (approximately 2ha) in May and June 2015, using 3 different seed mixes –Wallaby grass (*Austrodanthonia geniculata*), fescue and Kasbah cocksfoot.

The results were patchy again within and between the sites. The Wallaby grass and fescue struggled to establish well, particularly on the lighter textured soils. The seed of these species is very small making it difficult to obtain sufficient moisture for long enough with very shallow sowing. Kasbah by comparison has a larger seed and has established well. Its use in the vineyard is new to South Australia, so it will be viewed with interest to see how it fits within the environment.

These results were evident at the Viticulture Innovation Day held in October 2015. Participants of the workshop were taken on a tour of the Pecador trial site by Chris Penfold.



Figure 5. Participants at the October 2015 Viticulture Innovation Day

Irrigation Annual Report Forms Data Summary and Comment

Irrigation Annual Report forms (IARs) were mailed to 124 irrigators. 115 irrigators who returned their completed forms on time have achieved "Accredited Irrigator" status and have been awarded Accreditation Certificates. Online submission was again very popular and very successful. Eight irrigators did not respond/ provide data and did not achieve accreditation. The data from 116 irrigators (93.5 %) has been collated and that data is presented in the following graphs and tables. Comments are included with each chart or table.

Flooding: Flooding by diversion or pumping was reported by two irrigators. One flooding event in July and one in August 2015. Only 32 hectares was recorded as being flooded this year, significantly less than previous years including the 150 Ha flooded in 2011-12.

Revegetation: The total area of revegetation reported in the Irrigation Annual Reports is around 1,890 ha. This includes 40 hectares revegetated during the Biodiversity Landcare Projects.

Red Gum Health: 109 Irrigators reported on the health of the red gums on their properties. Health, or otherwise, was rated from 0 to 5, 5 being healthy and 0 being dead. Red gums were generally noted to be once again in relatively good health. 26 irrigators reported that their red gums were all 100% healthy, while most of the remainder listed the majority of their trees to be in relatively good health. Unfortunately 3 Irrigators listed their red gums as getting worse with the majority of plants sub-optimal to stressed due to lack of rain and flooding.

Water Leasing: Table 1 below shows the amount of water leased in 2015-16 compared with water leased in previous years. Overall, less water was leased by irrigators this year than last. The amount of River Murray water leased out to Outside Irrigators decreased by over 1,113ML and the amount leased in from irrigators outside of the Angas Bremer Irrigation Management Zone increased by 833ML. The volume of River Murray water leased to other irrigators within the Angas Bremer Irrigation Management Zone is much lower than last year. For the last four years no reports of leased groundwater within the zone were received. Irrigators still seem to be preferentially irrigating with, and leasing, the available River Murray water.

Table 1: Water Leasing

Type of Lease	Megalitres 2012-2013	Megalitres 2013-2014	Megalitres 2014-2015	Megalitres 2015-2016
RM water leased from ABIMZ to outside ABIMZ	1,070.00	2,329.00	3,394.20	2,280.50
RM water leased from outside ABIMZ to inside ABIMZ	1,563.20	2,510.00	4,190.90	5,023.90
RM water leased from inside ABIMZ to inside ABIMZ	431.47	651.87	329	192
Groundwater leased from AB licence to AB licence	0	0	0	0

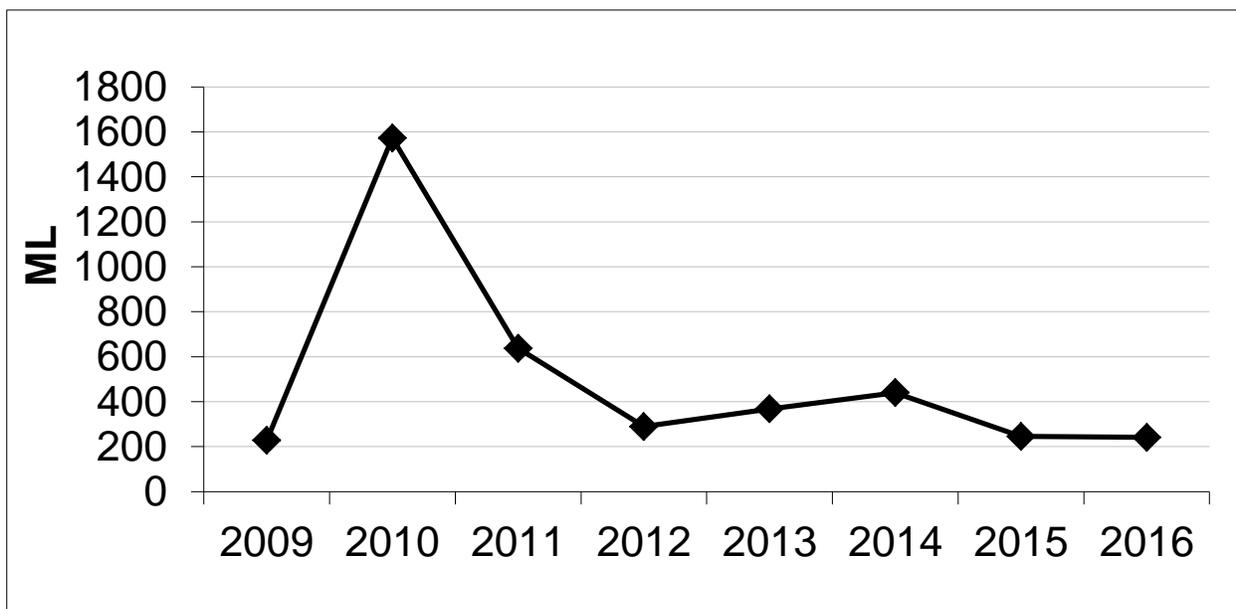


Figure 6: Angas and Bremer Rivers Water Extractions 2009-2016: Not all of the water taken from these rivers, such as the water diverted through weirs and sluices, is accounted for in this chart. The volumes on this graph are metered volumes from irrigators with meters installed, as well as the amount recharged into the aquifer from these rivers, as reported on the Irrigation Annual Reports. The amount of water that was recorded as having been extracted from these rivers is similar to last year but is very low compared with the extraction levels recorded in 2010.

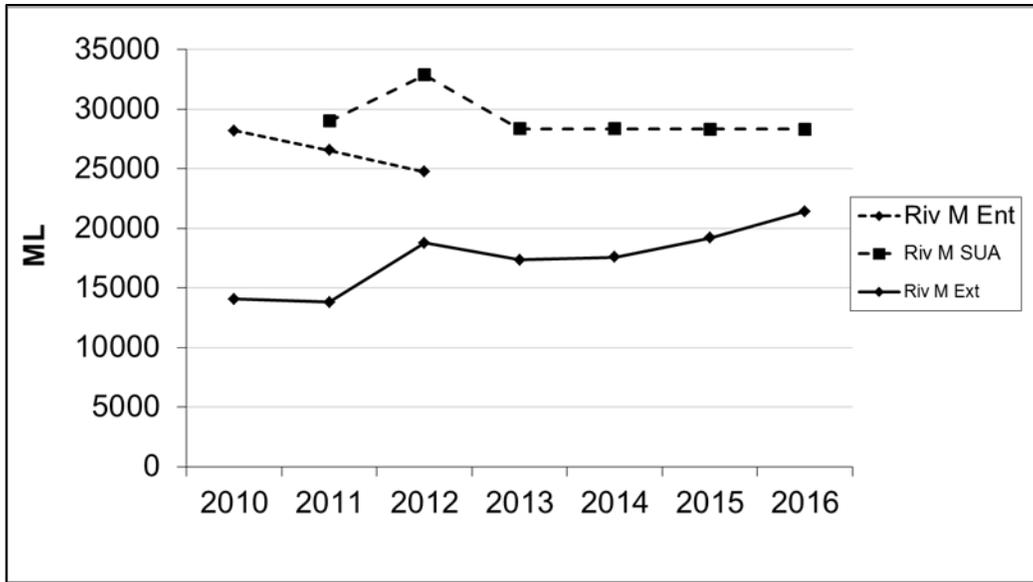


Figure 7: River Murray Water Entitlement, Site Use Approval and Extraction 2009-2016: Entitlement (RivM Ent) is the volume of water endorsed on licenses and does not include any credits for rollover, recharge etc. The River Murray Site Use Approval (RivM SUA) is the maximum quantity of River Murray water that can be used for irrigation on land identified as being in the Angas Bremer Irrigation Management Zone in 2015-2016. Extraction (RivM Ext) is the volume of water that was used during the irrigation year. As Site Use Approval volumes give a more accurate description of the amount of water that could potentially be used in the region, it is now being recorded on the charts instead of the Entitlement volume. The total Site Use Approval volume for 2015-16 remained at 28,382 ML, and the recorded use was 21,434.35 ML, slightly higher than the 19,200.86 ML used last year.

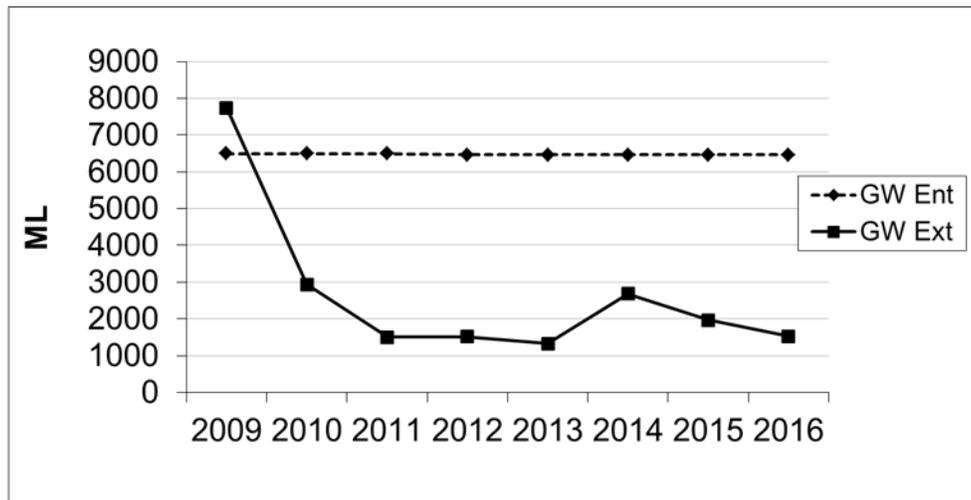


Figure 8: Groundwater Entitlement and Extraction 2009-2016: The maximum entitlement for 2015-16 was 6,500ML and the recorded use was 1,529.93 ML less than the volume of 1963.1 ML used in the previous year. This is much lower than the 7,700 ML used during the “Millennium Drought”.

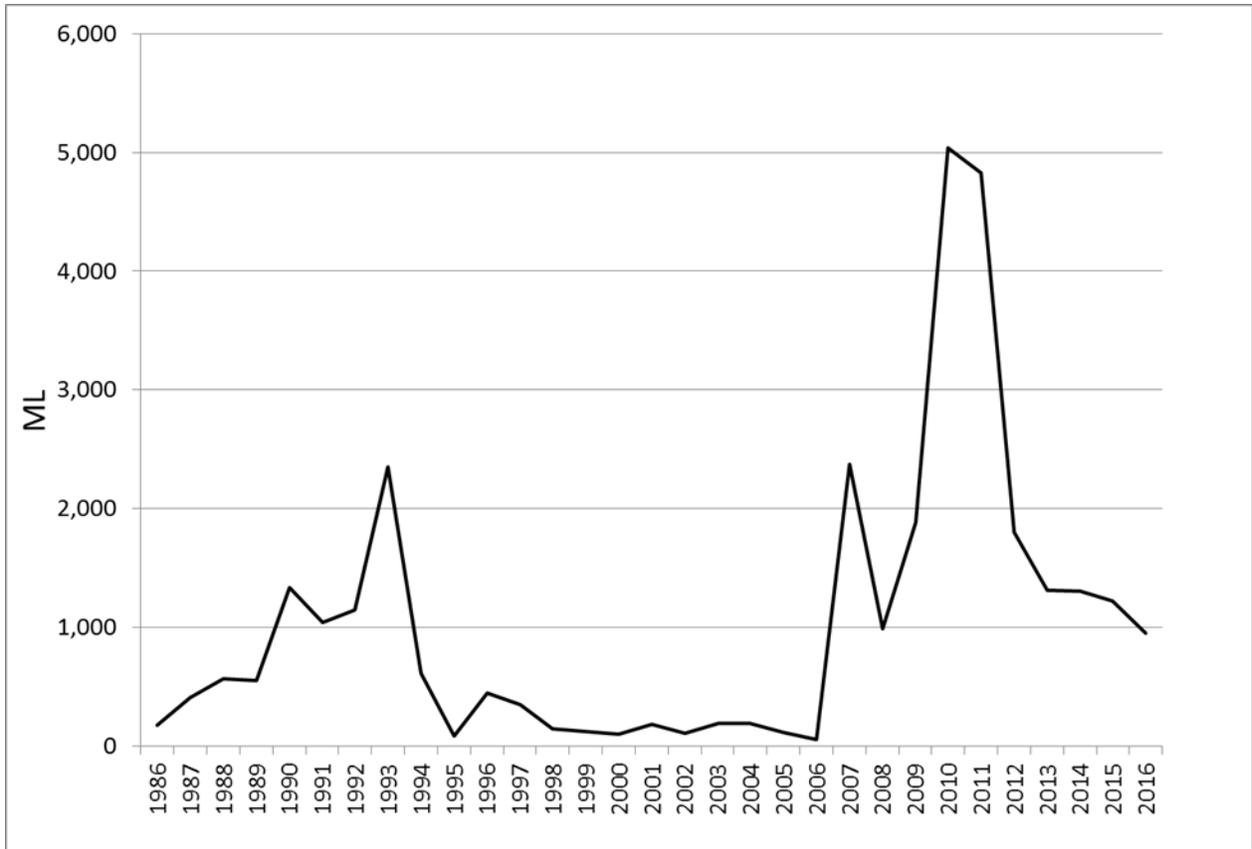


Figure 9: Managed Aquifer Recharge (formally termed Aquifer Storage and Recovery (ASR)) : This chart shows the total volume of water artificially recharged to the aquifer from 1986 to 2016. The **948 ML** recharged from the Angas, Bremer and Murray rivers in 2015-2016 was slightly lower than last year's volume, and still substantially lower than the record levels achieved in 2010.

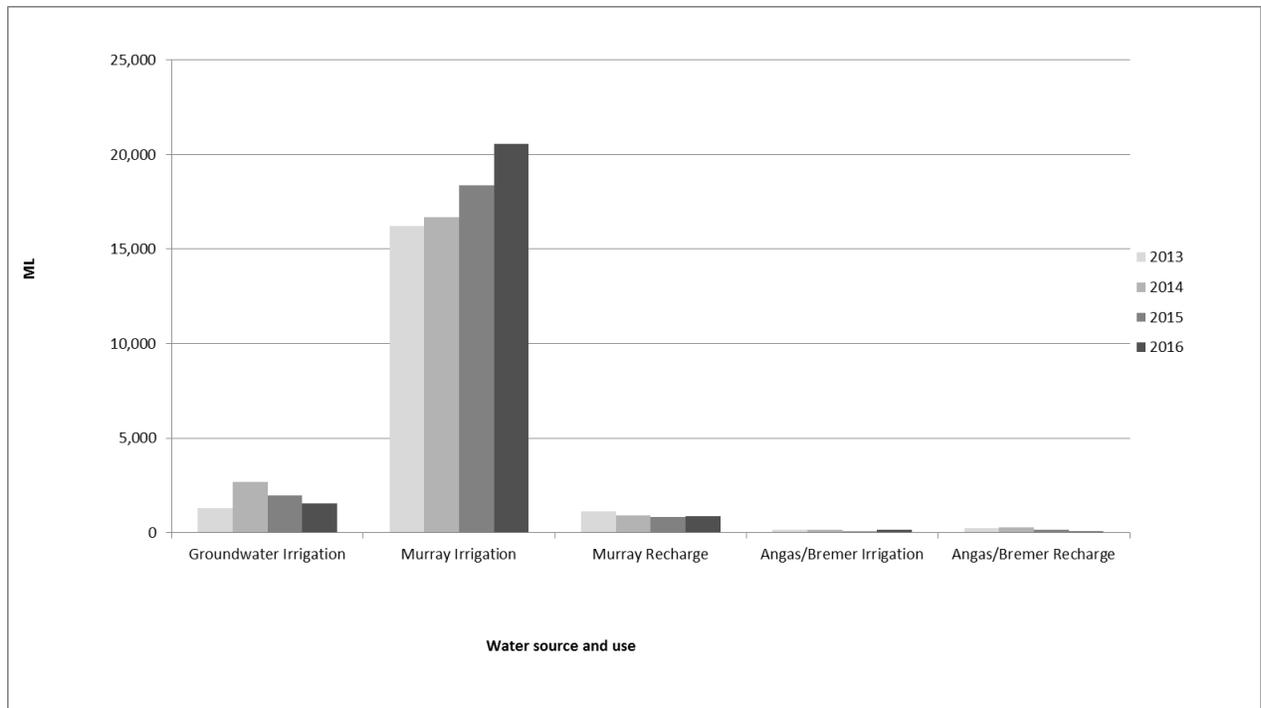


Figure 10: Total volume of water used 2015-2016: The total volume of water extracted from all sources within the region over the 2015-16 year was **23,205 ML**, which is higher than the previous two years, 2014-15 = 21,409 ML and 2013-14 = 20,723 ML.

