Irrigation in the Angas Bremer

Irrigation Management Zone

2003-2004

Angas Bremer Water Management Committee Inc. Annual Report

A Summary of the data collated from Irrigators Annual Report Forms and from activities of the Committee.

Contents

1. Activities of the Angas Bremer Water Management Committee Inc. 2002-2003

1.1 Flood Plain Study.

This project commenced in 2001. Soil moisture loggers and depth to water table loggers are installed at a number of sites on the flood plains of the Angas and Bremer Rivers in the Angas Bremer Irrigation Management Zone.

Background

The first grapes at Langhorne Creek were planted by Frank Potts in about 1860. They were planted on the deep, alluvial floodplain soils of the ephemeral Angas and Bremer Rivers. The floodplains were chosen because, after natural winter flood events, the grapes started their growing season with a deep soil profile, full of water. No irrigation water was needed.

In 1886 the first adjustable weir was built, temporarily to block flow in the Bremer River and cause the river to flood even when the winter flow was too low to cause a natural flood. The effects of these traditional practices are being investigated in the Floodplain study.

The Floodplain study 2003-4

The Floodplain Study is

1. mapping the boundary of each flood event and
2. estimating the volume of water draining to the water-table below each flood.

   The volume is being estimated by

   (a) measuring and recording the soil-moisture every 15 minutes at each 0.5m depth interval down to the 6m deep water-table at each of 8 sites and

   (b) measuring and recording well water-levels every 15 minutes at 12 shallow wells into the water-table aquifer and at 12 deeper wells into the confined aquifer.

   For each of the 8 soil moisture sites, one comprehensive chart has been drawn using all the data collected up to April 2004. Each chart displays all the soil moisture data (up to 10 lines) and all the well water-level data (2 lines) for that site. Each line displays up to 60,000 data points.
3. Learning how the creek water-flows affect groundwater levels

A map showing the areas flooded in August 2003 will be on show at the next ABWMC public meeting, this map will also show where the revegetation is located.

The following charts show the effects of flooding

Figure 9 shows an example of the soil moisture changes and Figure 10 shows an example of the watertable height changes. Figure 11 shows, in detail, the time taken for the water to penetrate down to each soil depth after the flood event on 8 September 2001.

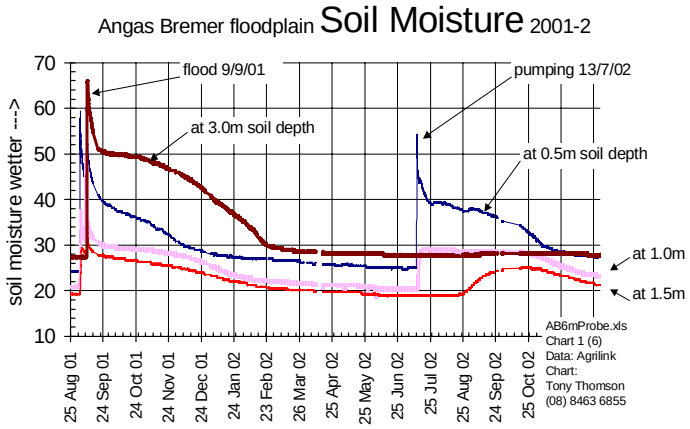


Figure 9 The flood on 8/9/01 wet soil down to 3m. Pumping on 13/7/02 wet down to only 1m

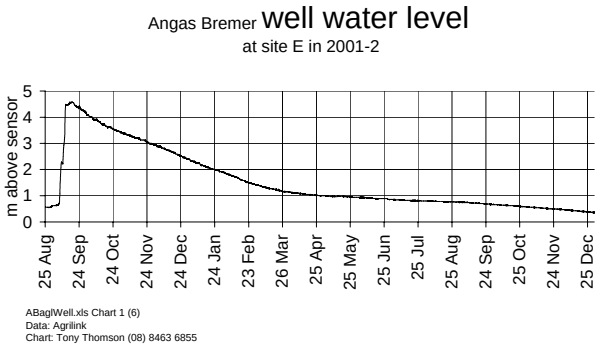


Figure 10 The water-table rose by 4 metres after the flood on 8/9/01. Without a flood in 2002 the watertable fell continuously.

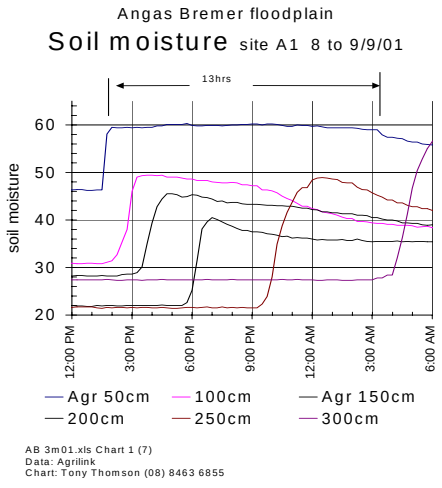


Figure 11 After the 13hr flood on 8/9/01, it took 8hrs for the water to reach down to 2.5m and 14hrs to reach to 3m

1.2 Irrigation Efficiency – FullStop

The CSIRO FullStop device is being used in the Angas Bremer Irrigation Management Zone to measure Irrigation efficiency. 2003-2004 is the third irrigation year that the device has been used and reported on in the Angas Bremer Irrigation Management Zone (ABIMZ). Each Irrigator is required (under the Irrigators Code of Practice) to have installed in their irrigated crop two FullStop's, one at 50cm and one at 100cm. A record sheet is kept by each irrigator which is submitted annually with their Irrigation Annual report

Important Note:-

The Committee requests all Irrigators to test, record and report the salinity of the water removed from the 50cm FullStop in addition to the 100cm FullStop.

Samples bottles are available from the Langhorne Creek Post Office and samples can be left there for testing, irrigators are advised the results of testing.

FullStop at Angas Bremer**:**

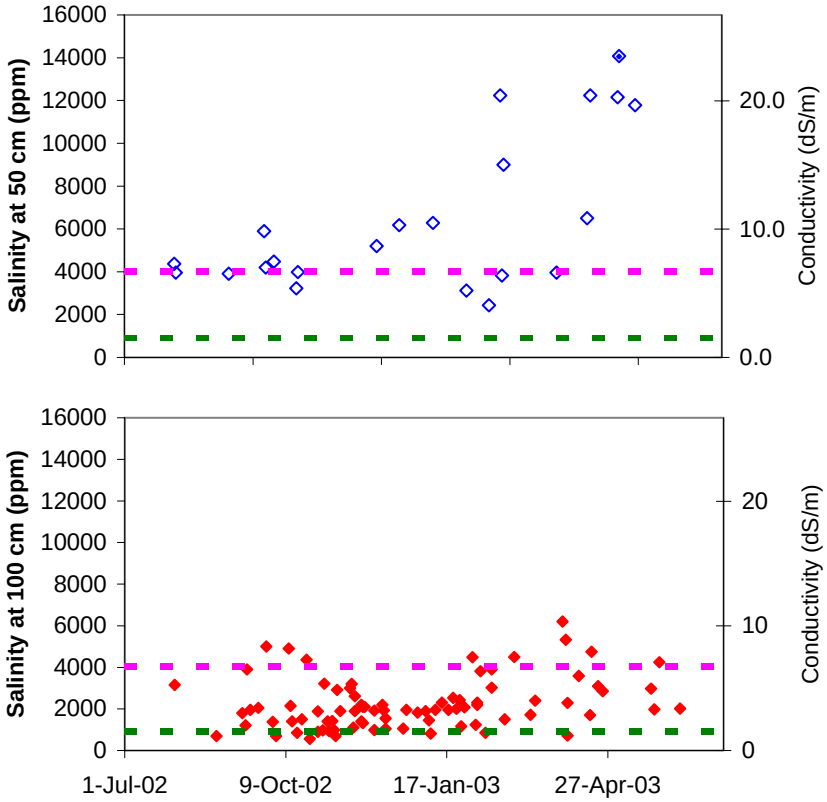
A summary of the 2002-3 irrigation season

FullStop Wetting Front Detectors were installed at 50 and 100 cm on over 100 properties, and growers reported how deep their irrigation water penetrated and the salinity of the water captured by the detectors.