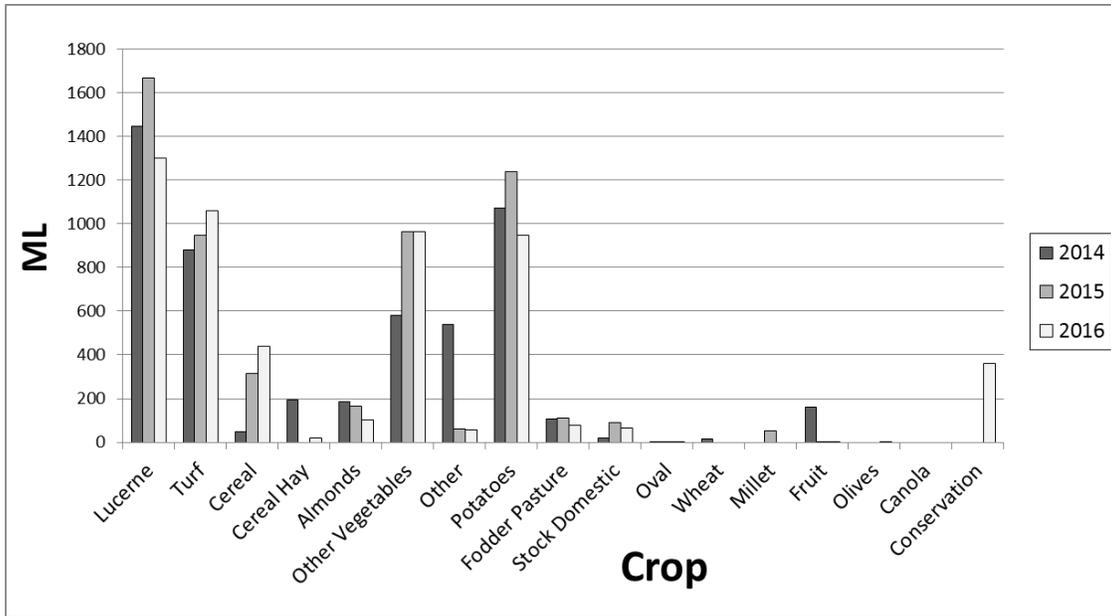


Figure 11: Total volume of water used for each crop type: This volume is the total used from all sources; groundwater, Angas/Bremer water and River Murray water that was applied to each crop type (grapes excluded). **The total volume of water applied to grapes was 15,961 ML in 2015-16 almost identical to 15,972 ML in 2014-15, and more than 13,230 ML in 2013-14.** The volume of water used on some other crops has varied from previous years in line with the number of irrigators per crop.

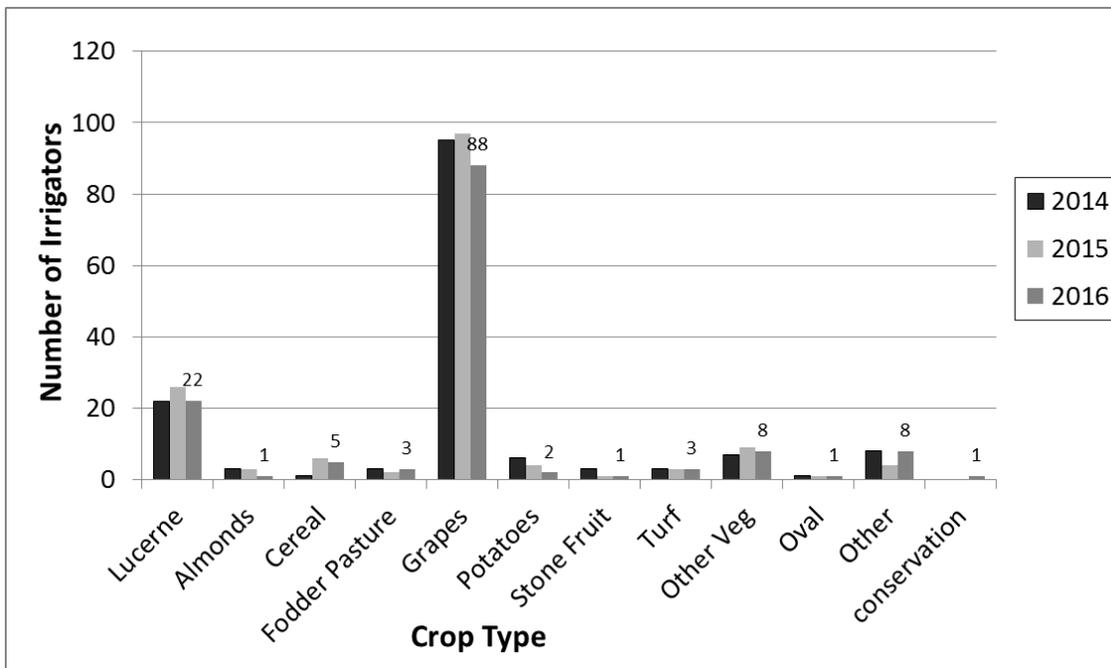


Figure 12: Number of Irrigators for Each Crop Type: The number of irrigators growing each crop type in the region appears to have remained relatively stable except for Lucerne and Grapes which have decreased and the Other category increasing from four to nine this year.

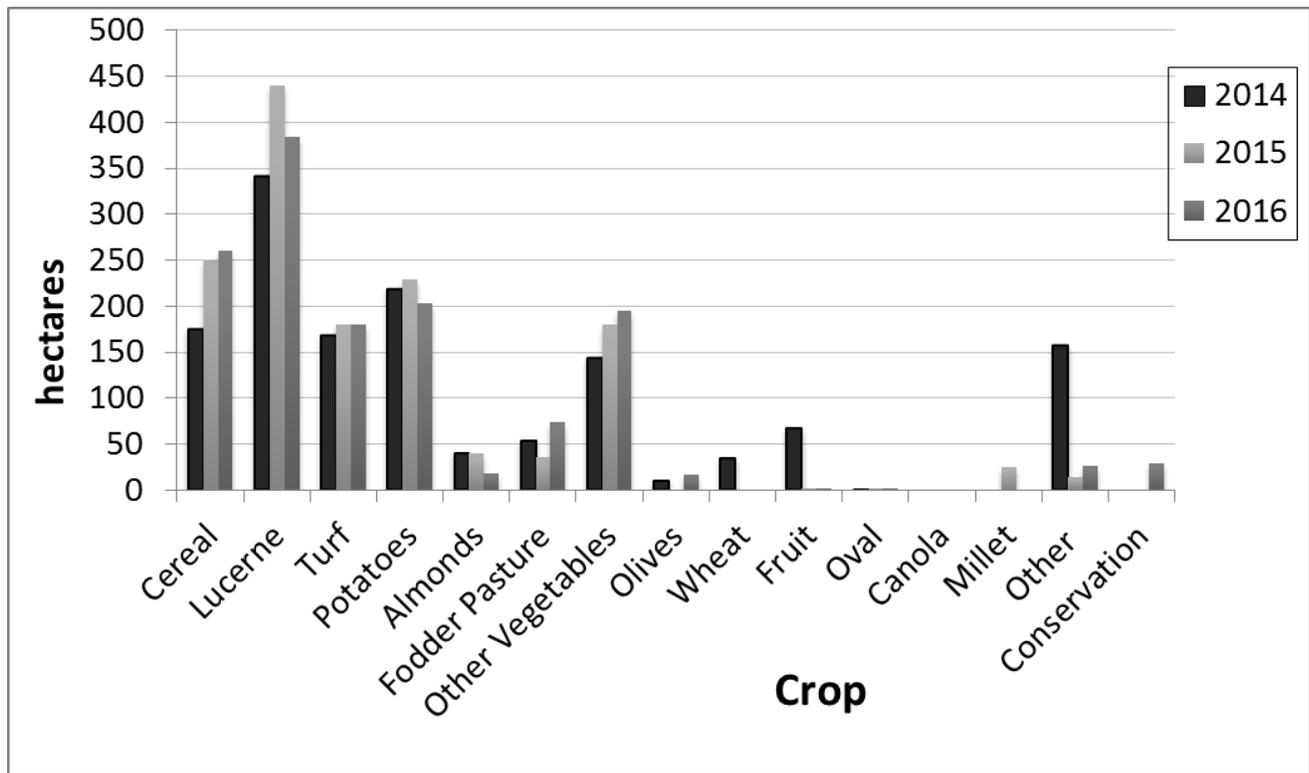


Figure 13: Area Irrigated by Crop Type: The area of each crop irrigated is shown in hectares. **The area of grapes irrigated in 2015-16 was 5,658 ha, a decrease compared with the 5,954 Ha recorded in 2014-15.** The total area under irrigation in 2015-16 was 7,043 ha, which is lower than last year's total of 7,380 ha.

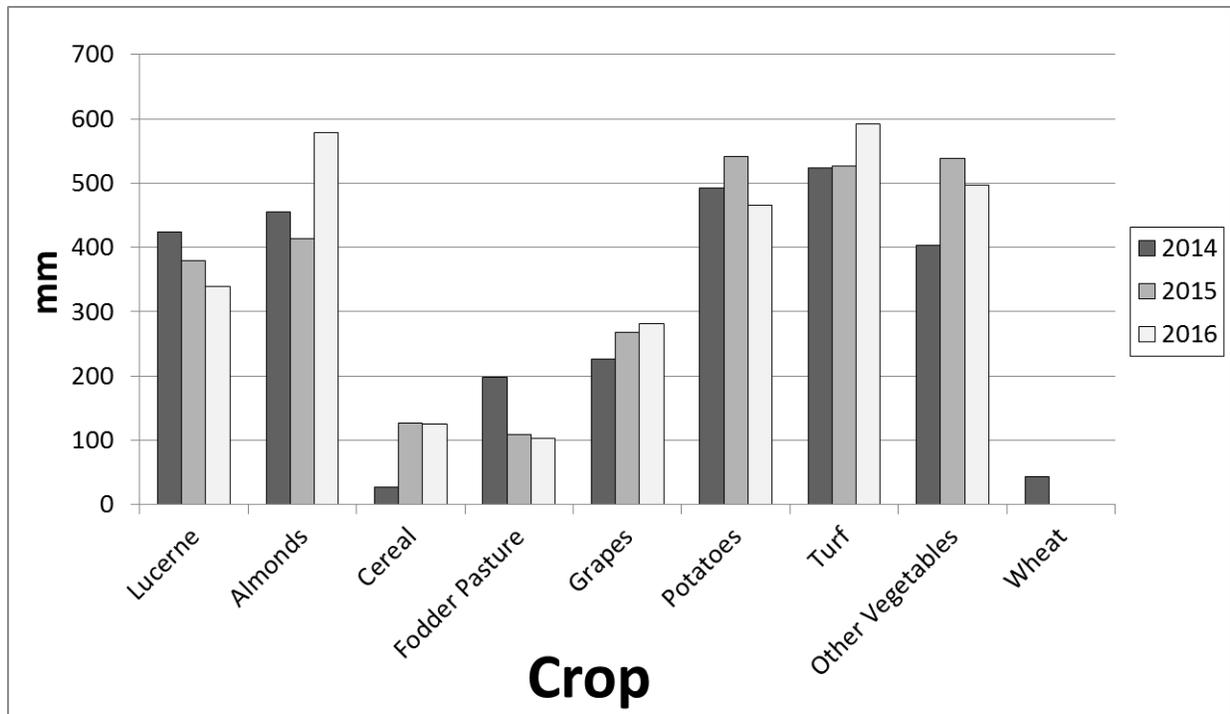


Figure 14: Average total irrigation for the year by crop type: Irrigation is shown in mm for 2013-14, 2014-15 and 2015-16.

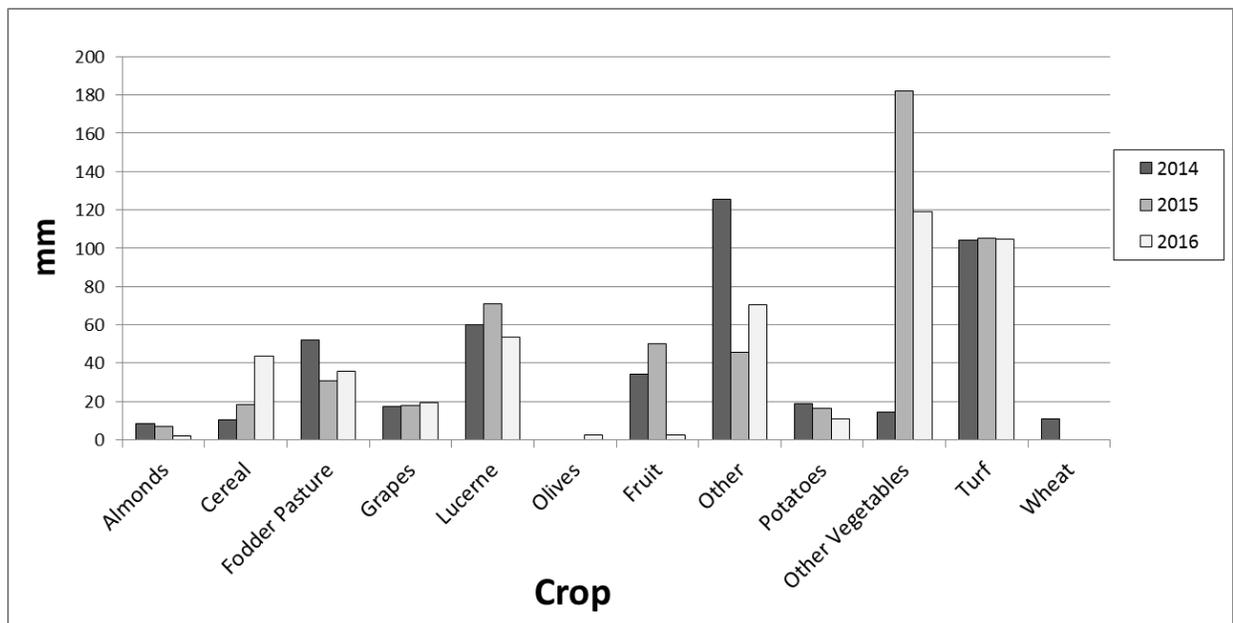
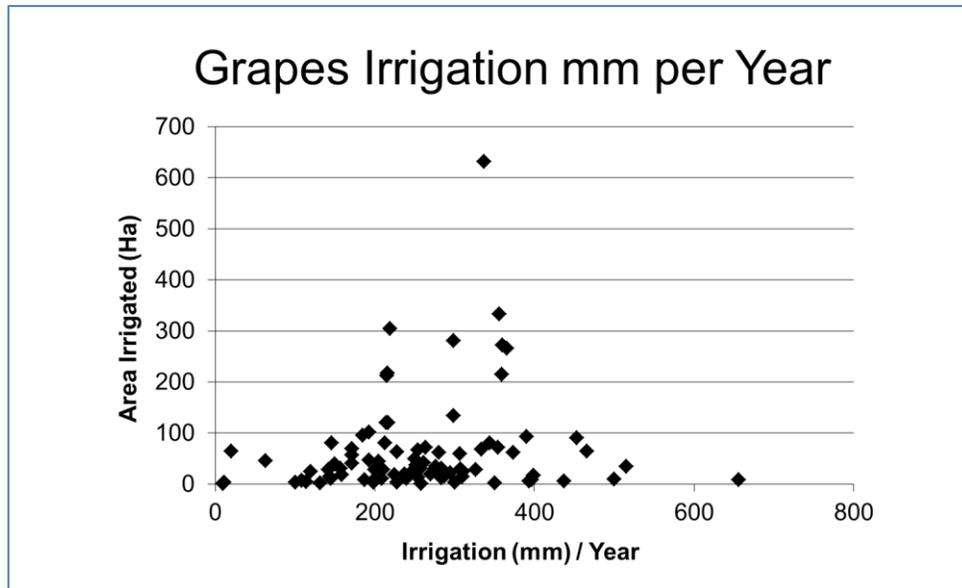
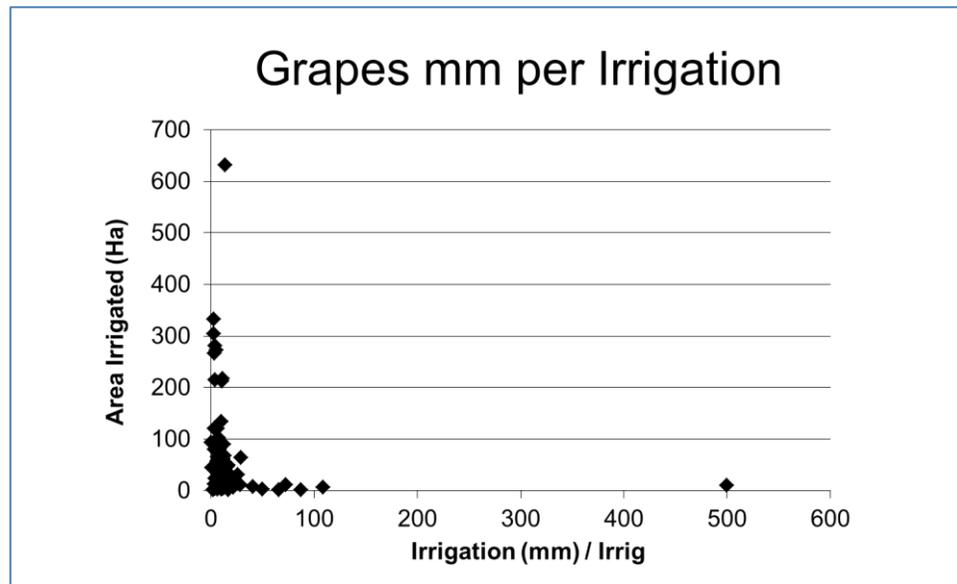


Figure 15: Average mm of water applied per irrigation for each crop type for the last three years.