The average amount of irrigation used was 1.75 ML/ha, with 10 growers applying more than 2.5 ML/ha and 12 applying less than 1 ML/ha. The average number of irrigation events was 29 (the range was 8 to 78). The average application at one time was 7 mm, but this also ranged from an average of 1.2mm to 16 mm per irrigation.

The shallower detector at 50 cm responded one or more times on 82% of properties (average of 10 times). The 100 cm deep detector tripped on one or more occasions on 44% of properties (average of 4 times). There was no relationship between the total amount of water applied in the season and the number of times the detectors responded. The detector response was much more influenced by the amount of water applied at one time.

Salinity measurements were made by 26 of the 34 growers who activated a FullStop at 100 cm depth. In addition 10 growers who did not get the deep detector to respond returned salinity samples from the 50 cm depth FullStop. A total of 85 samples were measured at 100 cm depth having an average salinity of 2208 ppm (3.7 dS/m). A total of 23 samples were measured at 50 cm depth having an average salinity of 6500 ppm (10.8 dS/m). This data confirms that the FullStops are working as expected; if wetting fronts do not pass detectors, then salt must be accumulating above them. When they are activated high concentrations of salt are measured.



The Figure shows the salinity of water (left axis in ppm and right axis in dS/m) collected from the 50 cm FullStops (top) and 100 cm FullStops (bottom). The lower dotted line shows where yield may start to decline and the upper dotted line where yield could be reduced by 50% according to Mass and Hoffman 1977.

Although this is still early days and the FullStop Wetting Front Detector is a new instrument, some preliminary recommendations can be given. Many of the growers who regularly activate the deep detectors could reduce their leaching fractions, because salt readings of 4000 ppm or below are acceptable for the 100 cm depth.

However the majority of growers, especially those off the flood plain, need to include leaching fractions into their irrigation management strategy so that salt levels at 50 cm do not get too high. An increase or a decrease in the leaching fraction may involve changing only the timing and amounts of irrigation given at one time, not the annual total. The readings from the FullStop can be used as a guide.

The level of the saline shallow aquifer is falling in the region because growers have been very careful not to over irrigate. This gives the opportunity for careful leaching to move salt below the active root zone, where it can be stored.

1.3 Angas Bremer Land and Water Management Plan

Every Angas Bremer Irrigator has their own copy of the Land and Water Management Plan. As additional modules are completed or existing modules are amended they are posted out to the irrigators.

It is hoped that the area history module will be completed and available to irrigators in the near future

1.4 Environmental Management System (EMS) Trial

The 3 year, MDBC funded "Environmental Management in Viticulture – Langhorne Creek" EMS trial has progressed through a further 12 months. With support from catchment interests, representatives of the 20 participating Langhorne Creek vineyards carried out environmental risk assessment of the region. Environmental standards in the form of Best Management Practices (BMPs) for the full range of vineyard activities have been developed for the issues identified.

Activity has progressed with the participants carrying out environmental risk assessment of their own properties. They are now developing their plans to address environmental issues of their vineyards using the BMPs as a guide.

Work will continue over the remaining 9 months of the project with the implementation of the plans and monitoring to assess the progress made.

The Winemakers Federation of Australia has recently advised of the intention to introduce an industry EMS to achieve and demonstrate the wine industry's environmental credentials to domestic and international markets. It is anticipated that the industry EMS will be closely aligned to our trial.

1.5 Irrigation Annual Reporting.

For the second year the Irrigation Annual Reports have been collated into the new database, some minor problems have occurred which will be overcome.

Maps of the Angas Bremer area showing the groundwater levels, the groundwater salinity and the areas flooded will be produced and will be part of this report.

2 Summary of the Irrigation Annual Reports 2002-2003

Of the 142 Irrigation Report forms mailed out by the Committee136 were returned to the Secretary. 116 Irrigators achieved accreditation by properly completing the form, by reporting on their FullStop and by marking on the map provided where their revegetation is located and where flooding occurred during the irrigation year. 15 irrigators failed to achieve accreditation for various reasons, one of which was very late lodgement of their IAR; the Committee has sent letters to these irrigators pointing out the reasons for non-accreditation. The non-accredited irrigator's details have been passed onto DWLBC

Six irrigation licensees did not submit a report; the names of these licensees have been given to DWLBC and to RMCWMB.

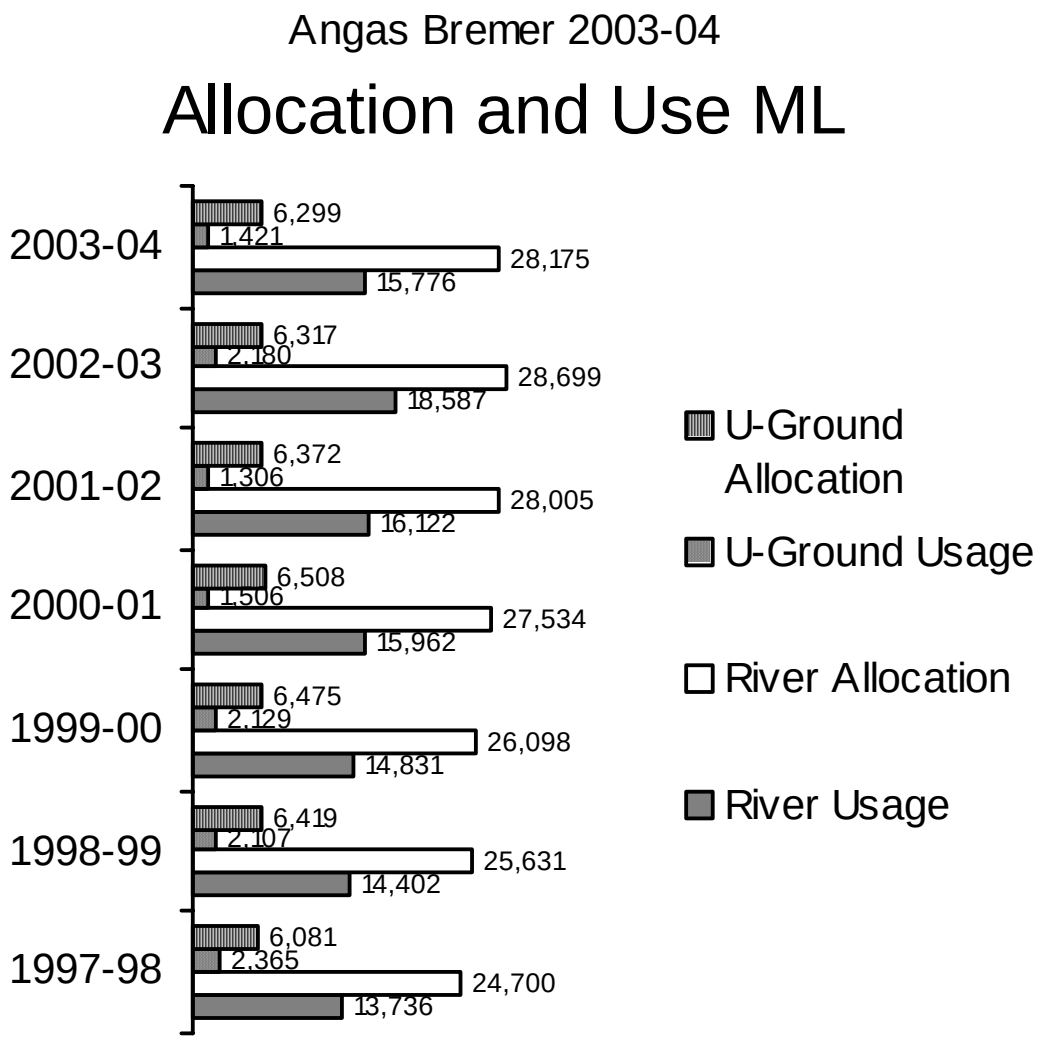
"Certificates of Accreditation" will be posted out with this report.