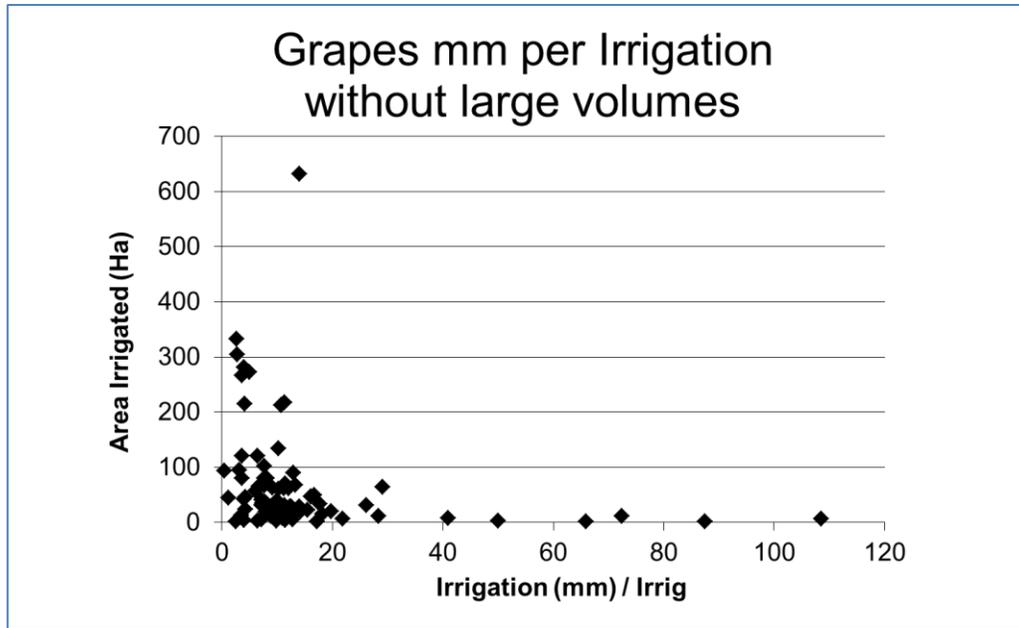
Figures 16-19: These charts are for the more common crops. **For each crop one chart shows (a) the mm per year and (b) the mm per irrigation.** For grapes, an additional chart (16c) has been included. It excludes those irrigators who applied a large volume of water in a single irrigation or flood event.



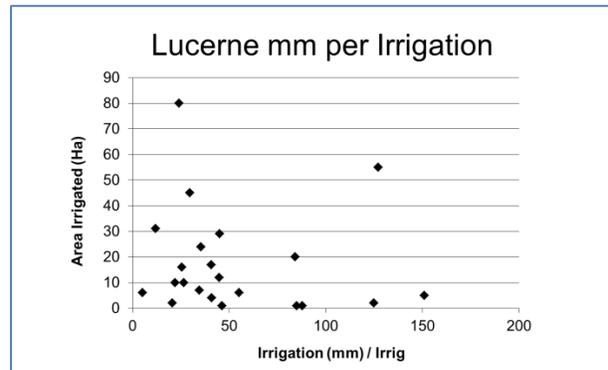
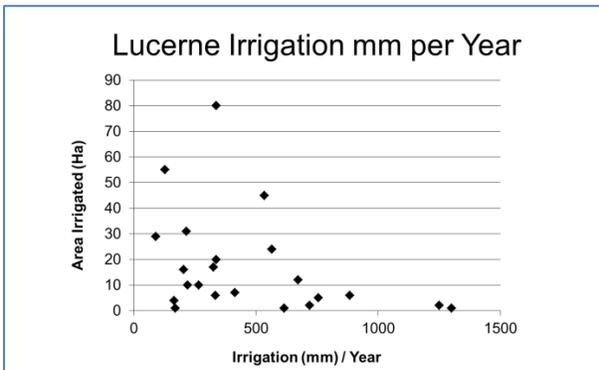
16a)



16b)

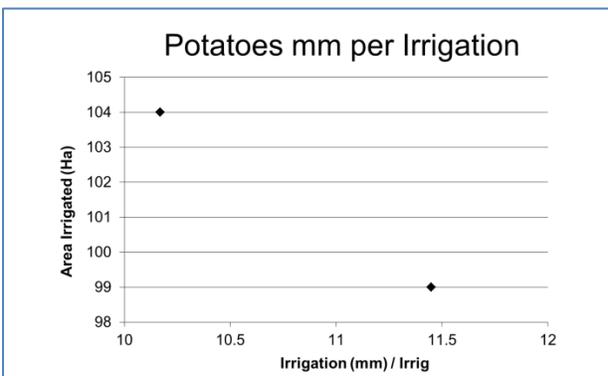
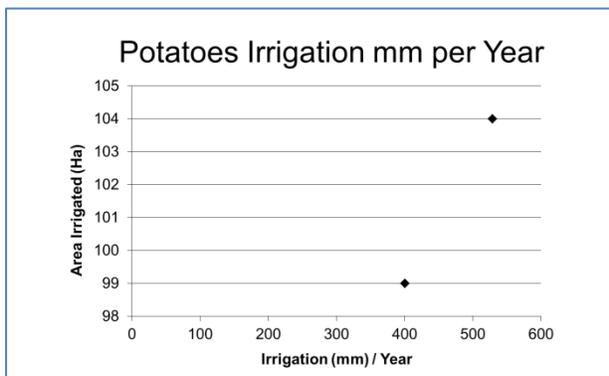


16c)



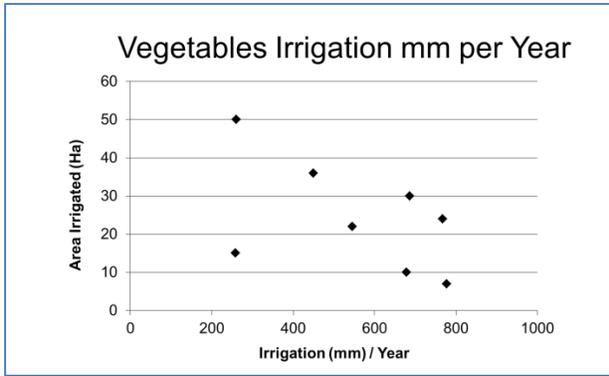
17(a)

17(b)

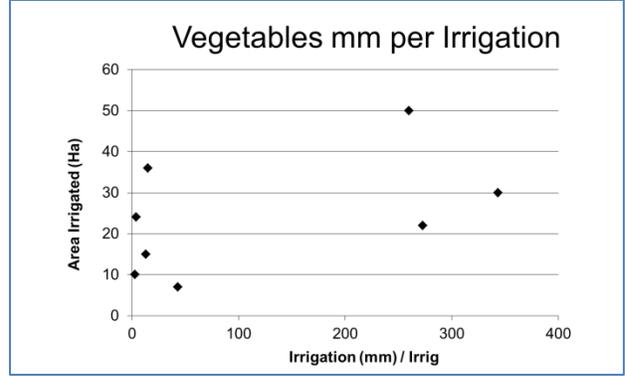


18(a)

18(b)



19(a)



19(b)

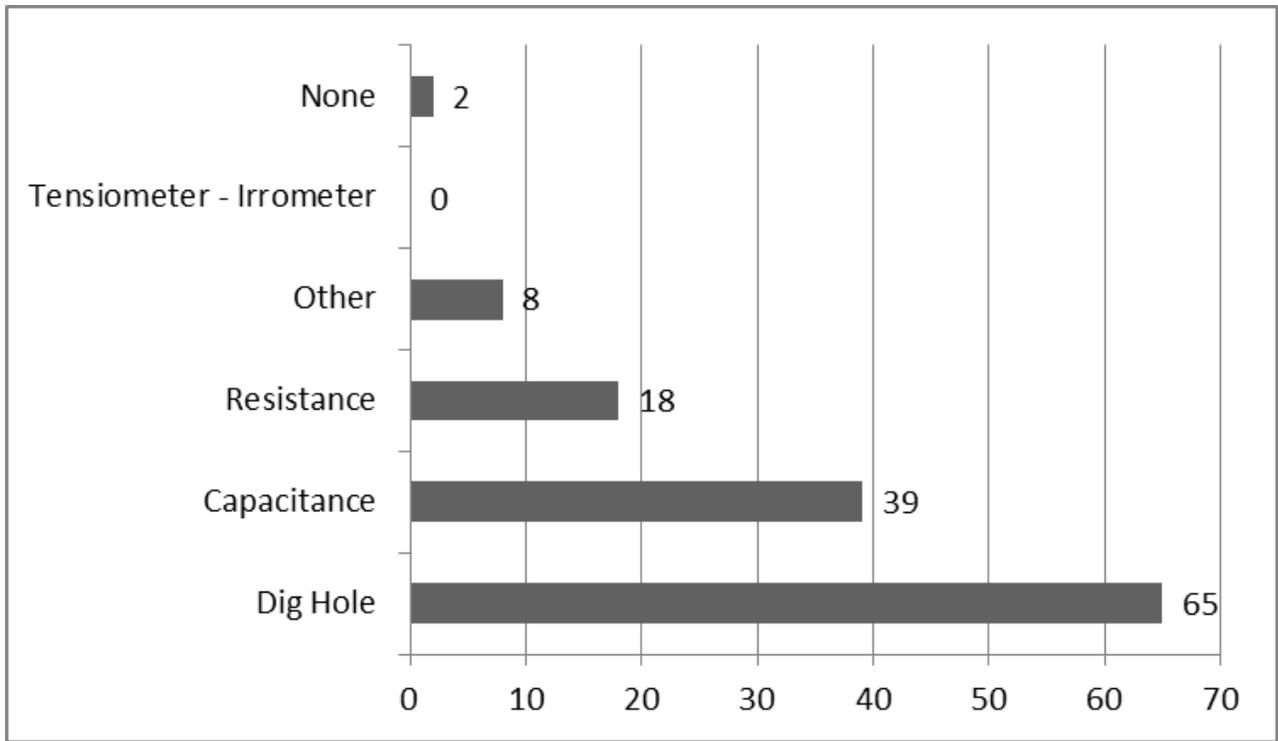


Figure 20: Number of growers using Soil Moisture Monitoring devices in 2015-16: “Resistance” includes Gypsum Blocks. “Capacitance” includes Agwise soil moisture probes, Agrilink C probe, Dataflow Gopher, Sentek Diviner and Sentek EnviroSCAN. “Dig hole” includes Dig stick, spade, auger and post hole digger.

Table 2: Average ML/Ha per crop per year: This table shows the average ML/Ha of irrigation water applied to different crop types and compares 2016 with previous years. This information is also displayed in the following Figure 21.

Year	Grape	Lucerne	Vegetable	Potato	Fodder	Almond	All Crops
2015-2016	2.82	3.38	4.96	4.66	1.02	5.79	2.99
2014-2015	2.68	3.8	5.39	5.41	3.03	4.15	3.13
2013-2014	2.26	4.24	4.02	4.92	1.98	4.56	2.51
2012-2013	2.62	4.53	6.35	4.01	1.58	3.91	2.62
2011-2012	2.25	4.52	7.76	4.13	1.22	4.37	2.55
2010-2011	1.9	2.2	2.4	3.1	0.5	3.4	2
2009-2010	2.3	4.32	3.6	3.72	1.2	5.11	2.47
2008-2009	1.73	2.99	4.38	1.74	1.24	1.04	1.78
2007-2008	1.97	4.36	7.8	2.51	2.36	5.24	2.07
2006-2007	2.04	5.13	6.43	4.12	1.7	5.23	3.67
2005-2006	1.8	4.23	5.04	2.99	1	4.06	2.95
2004-2005	1.99	5.22	5.18	3.67	2.74	4.79	2.25
2003-2004	1.97	4.5	8.8	3.5	2.7	4.2	2.28
2002-2003	2.2	6.8	6	3.8	4.3	4	2.61
2001-2002	2.1	4.4	5.1	4	3.3	4.5	2.5
2000-2001	2.1	4.8	5.7	3.6	4.7	3.1	2.6
1999-2000	2.1	6	6.3	3.7	3.7	2.8	2.6
1998-1999	2.2	5.1	4.5		3.8	2	2.7

Average ML/Ha used for each crop type

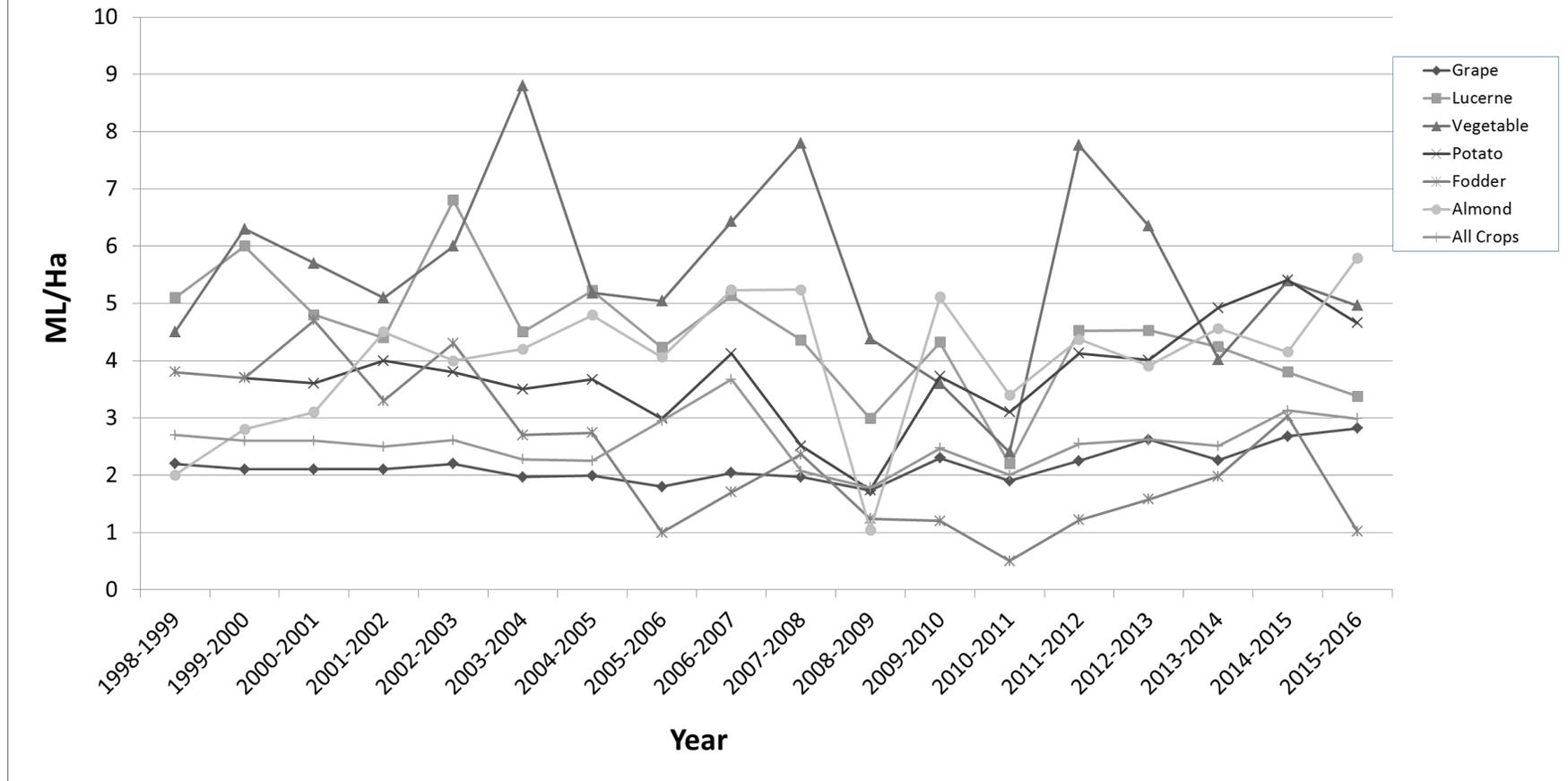


Figure 21: Average ML / Ha used for each crop type

Table 3: ML used and Ha irrigated comparison chart:

	2015-2016	2014-2015	2013-2014	2012-2013	2011-2012	2010-2011	2009-2010	2008-2009	2007-2008	2006-07	2005-06	2004-05	2003-04	2002-03	2001-02	2000-01	1999-2000
Total ML	20,932	20,408	18,605	18,617	17,056	13,346	16,241	12,001	14,743	20,911	15,811	17,719	17,154	20,715	17,428	17,467	16,961
Total ha	7,011	7,380	7,406	7,107	6,687	6,687	6,578	6,748	7,049	8,370	7,739	7,869	7,509	7,934	7,089	6,788	6,625
Grape ML	15,961	15,972	13,230	13,129	11,990	11,275	13,718	10,738	12,330	12,827	11,293	11,688	11,927	13,165	11,159	10,626	10,021
Grape ha	5,658	5,954	5,850	5,641	5,323	5,965	5,971	6,199	6,245	6,271	6,170	5,876	6,059	6,059	5,357	4,991	4,665
Lucerne ML	1,300	1,668	1,446	1,820	1,477	376	657	326	675	1,437	1,378	1,791	1,608	2,560	2,051	2,040	2,491
Lucerne ha	384	439	341	402	327	170	152	109	155	280	325	343	354	376	471	429	418
Veg ML	963	964	580	610	877	193	36	57	179	373	363	638	605	647	651	769	761
Veg ha	194	179	144	96	113	81	10	13	23	58	72	123	69	108	103	134	121
Potato ML	947	1,238	1,073	1,232	1,283	555	320	131	136	1,200	1,171	1,278	1,280	1,504	1,719	1,773	1,812
Potato ha	203	229	218	307	311	179	86	75	54	291	392	348	360	394	425	490	485
Fodder ML	76	109	107	90	78	22	47	32	53	222	144	505	399	752	316	742	358
Fodder ha	74	36	54	57	64	43	39	26	23	130	144	184	146	173	97	157	96
Almond ML	104	166	187	180	188	148	225	193	231	251	195	230	203	188	246	172	164
Almond ha	18	40	41	46	43	43	44	44	44	48	48	48	48	47	55	55	58
Other crops ML	1,581	2,069	1,935	1,556	1,094	777	1,238	524	795	2,004	900	1,589	1,132	1,899	1,286	1,259	1,354
Other crops ha	480	503	573	558.5	501	206	276	282	505	906	588	936	443	777	583	533	777

Charts of Standing Water Level and Salinity in Unconfined and Confined Aquifers

Figures (s) 22 a + b (Pg. 21-22): These and the following charts were produced by the Department of Environment, Water and Natural Resources. These first two charts are contour maps of the Quaternary (Q) unconfined aquifer. The first **a)** is from the 2015-16 water use year (June 2016), the second **b)** from 2014-2015 (June 2015). The data for each map came from the State Government's Angas Bremer groundwater observation network. This data is available to the public on the Groundwater Data application of the WaterConnect website (www.waterconnect.sa.gov.au). The numbers on the maps are metres below ground level of the standing water table. Winter was selected as it is the time of greatest risk of shallow watertables. When compared with last year the picture suggests the water level is consistently deeper by almost 1m in the Angas Bremer Prescribed Wells Area.

Figure 23a + b (Pg. 23-24): The next 2 charts show the potentiometric surface elevation contours of the Tertiary (T) confined aquifer in **a)** April 2016 and **b)** March 2015, using data from the State Government's Angas Bremer groundwater observation network only. The April data (post irrigation season) was selected as it shows the greatest level of impact due to extraction from the aquifer. The water level in 2016 compared to 2015 is deeper over the whole Angas Bremer Prescribed Wells Area with a greater change in the northern section decreasing as you head towards the lake.

Figure 24 a, b + c (Pg. 25-27): These charts display the salinity of the confined aquifer using **a)** data collected in April 2016 from the State Government's Angas Bremer groundwater observation network as well as the samples supplied by the irrigators to the NRM Board and **b + c)** groundwater observation network and irrigator's samples from October 2015 and October 2014. The salinity is displayed in mg/litre (equivalent to ppm). When April 2016 data is compared to data from the previous October, there appears to be more fresh water along the rivers in April; however, this is not the case for the upper part of the Bremer with two wells reading higher in the April data (wells FRL004 and STY111). When comparing the October 2015 data to October 2014 the changes are quiet dramatic but it is difficult to compare as there are fewer irrigator samples and observation wells included in the October 2015 chart. The Department has optimised the network to be more targeted and more efficient resulting in less wells being monitored. DEWNR encourages landholders / irrigators to submit their samples twice a year to help provide a good spatial distribution of data.

Ground water data can also be accessed via the WaterConnect website located at www.waterconnect.sa.gov.au. This website will let you view and download groundwater level and salinity data in the Angas Bremer area.

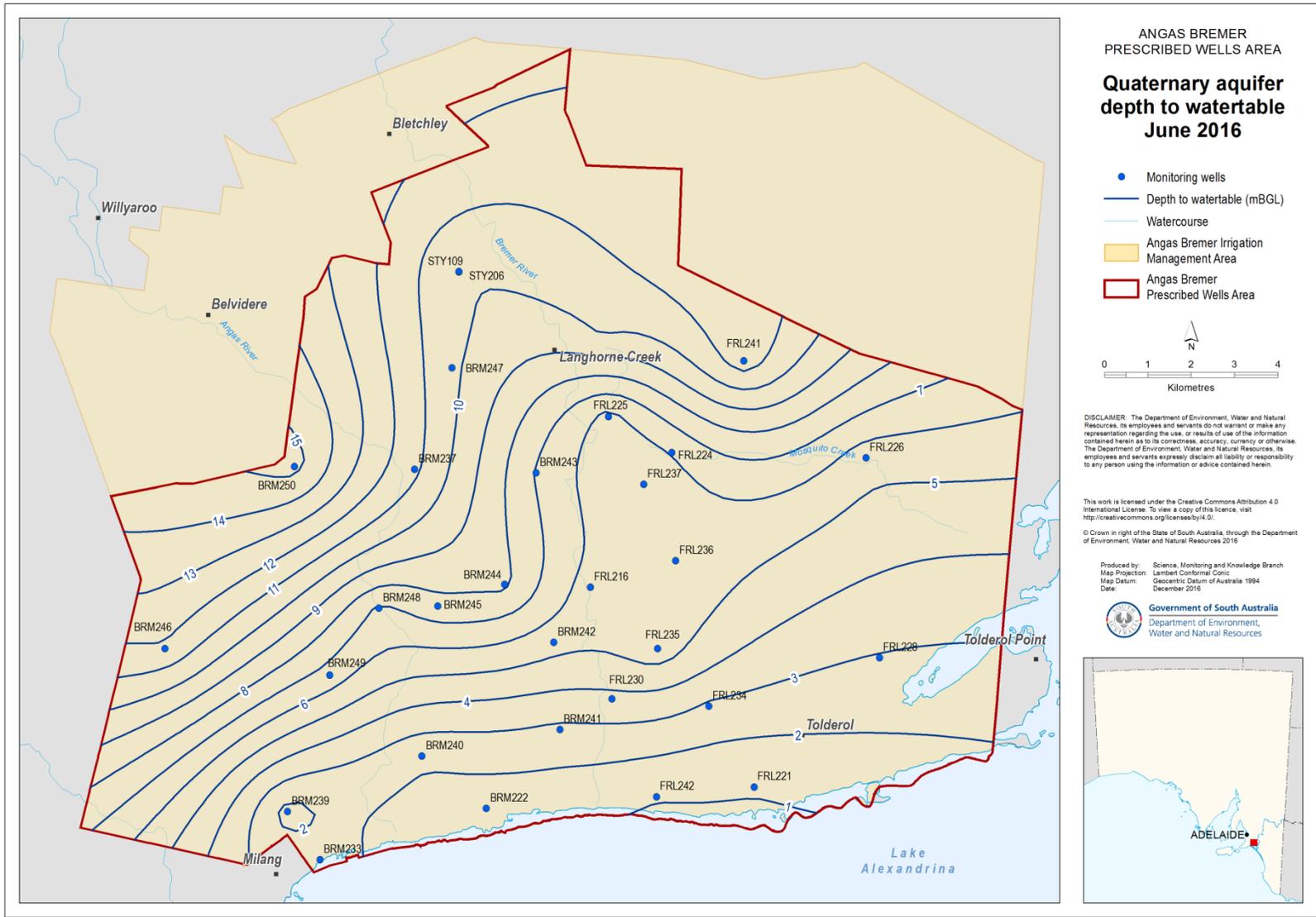


Figure 22a Standing Water Level in Quaternary Unconfined Aquifer June 2016

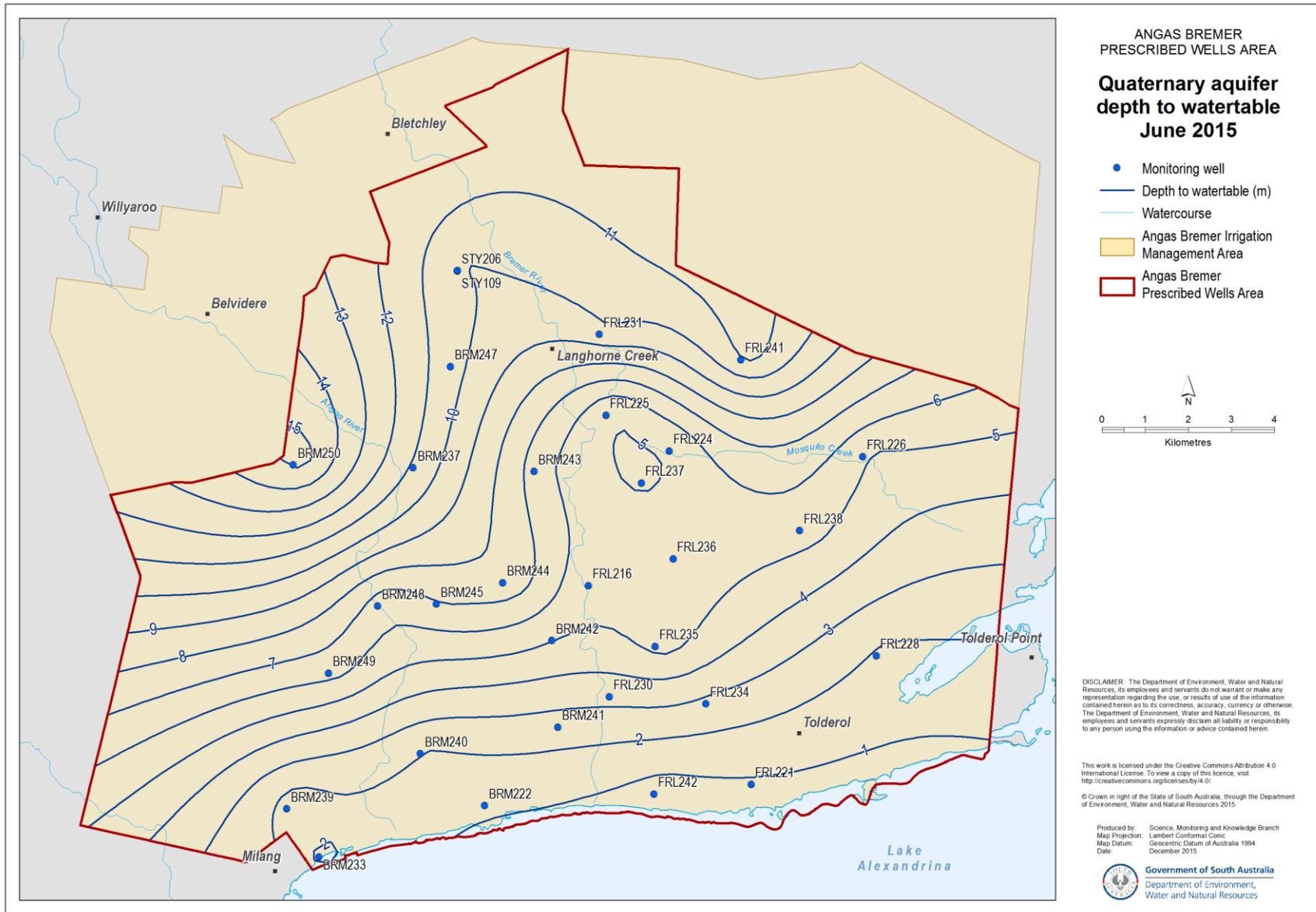


Figure 22b Standing Water Level in Quaternary Unconfined Aquifer June 2015

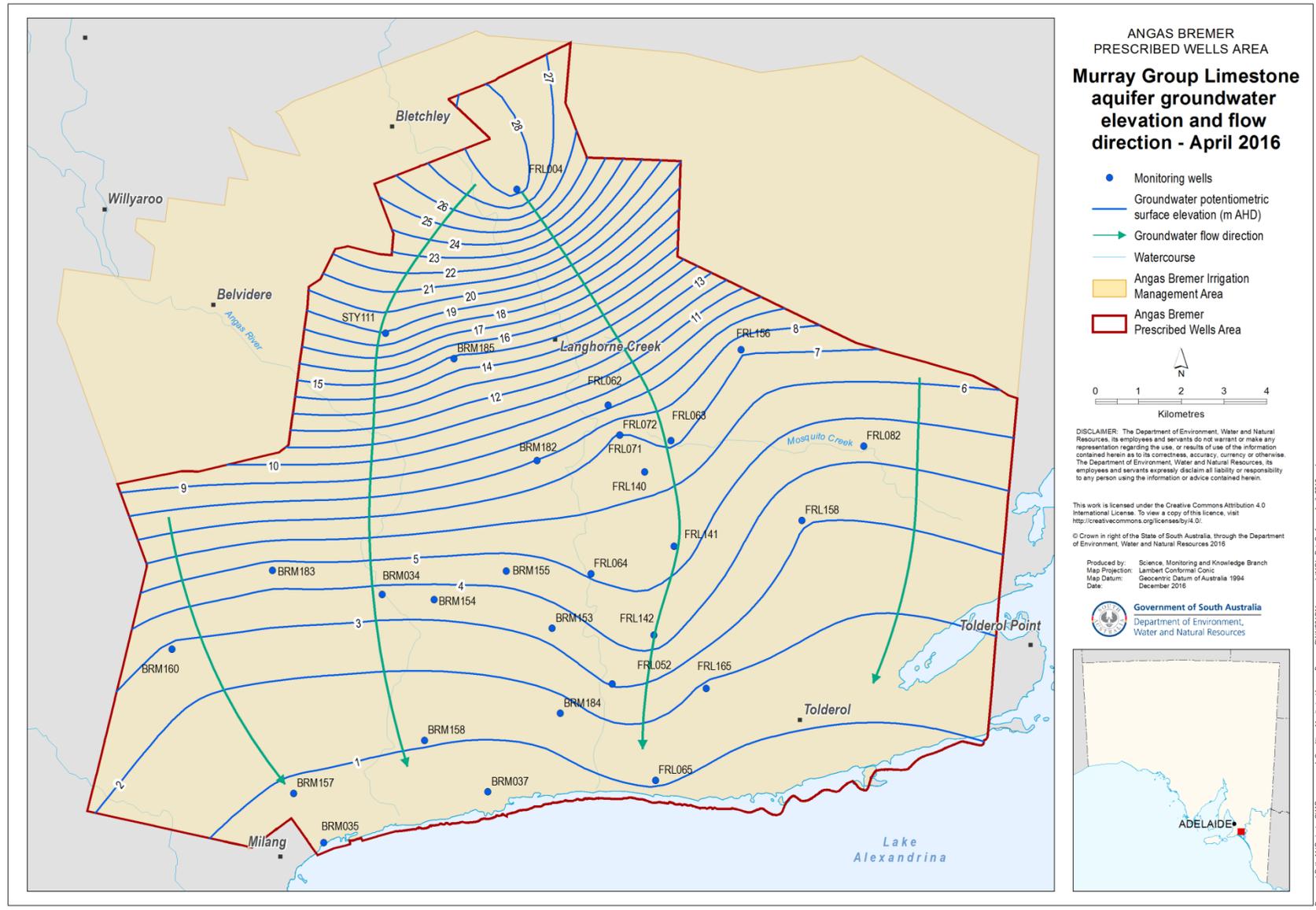


Figure 23a Water Level Elevation (m AHD in Tertiary Confined Aquifer April 2016, Post Irrigation, (Obs. Well data))