Those irrigators wishing to use the accredited irrigator 'logo' for 2004 should contact the Committee's Program / Project Coordinator Bruce Allnutt by phone or email.

By agreement with DWLBC a table showing name, licence number, allocation, meter number and meter reading for 2003-2004 will be provided to DWLBC to enable them to check their records.

2.1Water Allocation and Water Used 2003-2004

Total water use (ground and river) for 2003-2004 was 17,197 ML which is 17 % less that 2002-2003. Ground water use was 35% down on 2002-2003 and the River water use was 15% less than 2002-2003. Some of the less water usage can be attributed to the fact that some flooding occurred in July and September 2003. The district average ML per hectare for 2003-2004 was 2.3ML/ha compared with 2.6ML/ha in 2002-2003 and 2.5ML/ha in 2001-2002.
Chart 1 shows the Ground and River water allocation and use for each of the past 7 years.



2.1.1 River Murray Water

A decrease in the River Murray water allocation within the zone of 524ML, this represents a 2 % decrease from 2002-2003.

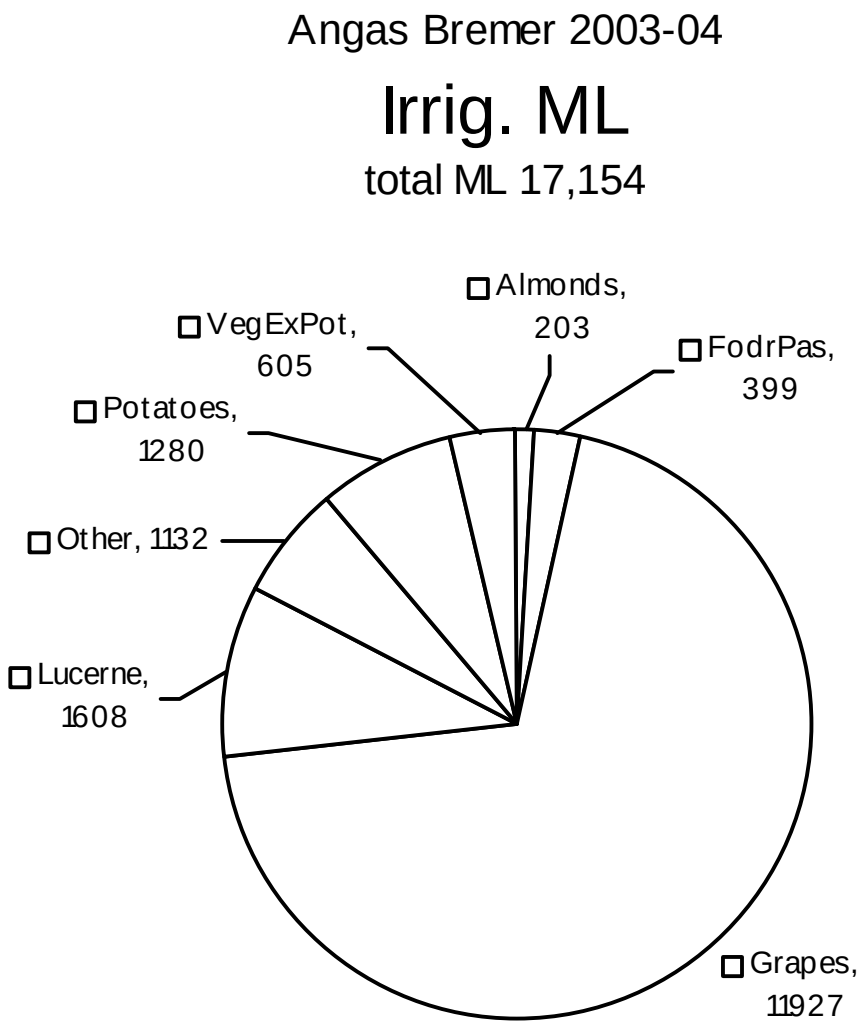
2.1.2 Groundwater

Groundwater allocation decreased from that reported last year, by 18ML.

2.2Water use by Crop

The total water use (both ground and River) for the year was 17,154ML Of this total; 30ML was used for Stock & Domestic and 9.5ML for Industrial use. With the exception of almonds all other crops used less water than in 2002-2003, as can be seen in Table 1.

Chart 2 shows the volume of irrigation water used on each crop type.



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note: “Other” includes turf, oval watering, olives, cereal and other broad acre crops, fruit trees, stock and domestic use and Industrial use.

Table 1

Table 1 shows the total water used on each crop and the number of hectares of each crop irrigated, the percentage of change between 2002-03 and 2003-04 for water and hectares is shown at the bottom of the table.

Year	Total ML	Total ha	Grape ML	Grape ha	Lucn. ML	Lucn. Ha	Other ML	Other ha	Veg. ML	Veg. ha	Potato ML	Potato ha	Past. ML	Past. Ha	Alm. ML	Alm. Ha
1996-7	11,348	4,156	4,332	2,134	2,490	741	3,081		1,446					328		88
1997-8	16,100	6,545	6,001	3,645	3,700	876	2,248	872	2,670	679			1,526	369	147	61
1998-9	16,509	6,153	8,864	4,084	3,526	698	738	555	2,355	518			906	241	119	61
1999-00	16,961	6,625	10,021	4,665	2,491	418	1,354	777	761	121	1,812	485	358	96	164	58
2000-01	17,467	6,788	10,626	4,991	2,040	429	1,259	533	769	134	1,773	490	742	157	172	55
2001-02	17,428	7,089	11,159	5,357	2,051	471	1,286	583	651	103	1,719	425	316	97	246	55
2002-03	20,715	7,934	13,165	6,059	2,560	376	1,899	777	647	108	1,504	394	752	173	188	47
2003-04	17,154	7,509	11,927	6,059	1,608	354	1,132	443	605	69	1,280	360	399	146	203	48
% change 02-03 to 03-04	- 17%	- 5.5%	- 9.5%	=	- 37%	- 6%	- 41%	- 43%	- 7%	- 36%	- 15%	- 9%	- 47%	- 16%	+ 8%	+ 2%

Note : Potato was included with Vegetable prior to 99-00

Table 2

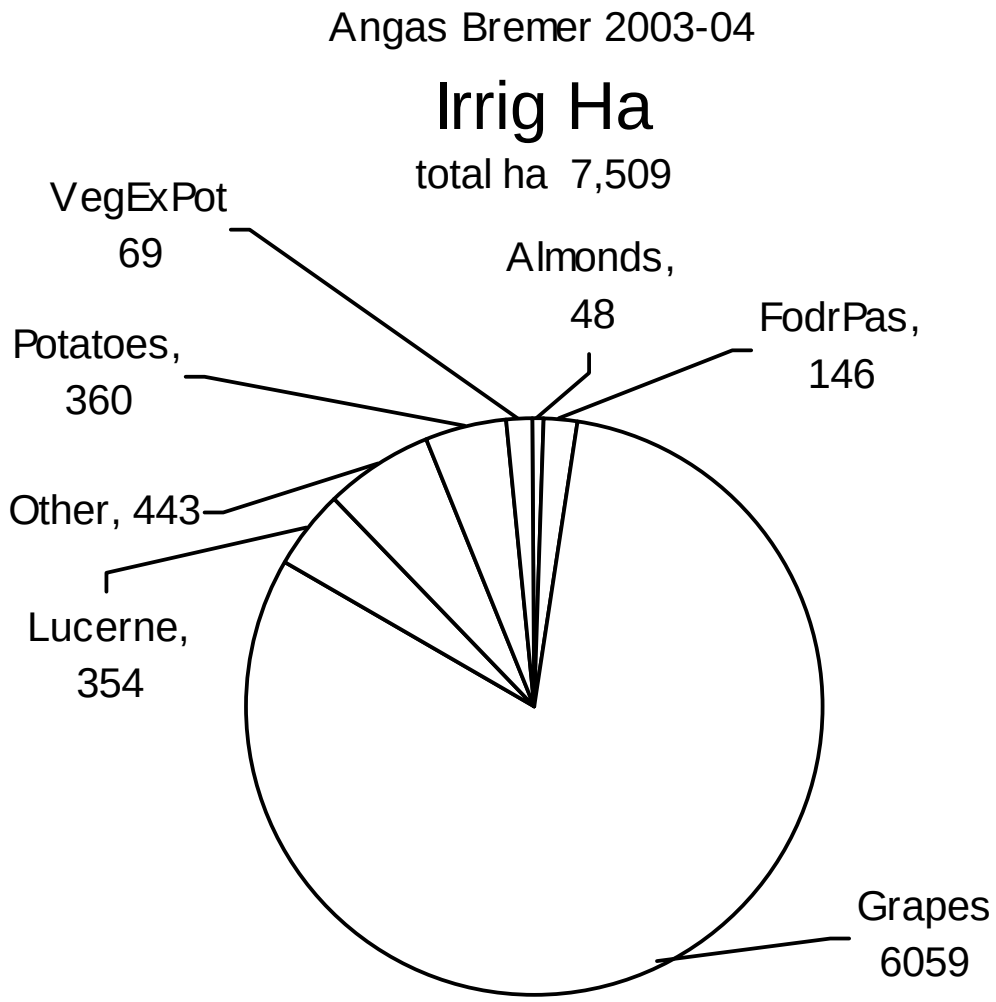
Table 2 illustrates the percentage of the total ML used each crop and percentage of the total ha irrigated each crop 2003-2004

	Grape	Lucerne	Other	Vegetable	Potato	Pasture	Almond
ML used	70%	9%	6.5%	3.5%	7.5%	2.5%	1 %
ha irrigated	80.8%	4.9%	5.9%	0.9%	4.9%	2%	0.6%

2.3Irrigated Land use

In 2003-2004, the total area irrigated in the Angas Bremer Irrigation Management Zone was 7,509 ha, this represents a decrease of 5.5% from 2002-2003. This decrease is due in part to 136ha not reported on in 2003-2004 and the fact that some of the crops on the floodplains were not irrigated during the year as they were flooded in the early part of the irrigation year.

Chart 3 Shows the area in ha of each crop type irrigated.

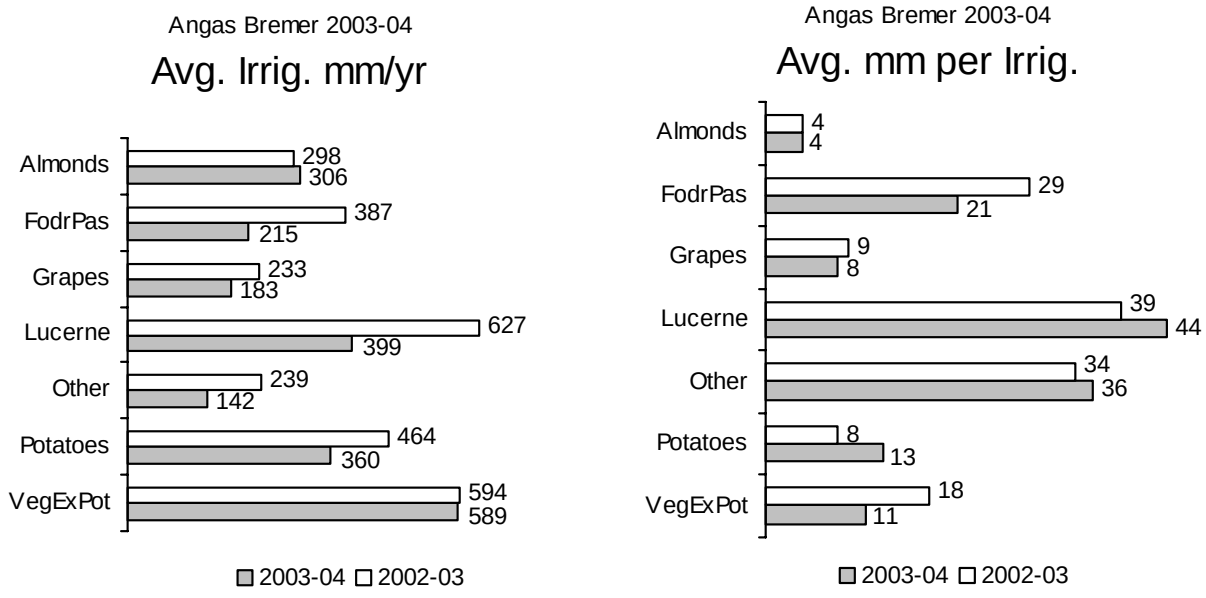


Notes: Table 1 (page 6) shows the difference in area of each crop 1996-97 to present.
: The areas above are not the total areas of any crop in the district, they are the areas Irrigated.

2.4 Average Irrigation in mm for each crop

Chart 4 (a) (below left) shows the average irrigation in mm per year for each crop.
Chart 4 (b) (below right) shows the average irrigation in mm per irrigation for each crop.
Both charts show the data for 2003-2004 and for 2002-2003.