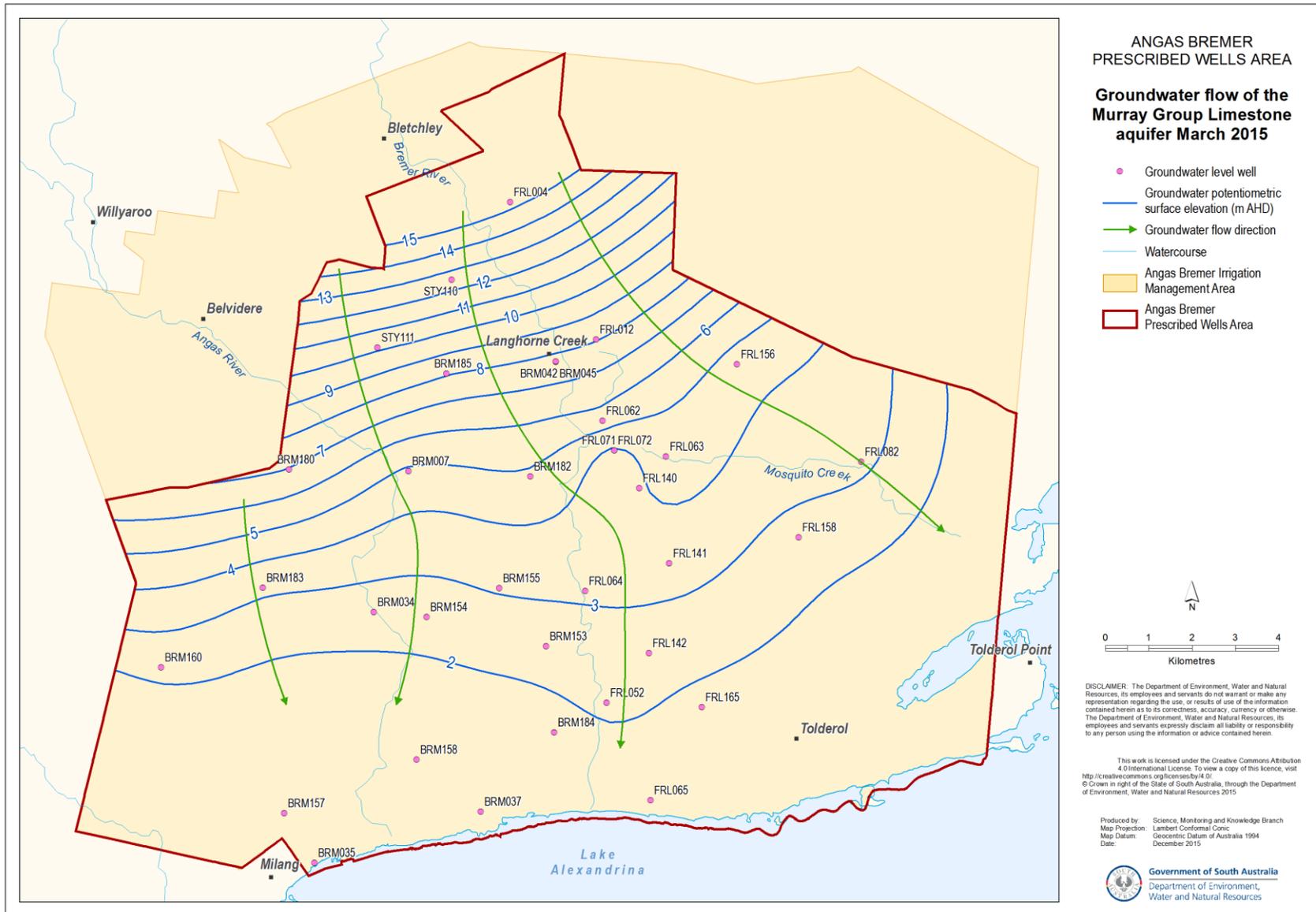


Figure 23b Water Level Elevation (m AHD in Tertiary Confined Aquifer March 2015, Post Irrigation, (Obs. Well data))

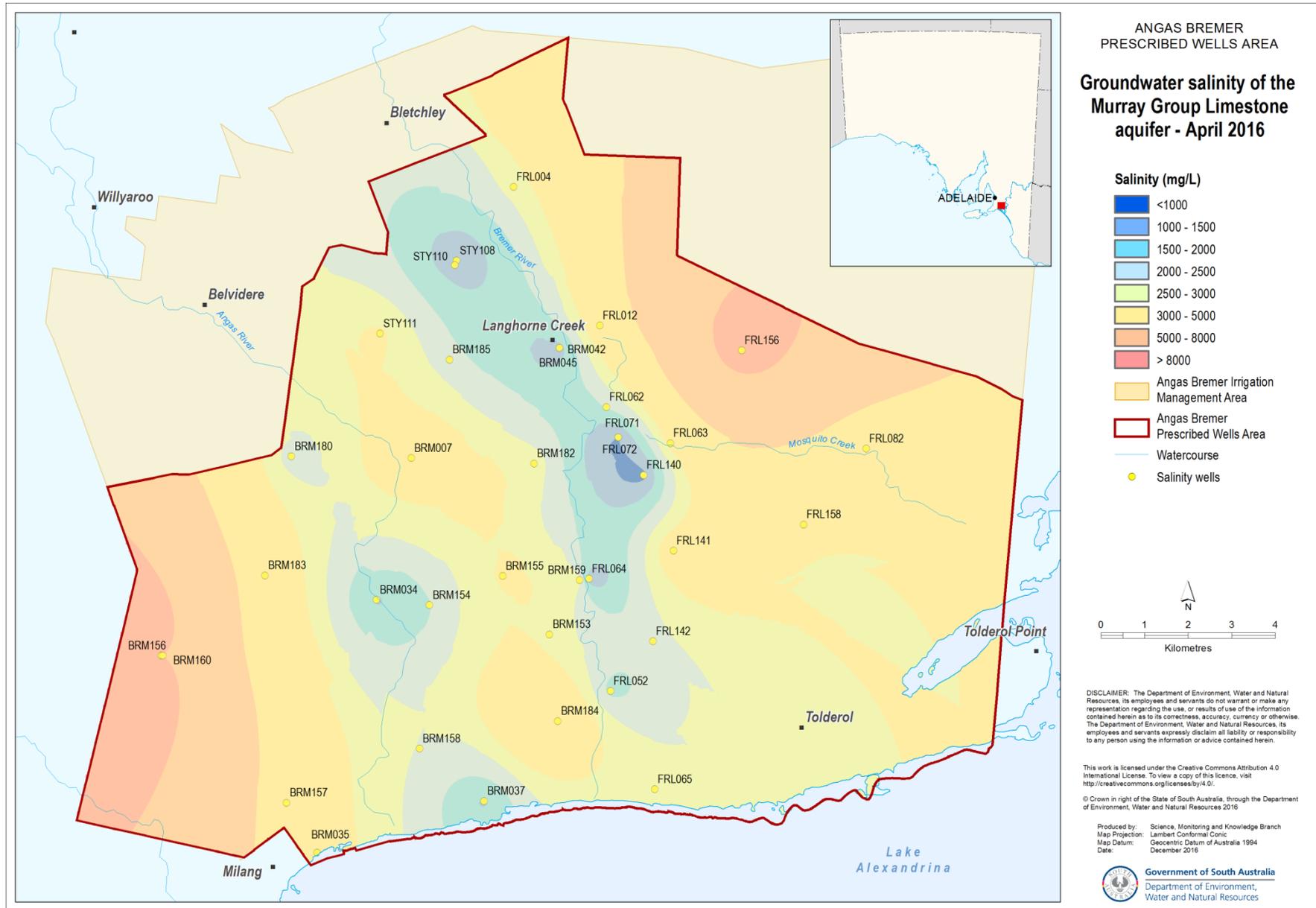


Figure 24a Salinity in Confined Aquifer samples from Government Observation Wells and Irrigators' Water Samples April 2016

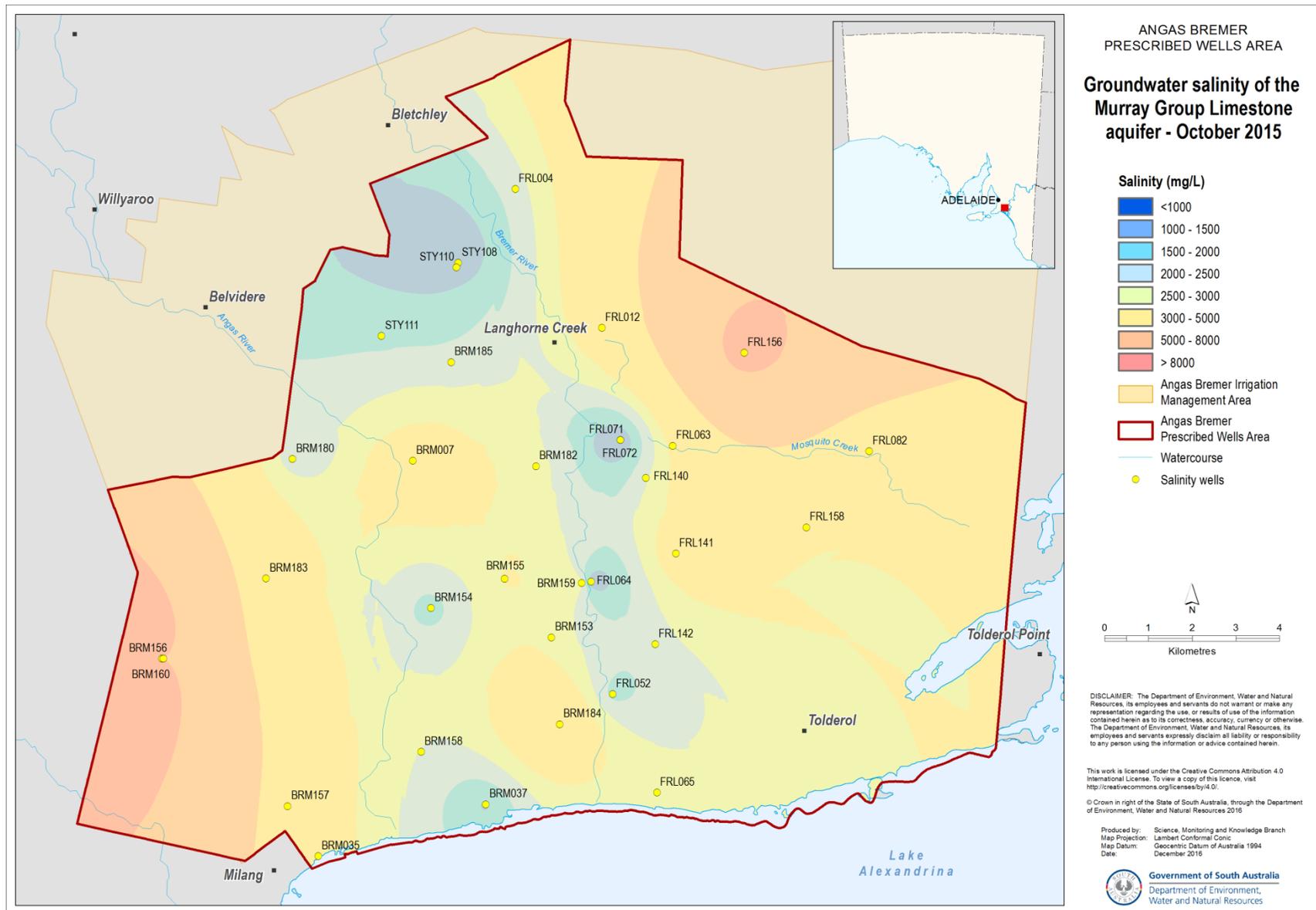


Figure 24b Salinity in Confined Aquifer samples from Government Observation Wells and Irrigators' Water Samples October 2015

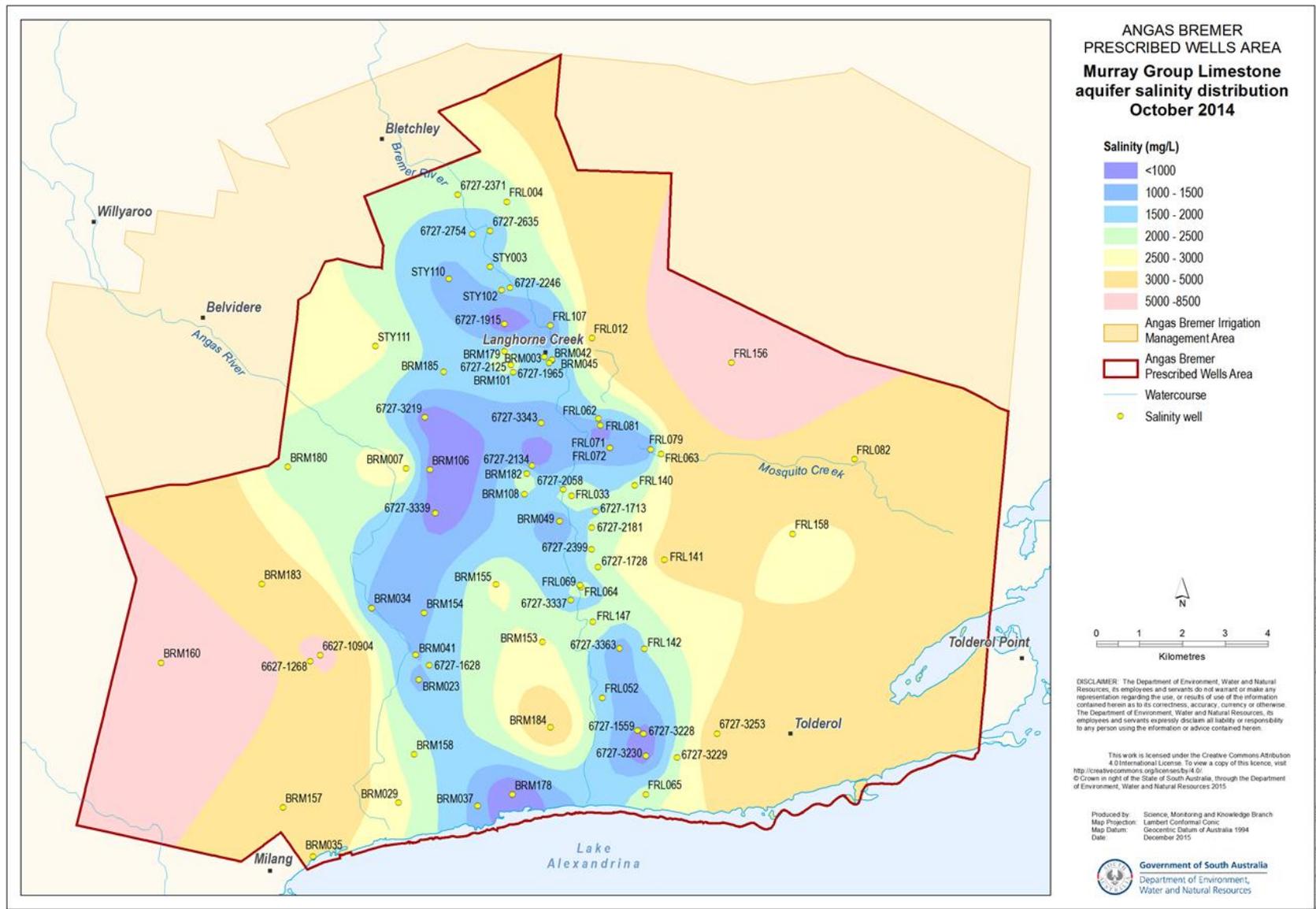


Figure 24c Salinity in Confined Aquifer samples from Government Observation Wells and Irrigators' Water Samples October 2014

Langhorne Creek Weather Station Statistics

Michael Cutting, Natural Resources SA Murray Darling Basin

2015/16 Seasonal Summary

As shown in Figure 25, 266.0mm of **rainfall** was recorded during 2015/16 (July – June) at the Langhorne Creek Central (Lake Breeze) weather station site which was very similar to the 262.6mm that was recorded in the 2014/15 season. Interestingly 306.4mm of rain has already been recorded at Langhorne Creek Central in the first 6 months (July – December inclusive) of the 2016/17 season.

The 2015/16 **evapotranspiration (ET)** figure of 1,262.2mm was a very slight increase on the 2014/15 total of 1,249.2mm however the overall seasonal evaporative deficits (evapotranspiration – rainfall) were very similar at 996.6mm and 986.6mm respectively.