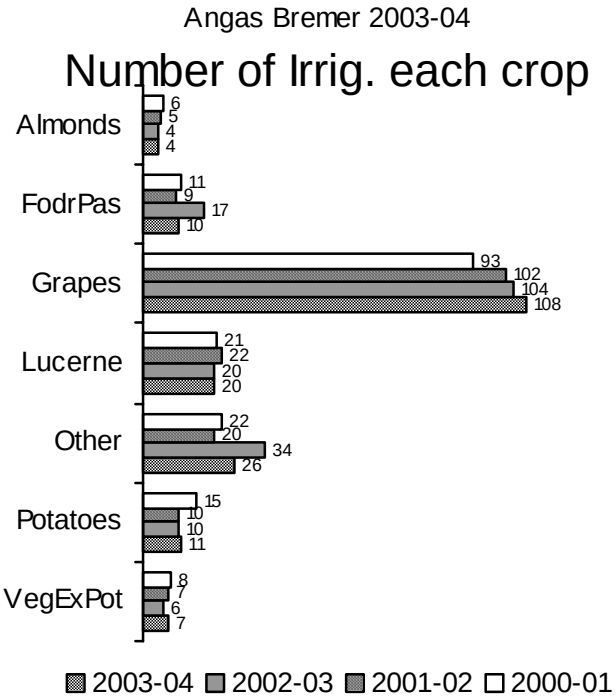
Chart 4



2.5 Number of Irrigators each crop

Chart 5 lists the number of irrigators for each crop variety and compares with past years.
Some irrigators grow several crop varieties.

Chart 5



2.6 Volume of Irrigation Water applied to each crop type

The next 15 scatter charts show the volume of irrigation water applied to each crop by each grower, the first graph in each set shows the mm per year and the second shows mm per irrigation.
Each dot on the graph represents one irrigator and the volume of water applied by that irrigator.

Chart 6

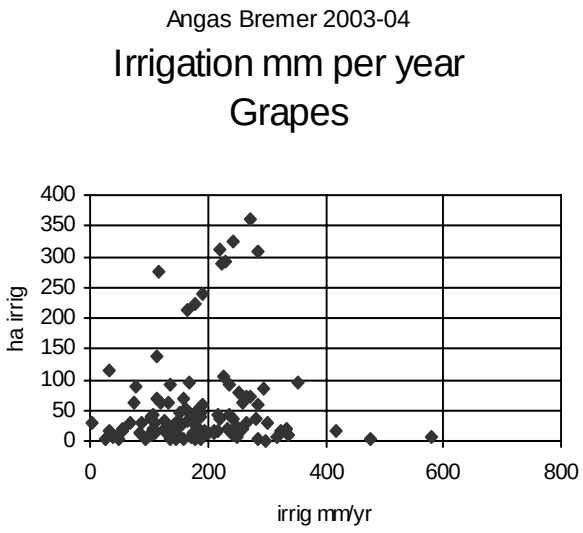


Chart 7

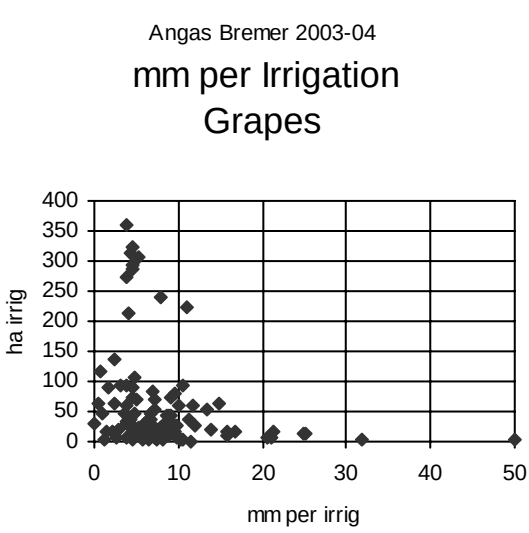


Chart 8

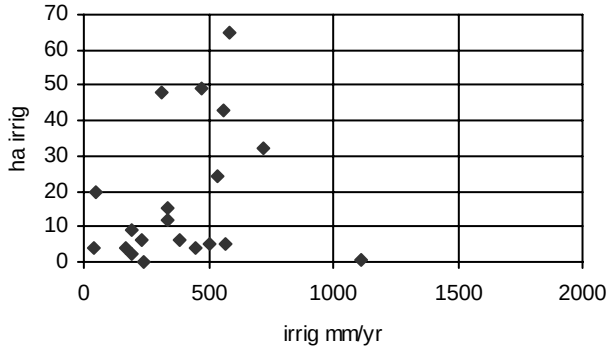


Chart 9

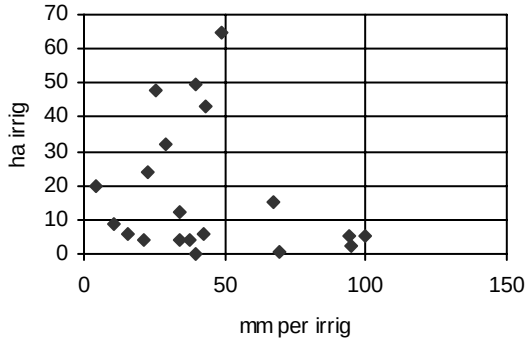


Chart 10

Angas Bremer 2003-04

Irrigation mm per year
Other

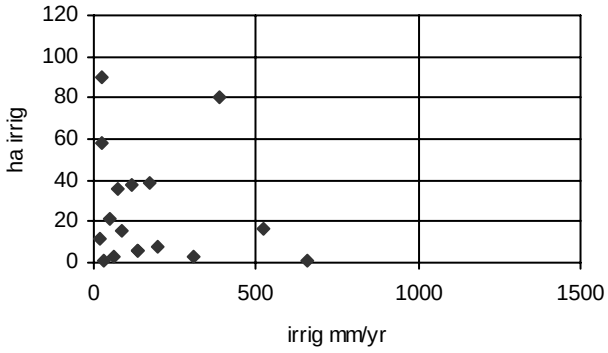


Chart 11

Angas Bremer 2003-04

mm per Irrigation
Other

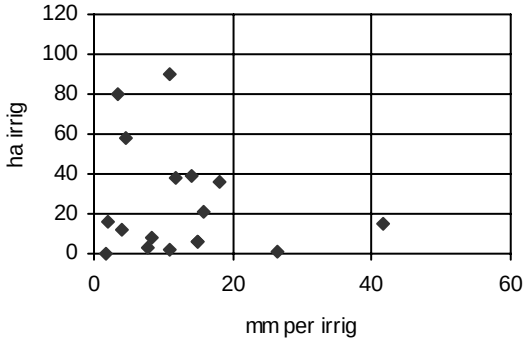


Chart 12

Angas Bremer 2002-03

Irrigation mm per year
Potatoes

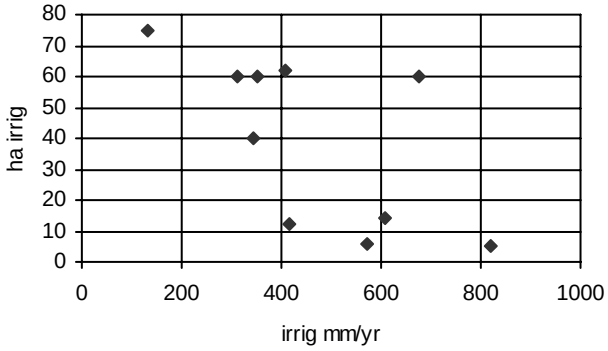


Chart 13

Angas Bremer 2002-03

mm per Irrigation
Potatoes

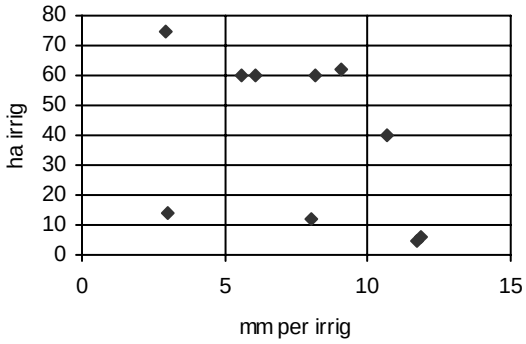


Chart 14

Angas Bremer 2003-04

Irrigation mm per year
Vegetables

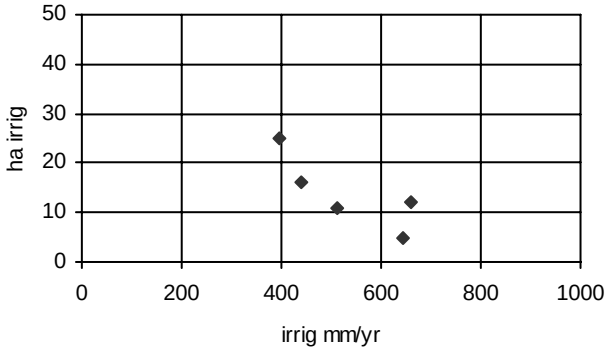


Chart 15

Angas Bremer 2003-04

mm per Irrigation
Vegetables

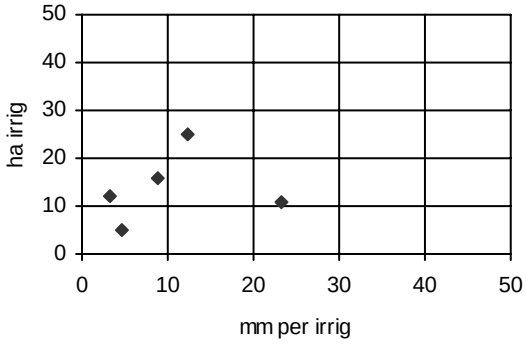


Chart 16

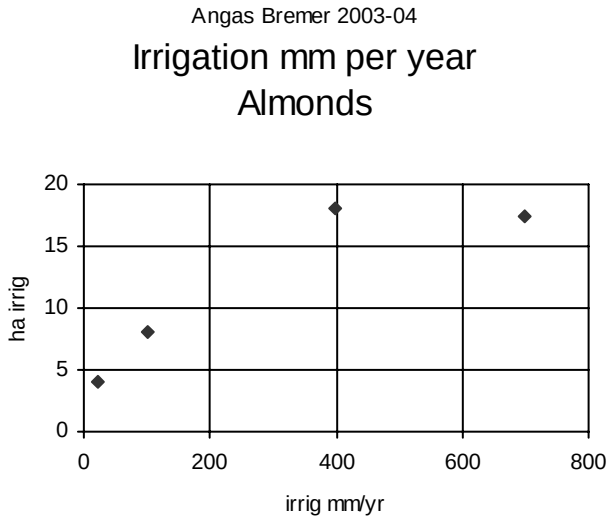


Chart 17

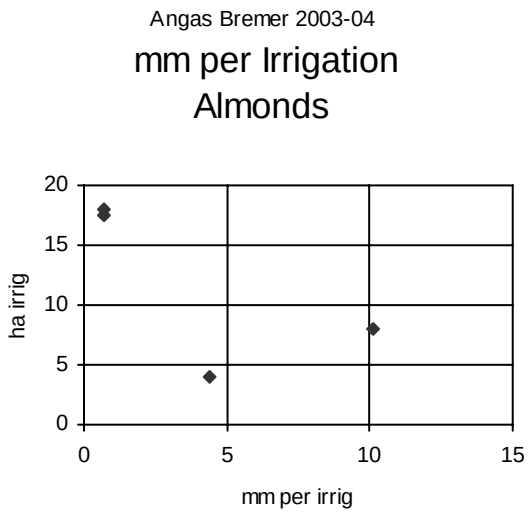


Chart 18

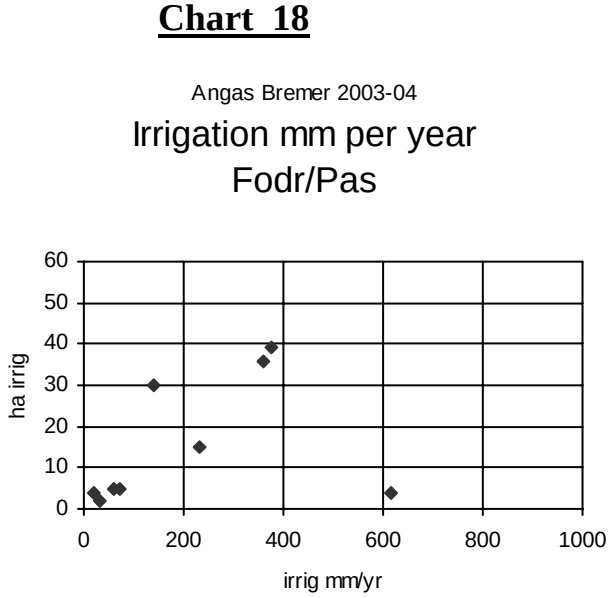


Chart 19

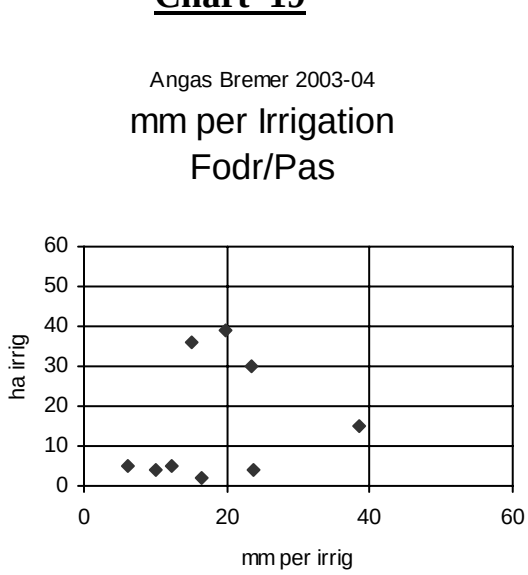


Table 3

Table 3 shows the volume of water applied per ha per crop for each of the years for which data has been collected.