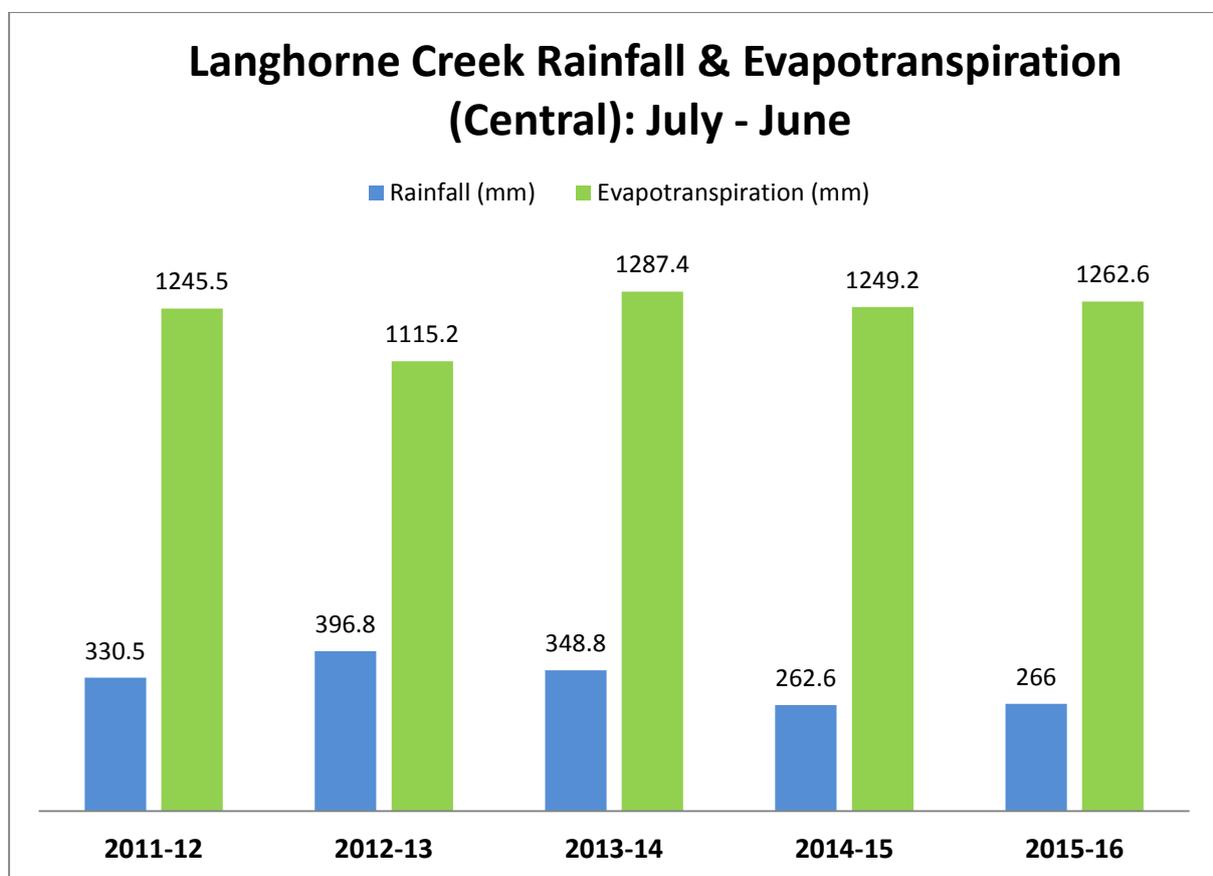


Figure 25: 2015/16 Rainfall and Evapotranspiration – Langhorne Creek

The warmest **daily maximum** for 2015/16 of 41.0C was observed on the 19th December 2015 while the **minimum daily** temperature of -1.7C was recorded on the 20th July 2015.

As was the case in the 2014/15 season the highest **daily evapotranspiration** figure occurred outside of the summer months with the 10.5mm daily maximum recorded on 5th October 2015. Interestingly this was the only day in the 2015/16 season where the daily evapotranspiration figure exceeded 10mm.

Data from the three additional automatic weather stations owned by Langhorne Creek Grape and Wine has now been fully integrated into the SAMDB weather station network and displayed on the website. These stations were installed in mid-October 2015 and therefore a complete 2015/16 data set is not available. The new stations are known as Langhorne Creek North, Langhorne Creek South East and Langhorne Creek West.

For comparison purposes Figure 26 below shows the rainfall recorded at the four Langhorne Creek weather stations for the period November 2015 – June 2016 inclusive. As can be seen across this eight month period the rainfall totals were fairly consistent.

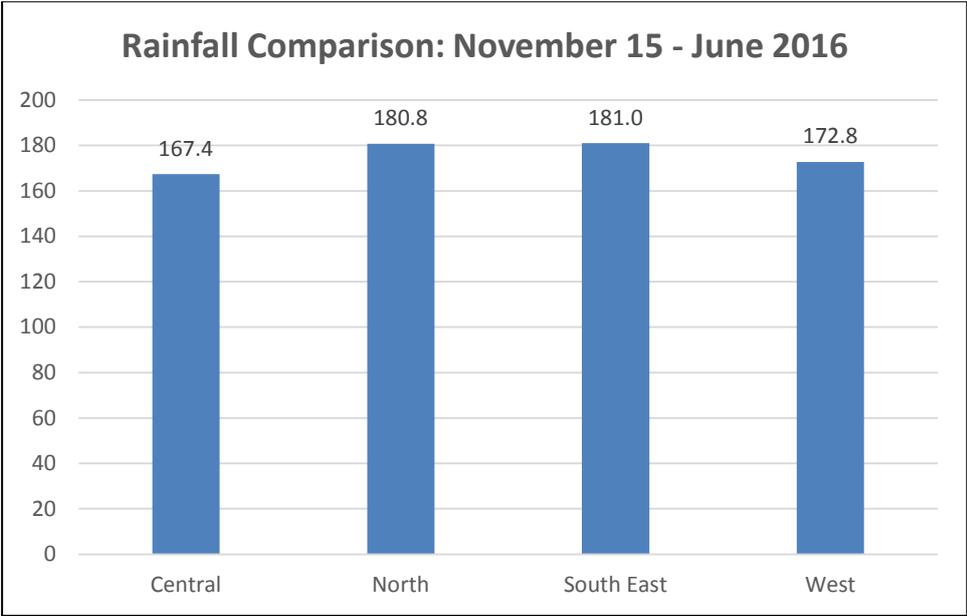


Figure 26: Rainfall Totals within the Langhorne Creek District

Mobile Friendly Weather Station Website:

A mobile friendly website has now been developed which enables local weather station data to be viewed in a format that is optimised for mobile devices. Data views are now also tailored based on the type of activity being undertaken e.g. Irrigation, Spraying as shown in Figure 27 below.

The mobile friendly website address is <http://m.aws.naturalresources.sa.gov.au> however an automatic redirection prompt is in place from the existing desktop version when viewing data from a mobile device.



Irrigation

Rain	
since 12am	2 mm
yesterday	0 mm
last 7 days	0.4 mm

Evapotranspiration		
ASCE	Tall	Short
last 7 days	12	10
yesterday	4.3	3.1

**Langhorne
Creek Central**

Figure 27: Mobile Friendly Data View

The Eighteenth Annual Public Meeting of the Angas Bremer Water Management Committee Incorporated

Monday 29th August, 2016 at 7:00pm
Bowling Clubrooms, Langhorne Creek

Attendees: Nick McDonald, Loene Furler, Ann Scutchings, Miranda Willersdorf, Adrian Pederick MP, Lyz Risby, Brett Ibbotson, Darren Aworth, Leah Hunter, Ken Follett, David Kohl, Mac Cleggett, Dale Wenzel, Barry Potts, Trevor McLean, Geoff Warren, Brett Cleggett, Simon Jacobs, Peter Mettam and Michael Cutting

Apologies: Sharon Starrick, Jarrod Eaton, Michael Clements and Caroline Holloway

1. Opening Address

The meeting was opened at 7:15 by Nick McDonald, Acting Presiding Member. Nick welcomed special guests, Adrian Pederick MP and speakers.

2. Annual Report

The Annual Report was presented by Nick McDonald. Nick thanked Barbara Blaser, who was Secretary of the Angas Bremer Water Management Committee for 28 years. Barbara retired at the end of the financial year and Nick especially acknowledged her commitment to the committee. Nick went on to thank Michael Cutting and Brett Ibbotson from Natural Resources SA Murray-Darling Basin for their attendance throughout the year. He also thanked Caroline Holloway and Leah Hunter from the Goolwa to Wellington Local Action Planning Association for their hard work in their current roles for the committee. Throughout the year the committee worked on the Annual Irrigation Report, Cover Crops Trials, 25th Anniversary Landcare Grant and were successful in securing a grant from the South Australian Murray-Darling Basin Natural Resources Management Board for a tour of securing low flows trial sites.

3. Variable Lakes Project - Peter Mettam – Natural Resources, SAMDB

The Variable Lakes Project aims to develop a public Lower Lakes Water Policy including a Barrage Operating Strategy to address the following issues:

- No formalised, endorsed Policy or Strategy for managing the barrages.
- Limited documented guidance, expert opinion and heavy reliance on operator experience.

The project is to be completed by 30th June 2017. Scope of the project will incorporate areas below Lock 1 and consider environmental, economic and social interests and will be constrained by existing plans and agreements (eg. the Basin Plan and Drought Emergency Framework). There will be opportunities for input from stakeholders including the Angas Bremer Water Management Committee throughout the project.

Nick thanked Peter for his presentation.
See attached slides (Appendix A)

4. River Murray Operations Update – Jarrod Eaton – Manager, Water Resources Operations, Natural Resources, SAMDB

Jarrod was unable to attend the meeting due to illness.

5. Update on current projects – Michael Cutting, Natural Resources, SAMDB

Michael gave an overview of current projects.

Green Trail/Blue Net Concept Plan – initial planning is underway to showcase innovative practices in the Angas Bremer Irrigation Region, via a self-drive or bike ride tour with interpretative signage etc. and complemented with an online experience. Angas Bremer Water Management Committee has driven/led many of the outcomes and achievements that may be promoted through this project and is invited to be involved in bringing it to fruition.

Weather Station Network – 3 new weather stations have been installed by Langhorne Creek Grape and Wine and integrated into the existing network. The weather Station Network website is now mobile friendly and can be tailored to provide information applicable to different activities.

Nick thanked Michael for his presentation.

Please see attached slides (Appendix B)

6. Summary of 2015/2016 Irrigation Annual Report & Angas and Bremer Rivers and Wetlands Project – Leah Hunter

Fewer online irrigation reports have been made compared to this time last year making it difficult to determine if there have been any significant changes. Final numbers will be recorded in the annual report that will be published before the end of the year.

Cover Crops Project – this project was funded through Alexandrina Council and SAMDB NRM Board. The project trialled the establishment of wallaby grass, Fescue and Kasbah/cockfoot as cover crops between vineyard rows.

25th Anniversary Landcare Grant – this revegetation project has been completed and the targets were exceeded.

Nick thanked Leah for her presentation.

Please see attached slides (Appendix C)

7. Financial Report – Nick McDonald, Acting Presiding Member

The Audited Financial Report of the Angas Bremer Water Management Board 2015-16 was presented by Nick.

See auditors report on page 34.

8. Flood levies and future funding – discussion.

Nick opened the meeting for discussion on the topic of Flood Levies and future funding.

Ken Follett reported that a meeting had been called with Sharon Starrick, Chair, SAMDB NRM Board and 45 attendees to discuss the flood levy charges and the set 3.1% annual increase. Ken expressed his opinion that the Department did not know enough about the unique Bremer system and what happens during a flood year. He was not satisfied with the response from the Department as a result of the meeting.

It was noted in the meeting that during a flood year it is possible to lease out allocated River Murray Water and those that get flood waters may pay less than those that continue to use metered water.

Lyz Risby from Natural Resources, SAMDB noted that irrigators in the Eastern Hills pay the levy and don't necessarily have reliable supply of water and there are issues of equity that need to be considered. Sharon Starick has offered to come and meet with the Angas Bremer Water Management Committee after the Annual Public Meeting.

There was discussion about the use of water taken via built infrastructure vs natural flow.

Lyz provided some fact sheets about the NRM Levy and what the money raised is used for. Land and water based levies have both increased significantly.

9. Election of members

The constitution of the Angas Bremer Water Management Committee requires that 9 members be elected. Four positions have been carried over from the previous committee, therefore nominations were called for five positions. Nick McDonald and Dale Wenzel declined to restand.

The following nominations were taken from the floor and accepted:

Darren Aworth

Michael Clements

Michael Cutting

Brett Ibbotson

Ken Follett

Loene Furler

The following members will continue on the committee:

David Kohl

Mac Cleggett

Barry Potts

George Borrett

10. General Business

a. Proposed change to the constitution

Nick advised the committee of a proposed change to the constitution to be voted on at the next meeting:

7.1 The committee shall meet together for the dispatch of business at least **two** times per calendar year and in such a place and at such a time that is convenient to a majority of committee members.

b. Other business

A question about the High Demand Zones project was put to Brett Ibbotson – Natural Resources, SAMDB. Brett advised that the project has been attempting to achieve voluntary reductions in water use to help reduce the demand for water in the first instance before reducing allocations.

The meeting was closed at 8:51 pm.

Audited Accounts 2015-16

ANGAS BREMER WATER MANAGEMENT COMMITTEE INC.

AUDITOR'S REPORT

Scope

I have audited the accounts of the Angas Bremer Water Management Committee Incorporated for the period ended 30th June, 2016 as set out on pages 1 to 3.

The accounts are a special purpose report and have been prepared on the basis explained in the Notes to the accounts. The Committee is responsible for the preparation and presentation of the accounts and the information they contain. I have conducted an independent audit of the 2015/2016 figures as shown in the accounts in order to express an opinion on them to the Committee members.

My audit has been conducted in accordance with the Australian auditing standards to provide reasonable assurance as to whether the accounts are free of material misstatement. My procedures included examination, on a test basis, of evidence supporting the amounts and other disclosures in the accounts, and the evaluation of accounting policies and significant accounting estimates. These procedures have been undertaken by me to form an opinion as to whether, in all respects, the accounts are presented fairly in accordance with the accounting policies as described in the Notes to the accounts.

The audit opinion expressed in this report has been formed on the above basis.

Audit Opinion

In my opinion, the accounts of the Angas Bremer Water Management Committee Incorporated are properly drawn up: (i) So as to give a true and fair view of the state of affairs of the Association as at 30th June, 2016 and the operations of the Association for the period ended on that date; and (ii) are in accordance with accounting standards that are applicable to the Association as a non-reporting entity.



.....
Michael W. J. Perrey
Certified Practising Accountant

127 Swanport Road,
Murray Bridge
SA 5253

Signed at Murray Bridge this 28th day of July, 2016

ANGAS BREMER WATER MANAGEMENT COMMITTEE INC.

INCOME & EXPENDITURE STATEMENT

FOR THE YEAR ENDED 30TH JUNE 2016

		<u>2016</u>		<u>2015</u>
<u>INCOME</u>				
AB Business Plan	-		10,150.00	
AB Rivers & Wetland	950.00		18,500.00	
Cover Crops II Grant	200.00		800.00	
SEWPAC	-		8,150.00	
Irrigation Annual Reporting	20,000.00		20,000.00	
Interest	4.53		2.83	
			-	
Rural Incentives Grant Cover Crops	-	21,154.53	663.64	58,266.47
<u>EXPENDITURE</u>				
<u>AB Business Plan exp</u>				
Advertising & Promotion	-		163.82	
Audit	-		660.00	
Meeting Costs	-		1,984.91	
Postage & Stationery	-		511.37	
Printing	-		836.55	
Project Coordinator	-		13,857.98	
Project Officer	-		1,805.60	
Travelling	-		525.98	20,346.21
Retained Funds expense		-		1.10
<u>IAR Expense</u>				
Advertising	170.00		-	
Audit	600.00		-	
Catering APM	34.41		-	
Domain Reg	-		21.90	
GWLAP	16,571.25		-	
Meeting Room	255.00		-	
Insurance	2,680.43		2,864.46	
Postage	43.09		6.36	
Secretary	3,098.58		1,200.32	
Sundry	5.83		-	
Web Host	167.83	23,626.42	-	4,093.04
<u>Biodiversity Project</u>				
Contractor	-	-	330.00	330.00
<u>AB Rivers & Wetland Expense</u>				
Contractor	14,377.53		-	
Field Day	279.55		-	
Seeds	3,185.96		-	
Other AB Rivers & Wetland exp	36.00	17,879.04	-	-
Cover Crops		2,300.00		1,374.92
Website upgrade		-		550.00
TOTAL EXPENDITURE		<u>43,805.46</u>		26,695.27
NET INCOME/(DEFICIT)		\$ (<u>22,650.93</u>)		\$ <u>31,571.20</u>

ANGAS BREMER WATER MANAGEMENT COMMITTEE INC.