ML per ha

	Grape	Lucerne	Other	Vegetable	Potato	Pasture	Almond	All crops
1996-7	2.0	3.4		4.0				2.7
1997-8	1.6	4.2	2.6	3.9		4.1	2.4	2.5
1998-9	2.2	5.1	1.3	4.5		3.8	2.0	2.7
1999-00	2.1	6.0	1.7	6.3	3.7	3.7	2.8	2.6
2000-01	2.1	4.8	2.4	5.7	3.6	4.7	3.1	2.6
2001-02	2.1	4.4	1.7	5.1	4.0	3.3	4.5	2.5
2002-03	2.2	6.8	2.4	6.0	3.8	4.3	4.0	2.61
2003-04	1.97	4.5	2.5	8.8	3.5	2.7	4.2	2.28

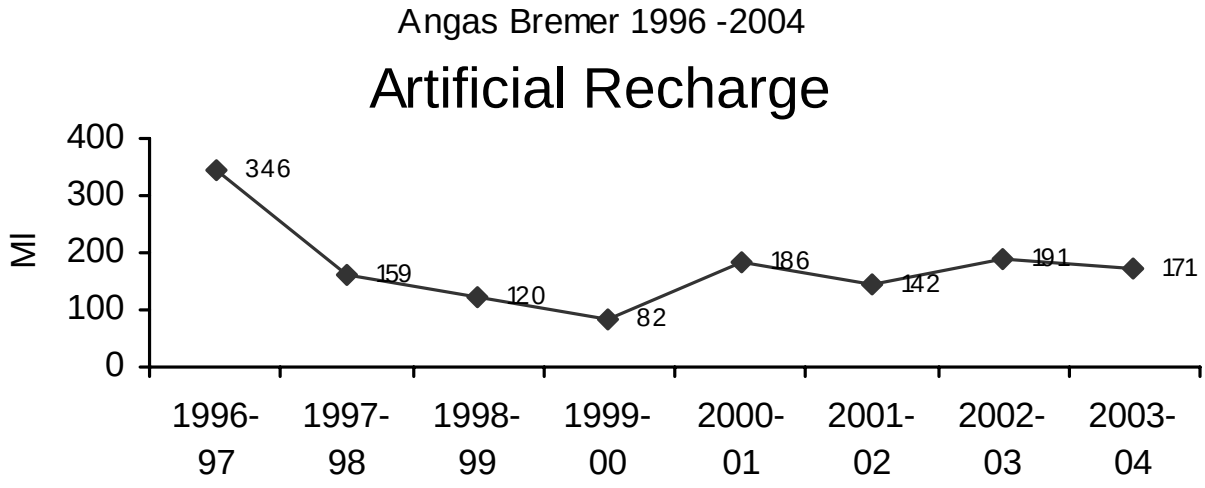
2.7 Grower Monitoring Wells

There are now 176 growers monitoring wells in the Irrigation Management Zone (IMZ) with one additional well still to be drilled. With the exception of small number of deeper wells in the Northern part of the IMZ all the remainder are the standard 6 meter wells.
158 wells were reported on for September 2003, of these 86 had water in them and 72 were found to be dry.
162 wells were reported on for December 2003, 85 with water in and 77 were dry.
Of 163 wells reported on in March 2004, 84 had water in and 79 dry.
164 wells reported on for June 2004, 86 with water in and 78 dry.
The wells not reported on were either the irrigators who did not submit an IAR or irrigators who did not achieve accreditation for not recording the water levels in their monitoring wells.
Groundwater mapping, for both unconfined and confined aquifers, standing water levels can be found at the back of this report at Appendix "E" and "F"

2.8 Recharge Wells

20 irrigators reported on their Recharge Wells for 2003-2004, of these 11 reported recharging with a total recharge of 171 ML.
Chart 20 shows the recharge for each of the past 7 irrigation seasons.

Chart 20



2.9 Flooding

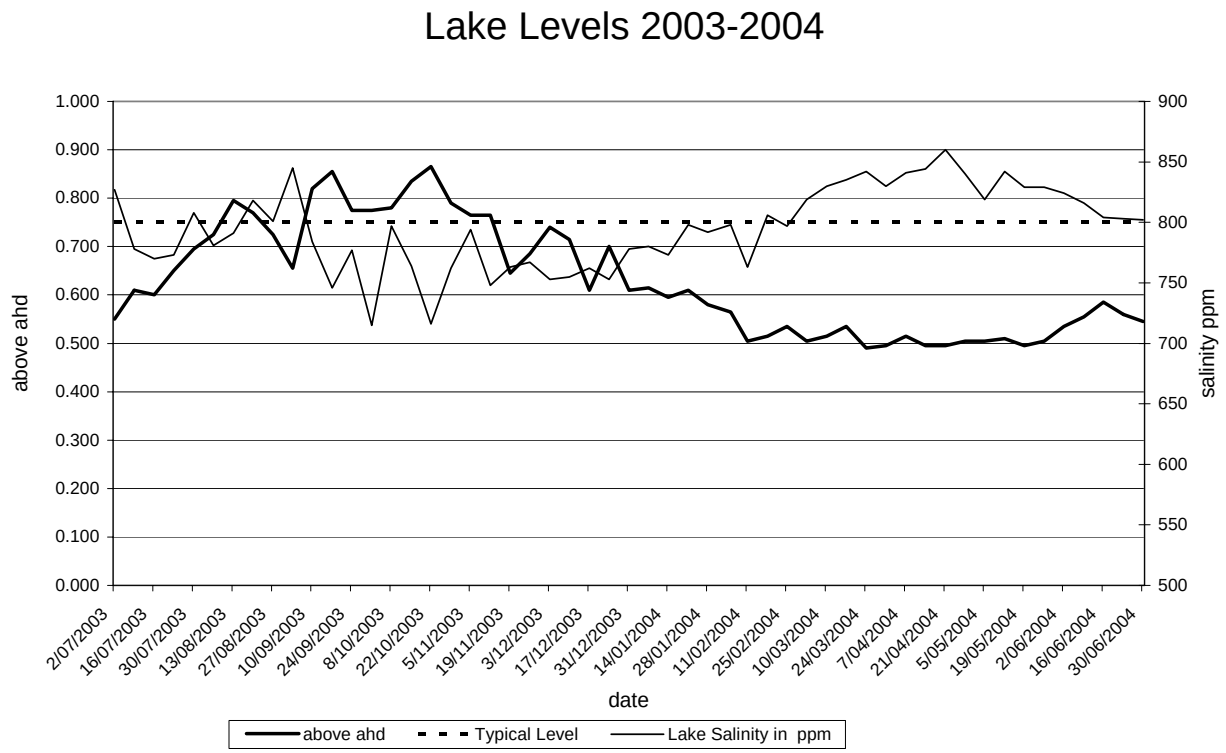
In 2003-2004 flooding occurred on the flood plain of both the Bremer and the Angas Rivers. A total of 1,056ha were flooded, some areas on more than one occasion. Flooding on the Bremer occurred along most of its course though the IMZ, apart from the lower reaches. The Angas flooded from Watson Park Road nearly to Lake Alexandrina. 37 irrigators reported flooding, at least once, on their properties during the Irrigation year, 33 irrigators on the Bremer and 4 on the Angas Rivers.
A total of 726ha of grapes were flooded (some several times), 108ha of Fodder/Pasture, 14ha of cereal, 10ha of Almonds and a total of 198ha of non-crop area was flooded.
Flooding took place between the 1st of July and the 15th of October, the longest area flooded was a swamp which was flooded from 3/9/03 to 30/11/03.
A map showing the areas flooded will be on display at the next ABWMC public meeting.

2.10 Water Salinity

(a) Groundwater: The water salinity of 38 production wells were reported on by irrigators for 2003-2004. Salinity readings varied from 1300ppm to 6717ppm, 22 of the wells were in the 1300 to 2000ppm range, 12 in the 2001 to 3000ppm while the remainder were greater than 3000ppm Appendix "G & H" (page 29 & 30) shows the Observation well salinity levels of both the unconfined and confined aquifers at July 2003 (when tested by DWLBC).
The Committee still has the salinity testing service available to irrigators; empty bottles can be obtained from the Langhorne Creek Post Office which is where samples can be left for testing. Samples are picked up approximately every 2 weeks and irrigators are advised of the test results.