BALANCE SHEET

AS AT 30TH JUNE 2016

	<u>2016</u>	<u>2015</u>
ASSOCIATION FUNDS		
Balance 1/07/15	57,318.16	25,746.96
<i>plus</i> Net Income/(Deficit)	(22,650.93)	<u>31,571.20</u>
Balance 30/06/16	\$ <u>34,667.23</u>	\$ <u>57,318.16</u>
 Represented by:		
ASSETS		
Current Assets		
Cash & Bank Accounts	33,277.23	61,248.16
Tax Control	<u>1,390.00</u>	<u>-</u>
TOTAL ASSETS	34,667.23	61,248.16
 less LIABILITIES		
Current Liabilities		
Tax Control	<u>-</u>	<u>3,930.00</u>
Total Current Liabilities	-	<u>3,930.00</u>
 TOTAL LIABILITIES	<u>-</u>	<u>3,930.00</u>
NET ASSETS	\$ <u>34,667.23</u>	\$ <u>57,318.16</u>

ANGAS BREMER WATER MANAGEMENT COMMITTEE INC.

NOTES TO AND FORMING PART OF THE ACCOUNTS

FOR THE YEAR ENDED 30TH JUNE 2016

Note 1. These financial statements are a special purpose financial report prepared in order to satisfy the financial reporting requirements of the Associations Incorporation Act (SA) 1985. The Committee has determined that the association is not a reporting entity.

The Accounts have been prepared in accordance with the requirements of the Associations Incorporation Act(SA) 1985, Statements of Accounting Concepts, the Accounting Standards and other mandatory professional reporting requirements as issued by the Australian accounting bodies where considered by the Committee.

The accounts have been prepared on the basis of historical costs and do not take into account changing money values or current valuations of non-current assets.

Significant accounting policies that have been involved in the preparation and presentation of the accounts are:

(a) Plant and Equipment

Plant and equipment is recorded as an expense for the period.

(b) Accounting Method:

The cash basis of accounting is adopted by the group.

ANGAS BREMER WATER MANAGEMENT COMMITTEE INC.

STATEMENT BY MEMBERS OF THE COMMITTEE

The Committee have determined that the association is not a reporting entity. The Committee have determined that this 'special purpose financial report' has been prepared to meet the reporting obligations and needs of the Committee and the requirements of the Associations Incorporation Act (SA) 1985.

In the opinion of the Committee members,

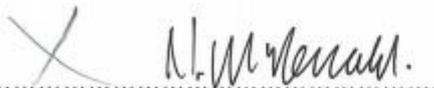
- (a) the accounts present fairly the results of the operations of the Association for the financial period ended 30th June, 2016 and the state of affairs of the Association as at the end of the financial period, 30th June, 2016
- (b) at the date of this statement there are reasonable grounds to believe that the Association will be able to pay it's debts as and when they fall due.

During the financial period to which the accounts relate, none of the following:

- (1) Committee Members
- (2) Officers of the Association
- (3) A firm of which the officer is a member; or
- (4) A corporate in which the officer has a substantial financial interest,

has received or become entitled to receive a benefit as a result of a contract or otherwise between the officer, firm or corporation and the Association except for: X

This statement is made in accordance with a resolution of the Committee and is signed for and on behalf of the Committee by



Nick McDonald
Acting Chairperson



Michael Clements
Treasurer

Dated: 7/8/16

Appendix A – Variable Lakes Project - Peter Mettam – Natural Resources, SAMDB

Variable Lakes:
Lake level Policy &
Barrage Operating
strategy

Angas Bremer WMC
August 2016

Peter Mettam
Senior Operations Officer
DEWNR, River Murray Operations

 Government of South Australia
Department of Environment,
Water and Natural Resources



Problem Definition

- No formalised, endorsed Policy or Strategy for managing Lower Lakes water levels or barrage operation
- Limited documented guidance -> expert opinion and heavy reliance upon operator experience (need to document knowledge).
- Potential for:
 - inconsistent and sub-optimal decision-making
 - lack of transparency and documentation
 - unbalanced consideration of competing interests including environmental, social and economic objectives

 Government of South Australia
Department of Environment,
Water and Natural Resources



Project Deliverables/Outputs

Lower Lakes Water Level Policy:

- Public document
- Practical guidance on water level management
- Optimise lake level operation for environmental, social, economic and water security outcomes
- Address benefits and risks of water level operations



Government of South Australia
Department of Environment,
Water and Natural Resources

Project delivery deadline:

30th of June 2017



Government of South Australia
Department of Environment,
Water and Natural Resources

Project Deliverables/Outputs

Barrage Operating Strategy:

- Provide guidance, including tools, rules and procedures for barrage operation
- Guidance under a range of different operating conditions
- Determine what can be realistically achieved
- Documented body of knowledge regarding lake levels and barrage operations

Government of South Australia
Department of Environment,
Water and Natural Resources

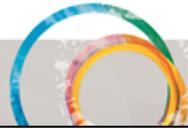
Project Phases & Key Outputs



Government of South Australia
Department of Environment,
Water and Natural Resources

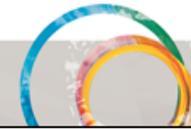
In Scope for Project

- Project incorporates areas below Lock 1
– E.g. LMRIA
- Consider environmental, economic and social interests



Out of Scope for Project

- There will be a range of out-of-scope options raised.
- These will be documented for later discussion
 - ❖ Potential Lake Albert connector
 - ❖ Barrage automation upgrades
 - ❖ Managing sea-level rise



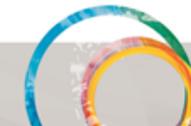
Basin Plan

- Lake Levels managed to ensure discharge to Coorong and Murray Mouth, prevent riverbank collapse and acidification of LMRIA
 - +0.4m AHD for Lake Alexandrina and Lake Albert 95% of the time
 - +0.0m AHD for Lake Alexandrina and Lake Albert 100% of the time
- Murray Mouth frequently open Flow/inundation/recession events to promote and meet ecological requirements
- Salinity/Water quality targets for Lakes and Coorong



Drought Emergency Framework for Lake Alexandrina and Lake Albert

- **Planning phase (0.4m AHD to 0.0m AHD)**
 - Close barrages and maintain levels above 0.0m AHD
 - Investigate and mitigate
- **Emergency action phase (0.0m to -2.7m AHD)**
 - Barrages remain Closed
 - Event-based water quality monitoring
 - Limestone dosing
 - Aerial seeding and planting around lake margins to promote sulfate reduction
 - Native fish translocations
 - Regulator or blocking bank construction



Benefits and Outcomes

Environmental

- Improved ecological character, resilience, an open Murray Mouth and salt export (Basin Plan Targets)
- An integrated approach to the use of flows from the South East and Murray-Darling Basin for managing the site

Economic

- Businesses benefit from an ecologically healthy site
- Minimise property and farming land loss through lakeshore erosion

Social

- Greater clarity and increased community knowledge and understanding for river users
- Maintenance of ecological character that supports cultural heritage and identity for the traditional owners of the site
- Reduced environmental and water security risks



Used by?

- Outputs used by the South Australian Government and the MDBA to assist with meeting their respective responsibilities to maintain the ecological character of the site
- Outcomes supported and owned by the community, relevant water management authorities and environmental water holders



Stakeholder Consultation

- Extensive stakeholder list
- Multiple consultations through project
- Channels of communication always open
- Transparent document and transparent process



Appendix B – Update on Current Projects – Michael Cutting – Natural Resources, SAMDB

Angas Bremer Water Management Committee: Annual Public Meeting

Update on Current Projects
29 August 2016

Michael Cutting
Natural Resources, SA Murray-Darling Basin Region



 Natural Resources
SA Murray-Darling Basin



Snapshot of:

1. Green Trail/'Blue Net' Concept Plan
 - *Background*
 - *Current Status*

2. Weather Station Network Update
 - *Langhorne Creek Grape & Wine AWS's*
 - *Data Comparisons*



Green Trail/ 'Blue Net' Concept Plan

- Over the years a number of concepts have been proposed to showcase the region – 'Red Trail'. Also seen in other regions e.g. Clare
- In 2015 the idea of the 'Green Trail' was raised at a local Entwine workshop
- **Intent:** To showcase the innovative and sustainable Natural Resources Management (NRM) practices and environmental outcomes in the Angas Bremer Irrigation Management Zone (ABIMZ) focusing on grape growers and wine makers
- This idea was then expanded to cover all irrigators in the Angas Bremer Irrigation Management Zone with a focus on community-driven Natural Resources Management (NRM) outcomes

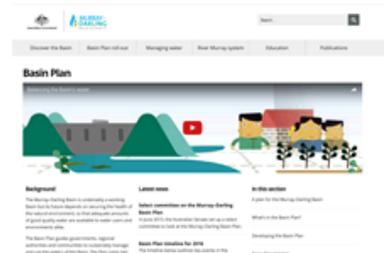
Green Trail/ 'Blue Net' Concept Plan (cont)

- Further expanded to cover the whole lower SAMDB catchment from Murray Bridge, around the Lakes and Coorong to Mount Barker and Goolwa
- 'Blue Net' name evolved from a recent meeting noting subject to change
- **Angas Bremer Node** within this with a water/irrigation management focus
- Engagement framework that highlights reliance on water and the interconnected nature of water



Blue Net Concept Plan: What is It?

- A series of stop-offs on a self-drive or bike ride tour or even online. Potential locations for interpretative signage and the subjects to be explained at each point are also identified
- Links to relevant objectives from regional, State and National water/NRM e.g. Basin Plan and industry sustainability programs
- Angas Bremer Water Management Committee have driven/led many of the outcomes and achievements that we are seeking to promote



Blue Net Concept Plan: Example Themes

Theme	Messages	More than grapes	Mixed irrigation in the region. All irrigation comes under the CoP.
World leaders	<ul style="list-style-type: none"> • Australian policies (NW, Water Act) • South Australian water management (NRM Act, Native Veg. policies) • Water allocation planning • ABWMC as community driven water management leaders (refer to papers by Muller (2000) and Straker - unique at a world scale) • Irrigation scheduling (weather stations) 	Water in good times and bad	<ul style="list-style-type: none"> • Local impacts of the Millennium Drought - lake levels and salinity • Development and implementation of the community pipeline • Watering local assets (e.g. Collier's waterhole during drought) • Future under the Basin Plan, increased water security
Code of Practice	<ul style="list-style-type: none"> • Potted history • Overall Code of Practice policies, annual reporting data collection, results, feedback and reporting processes. • Include summaries of messages. 	Clean production	<ul style="list-style-type: none"> • Chemical, minimum spray, integrated pest management and other 'clean' aspects of regional farming. Include a site near the lakes to make the link between Kangaroo Wetland of International Importance and clean production.
Code of Practice	Use Fullstop diagrams from AB CoP to explain the purpose of measuring irrigation drainage rate and quality.	Ecology	<ul style="list-style-type: none"> • On hills and edge of ABIMZ • What landscape would have looked like the time of formation - delta of Angas/Bremer rivers • Formation of freshwater lens
Entwine	<ul style="list-style-type: none"> • AWMI run program for environmental stewardship in the wine industry • Partnerships between industry and NRM regional bodies • High level of participation in Angas Bremer region 		

Green Trail/ 'Blue Net' Concept Plan

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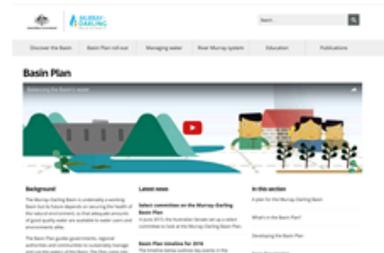
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Blue Net Concept Plan: Example Themes

Theme	Messages	
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Code of Practice	<ul style="list-style-type: none"> • Potted history • Overall Code of Practice policies, annual reporting data collection, results, feedback and reporting processes. • Include summaries of messages. 	<ul style="list-style-type: none"> • Water in good times and bad • Local impacts of the Millennium Drought - lake levels and salinity • Development and implementation of the community pipeline • Watering local assets (e.g. Collier's waterhole during drought) • Future under the Basin Plan, increased water security
Code of Practice	<ul style="list-style-type: none"> • Use Fullstop diagrams from AB CoP to explain the purpose of measuring irrigation drainage ratio and quality. 	<ul style="list-style-type: none"> • Clean production • Chemical, minimum spray, integrated pest management and other 'clean' aspects of regional farming. Include a site near the lakes to make the link between Ramsar Wetland of International Importance and clean production.
Entwine	<ul style="list-style-type: none"> • AWMI run program for environmental stewardship in the wine industry • Partnerships between industry and NRM regional bodies • High level of participation in Angas Bremer region 	<ul style="list-style-type: none"> • Ecology • On hills and edge of ABIMZ • What landscape would have looked like the time of formation - delta of Angas/Bremer rivers • Formation of freshwater lens

Blue Net Concept Plan: Opportunities?

- Basin Plan "Localism" – Grass roots solutions to local issues e.g. Irrigation Code of Practice (CoP)
- Connects very nicely to high level State objectives:
 - Premium Food & Wine exported to the world*
 - A Destination of Choice (Nature Based Tourism)*
 - The Knowledge State (Innovation)*
- Promote the sustainability credentials of the region



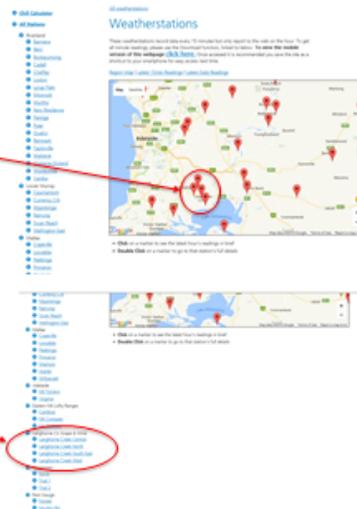
Blue Net Concept Plan: What's Next?

- Refine 'Angas Bremer Node' with key partners/collaborators:
 - Angas Bremer Water Management Committee
 - Langhorne Creek Grape & Wine
 - Langhorne Creek Progress Association
 - Alexandrina Council
 - DEWNR/SA MDB NRM Board
 - Milang & Districts Community Association
 - Tourism SA?
 - Others?
- Potential for fixed interpretative signage in high visitation areas e.g. Potts Reserve
- Need to consider the logistics of the drive/ride e.g. risk management, access etc

Weather Station Network: Local Changes

- October 2015 - 3 x automatic new stations owned by LCG&W integrated into the existing network: **Langhorne Creek** - North, South East and West
- Langhorne Creek Central (Lake Breeze) installed since 2005.
- Existing website upgraded to include all Langhorne Creek stations in the one location

<http://aws.naturalresources.sa.gov.au/>

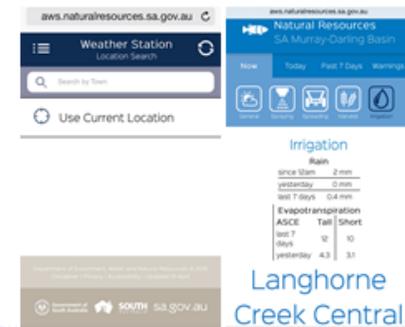


Weather Station Network: Mobile Friendly

- Early in 2016 a mobile/smart device friendly version of the weather station website was launched
- Tailored views based on 'farm' activity e.g. *Irrigation, Spraying*
- Site is still being refined – feedback welcome

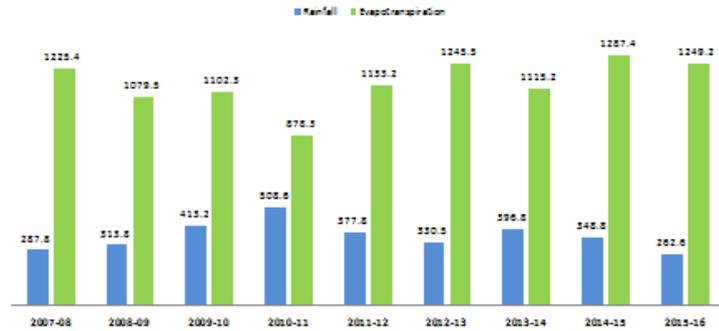
<http://aws.naturalresources.sa.gov.au>

and select mobile view OR
<http://m.aws.naturalresources.sa.gov.au>



Weather Station Network: 2015/16 Data

Langhorne Creek Rainfall & Evapotranspiration
(Central – Lake Breeze):
July – June

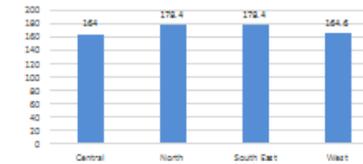


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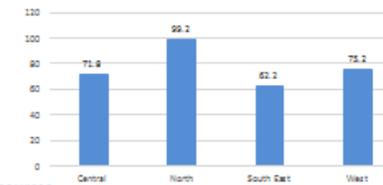


Weather Station Network: 2015/16 Data

Rainfall Comparison:
November 15 - June 2016 (8 months)



Rainfall Comparison:
July 2016



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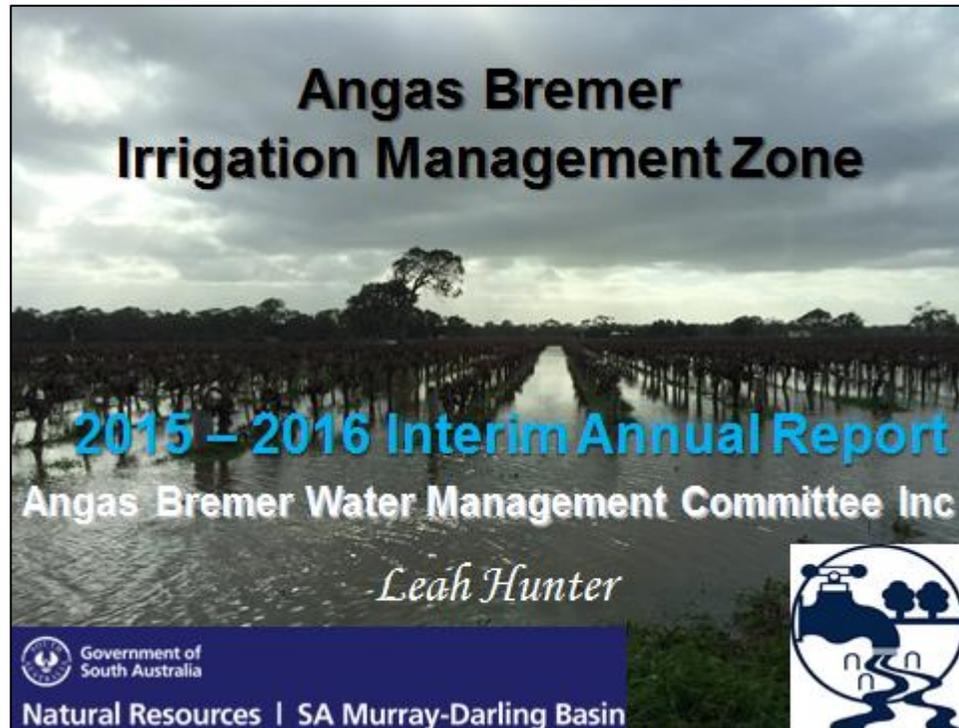


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thankyou



Appendix C – Update on Angas Bremer Water Management Committee Projects –
Leah Hunter – Project Coordinator



Irrigation Annual Report 2015-2016

- **Annual Report Summary**
 - Online reporting
 - Allocations and Usage
 - Irrigation
 - Crop Types
- **Other projects**
 - Cover Crops
 - Anniversary Landcare Grant



On Line Reporting

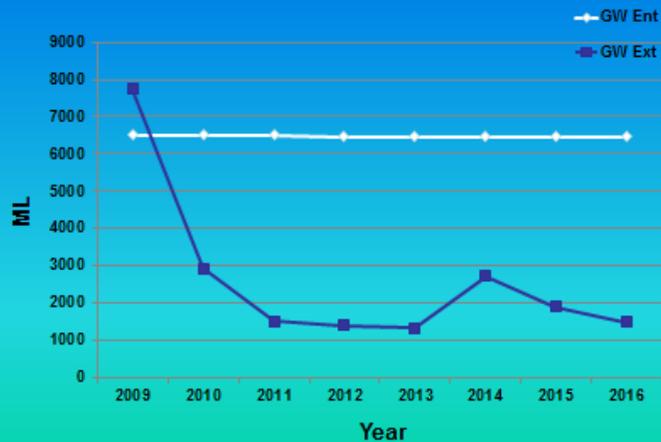
- Thank you again to everyone who submitted their reports online
- Went smoothly again although closing date had to be extended to August 18th
- 99 reports submitted online (74%)
- 112 out of 134 reports received by accreditation date (84%)



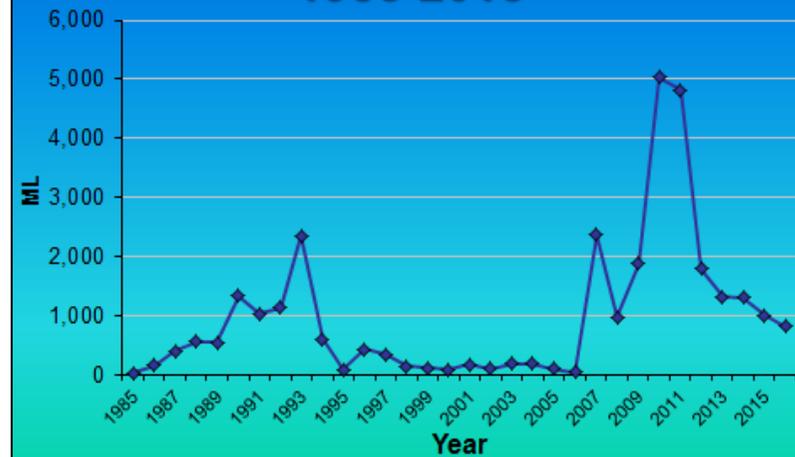
River Murray Water Allocation & Extraction

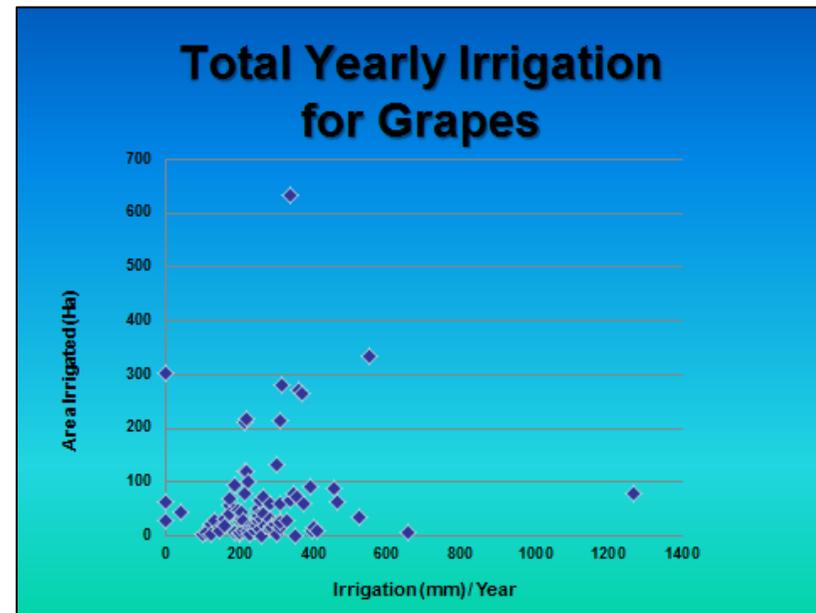
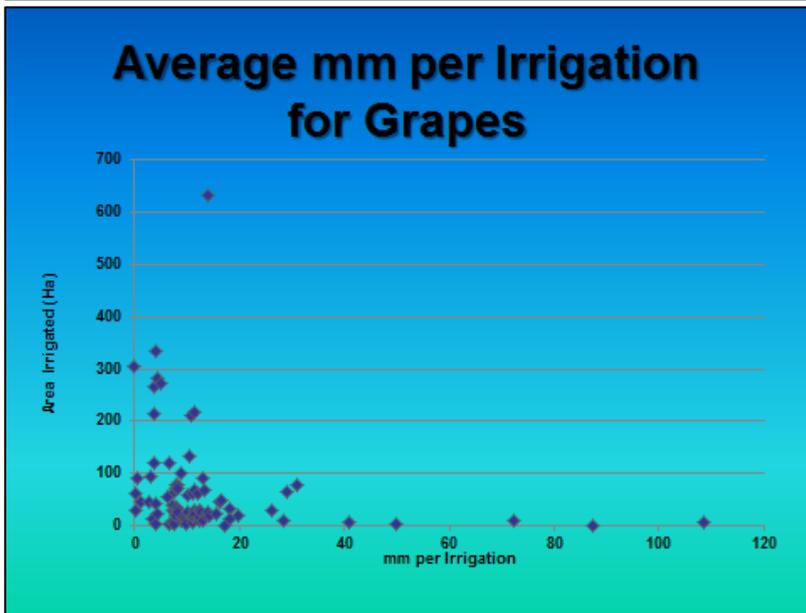
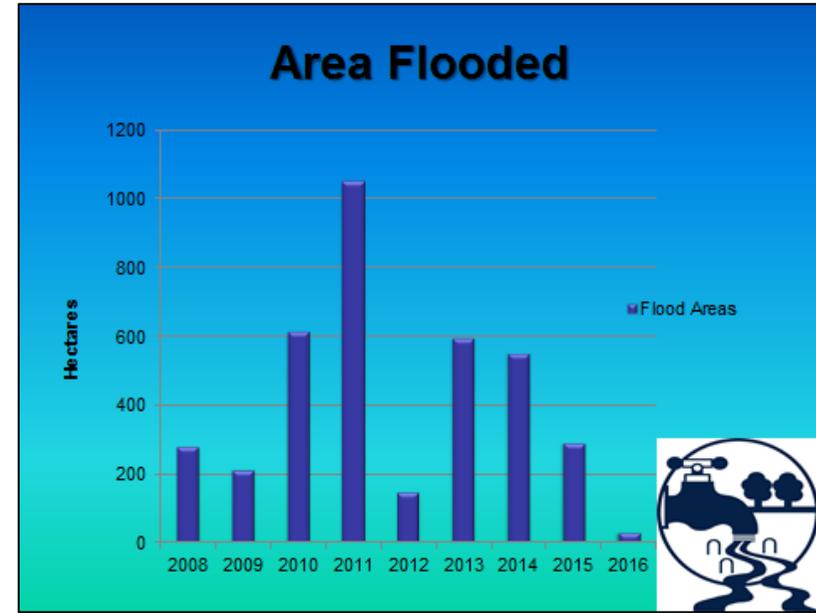
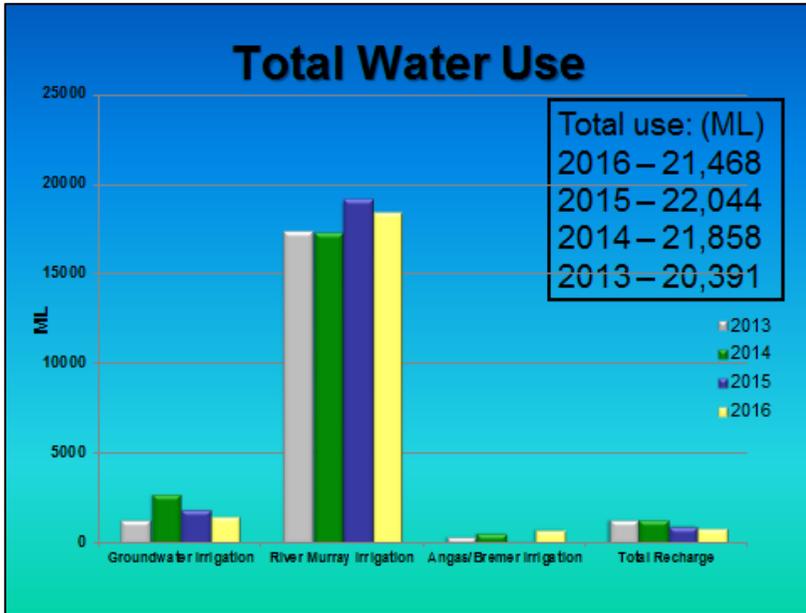


Groundwater Allocation & Extraction

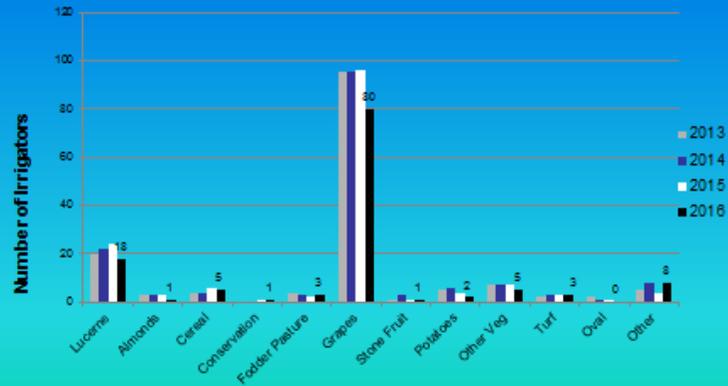


Volume Recharged to Aquifer 1985-2015





Number of Irrigators for Different Crops



*Area grapes – 5,498 ha; 5,954 ha in 2015; 6,400 in 2007

Cover Crops

- Alexandrina Council and NRM Funded - Complete
- Previous year: Not a lot of germination / Survivorship due to weather.
- Demonstration sites at Pecador vineyards and Brett Cleggett's with 3 different seed mixes
 - Wallaby grass
 - Fescues
 - Kasbah, cocks foot
- Field Day October 2015



Interim Annual Report

- All final graphs and further explanation in Annual Report
- Thank you to those who submitted their reports on time and on line!



25th Anniversary Landcare Grant

- Department of the Environment – 25th Anniversary Landcare Grant 2014-15.
- Angas and Bremer Rivers and Wetlands – Enhancing Corridor Biodiversity
- Completed 30th June 2016.
- Final Report Submitted



25th Anniversary Landcare Grant

- **Activities undertaken:**

- Site inspection
- Site preparation
- Weed Control
- Planting
 - No more direct seeding was completed in 2016
 - Tubestock 3027 plants in 2016, total = 3777
- Seed collection and propagation workshops
 - Held late November and early December



Angas Bremer Water Management Committee All Sites



Conclusion

- Thank you to Angas Bremer Water Management Committee members
- Thank you to Natural Resources SA Murray Darling Basin staff & Board
- Thank you



Appendix D – NR SAMDB, Media release



Natural Resources
SA Murray-Darling Basin

Irrigation upgrade breathes new life into Langhorne Creek vineyards

Posted 20 July 2016.

An upgrade to the irrigation infrastructure on the Bremerton Vineyards has led to easier vineyard management and more resilient grapevines.

Works across 'Kilpuruna' and 'Bremerton' patches at Langhorne Creek have included the replacement of non-performing drip lines and irrigation system components.

Components of the previous irrigation infrastructure were outdated and aging, causing a range of issues, according to Bill Potts from vineyard management company First Pick.

"The controllers were unreliable and we had very limited options in terms of scheduling irrigation shifts," Mr Potts said.

"The drip lines had become partially blocked and watering was inconsistent, causing dry and overly wet patches."

"There were lots of leaks, inconsistent water pressure and old-style soil moisture probes made irrigation decisions a bit of guess work."

In 2014, Bremerton Vineyards owners C&M Willson applied for funding to replace components of the irrigation system through the Australian Government's On-Farm Irrigation Efficiency Program (OFIEP), managed by the Natural Resources South Australian Murray-Darling Basin (SAMDB).

The business was awarded \$266,090 in exchange for returning 78 megalitres of irrigation water to the Commonwealth Environmental Water Holder (CEWH).

Returned water is directed to River Murray floodplains and wetlands as environmental water, securing the health of the system's ecosystems.

The funding was used to purchase and install drip lines, system controllers, variable-speed drives, filter banks and filtration systems and install soil moisture probes with the aim of increasing water use efficiency, resource use and environmental management, across 107ha of wine grapes.

One of the most positive outcomes from the upgrades has been the ability to better schedule irrigation shifts through the automated control system.

Water is now applied in 12-hour shifts, with water applied in short bursts during hot weather.

Mr Potts said they are much more confident about having to deal with extreme temperatures with the new system.

"We lost 60% of fruit in early 2015 after a 46° day," he said.

"Now we're watering before and during hot weather events in an effort to reduce vine stress and fruit losses.

"I'd hazard a guess that we'd reduce potential losses by 50% through better scheduling and irrigation control."

In addition to the gains through better irrigation scheduling, the new disc filter is providing better quality water and water pressure.

Combined with the new drippers at closer intervals than the previous system, water is now delivered more precisely and evenly throughout the vineyards.

"We've also installed several capacitance soil moisture probes which we use to track available moisture and schedule future irrigation applications," Mr Potts said.

"We also check soil moisture data to ensure that water has gone on as planned and this helps us to identify any leaks or weaknesses in the system.

"As well as a more reliable and efficient irrigation system, we're saving labour hours by not having to constantly fix drippers anymore."

C&M Willson Director Craig Willson said benefits from the irrigation upgrades were being realised beyond the vineyard.

"When comparing the 2016 vineyard yields and quality results to average results during the previous eight years, we can say the irrigation system upgrades have resulted in the best and most consistent yields in that period," Mr Wilson said.

"The winemaking team is happy, and the financial shape of the business is much sounder."

The On-Farm Irrigation Efficiency Program is funded by the Australian Government to achieve economic and environmental benefits under the Basin Plan. The Program, delivered by the SAMDB NRM Board across the southern connected system of the Murray-Darling Basin, assists irrigators to improve the efficiency and productivity of on-farm water while returning water to the environment. It includes activities for soil moisture management, critical for sustainable food production and water supply.