(b) River Murray Water; A graph showing the Lake Alexandrina salinity levels and the Lake level for 2003-2004 is shown in chart 21 (below). Lake level and salinity were monitored once a week (from a fixed site) and continues to be done.

Chart 21



2.11 Soil Moisture Monitoring

78 irrigators report using soil moisture monitoring devices, which is 2 more that the previous year. The major difference is that while resistance devices have decreased slightly, the capacitance devices have increased from 17 to 25.
Chart 22 shows the types of devices in use and the number of each device.
More than 100 irrigators have installed at least one set of "FullStop's" and have reported on them for 2003-2004. A report of the FullStop's can be found on page 4 of this report.
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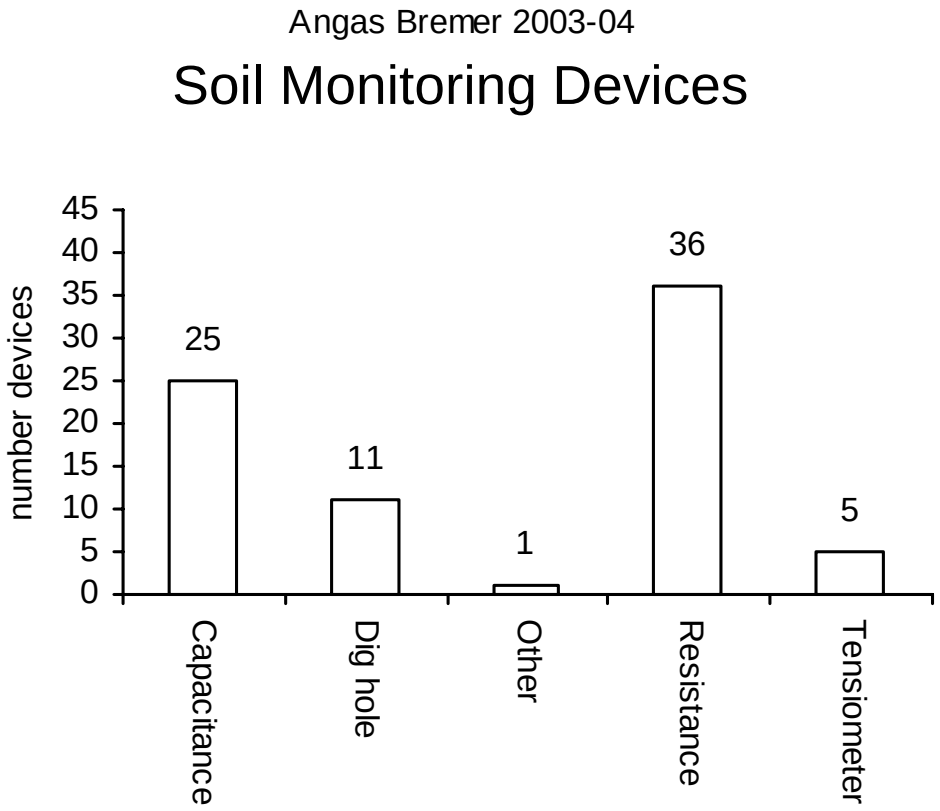
Chart 22



Capacitance devices include Sentek Enviroscan and Diviner, Agrilink 'C' probe and Dataflow Gopher, Resistance includes Gypsum Blocks, and Tensiometer includes Irrometer

2.13 Revegetation

From the IAR's, there has been 1,283 ha of revegetation claimed against water licences. With a total of 33,946 ML on licence, for 2003-2004 the requirement was 339ha.
An aerial photo of individual properties was posted out to irrigators with the 2003-2004 IAR form, this photo was then marked by the irrigator where their revegetation site is and the photo returned with the IAR. DWLBC have produced a district map showing the location of all the revegetation. A map of the revegetation areas will be on display at the next ABWMC public meeting
The Community revegetation scheme is being coordinated by a Committee, the Angas Bremer Irrigators Revegetation Association Inc (ABIRA). Irrigators who have insufficient land of their own on which to plant the required area of non-irrigated vegetation are invited to participate in this scheme.
A report from the ABIRA can be found at Appendix "D" (page 25)

2.14 Aquifer water levels

Appendix "E**"** (page 26 & 27) shows the depth to water in the unconfined aquifer. The maps use data from both the Observation wells and the grower monitoring wells. The 4 graphs show the water tables at September & December 2003 and March & June 2004.
Appendix "F" (page 28**)** shows the depth to water in the confined aquifer observation wells at March 2004

Appendix "A"

Angas Bremer Water Management Committee Inc.

Minutes of the Annual General Public Meeting held in the Langhorne Creek Football Clubrooms on Monday the 30th of August 2004

The Chairman (Mr. R. Giles) welcomed all in attendance and declared the meeting open at 1945hrs and called for apologies.
Apologies from: - Karlene Maywald, Trevor Giles, Len Case, David Wotton and Ron Nurse.
Chairman introduced and welcomed Mr John Johnson from the River Murray Catchment Water Management Board, Dr. Richard Stirzacker and Dr. Richard Creswell from the C.S.I.R.O.
The Chairman then read his report for 2003 – 2004. (copy at Appendix "B"))
Dr. Richard Stirzacker was invited by the Chairman to present his report on the FullStop.

Richard made his "outrageous prediction that in ten years time other irrigators will still be talking about the data collected in the AB district this year" How the data gathered is providing valuable information for further research.
A chart showing water use in the AB area for 2002-03 showed most Grape irrigators were using between 1½ to 2 per hectare per year, with the average being 1.75 ML /ha (or 175mm) per year. The average number of irrigations per year was 29 and the number of day's irrigation was applied for the year varied between 8 and 78 days. The amount of water applied per irrigation also varied between 1 and 16mm, showing a huge variation in irrigation practices in the district.
Another chart showing irrigation in Australia by industry had rice at 11ML/ha/year, grapes at 8ML/ha/year, sugar and dairy at 7ML/ha/year, nut trees at 6ML/ha/year, vegetables at 3 ML/ha/year, while in the AB district grapes used 1.8ML/ha/year.
Richard then presented slides of the performance of the FullStop's at 50 and 100cm and talked of the relationship between the amount of irrigation water applied and the depth and area of soil wetted and showed graphs of area and depth. How the plant roots reject some 'ions' and these 'ions' accumulate in the soil, and in particular salt.
How the S.A. Government are saying that irrigators have to be 85% efficient and that with 15% going to drainage a seven fold concentration can be expected.
The AB irrigators who took water samples from the 50cm FullStop's have shown that the concentration is higher that the 100cm FullStop's, the average for the 50cm units was 6,500ppm while the 100cm units' average was 2,200ppm. Richard is encouraging growers to test the water samples from the 50cm units. He stated that irrigators don't have to push into the water table. A graph was shown of the total suction (kpa) versus the salinity of the water gathered in the FullStop's.
Richard admitted that the FullStop's installed for sprinkler irrigators need to be re-assessed. The latest FullStop device was available for irrigators to see.
In future the FullStop's will be installed at 35 and 70cm with a further unit funded by the Committee to be installed at 100cm.
Richard offered a written version of his talk is available to any irrigator and for irrigators to recognise that salt will always be there in the soil.

The Chairman thanked Richard for his presentation and stressed the importance of the data collection which has proven that too much water being applied is not true. More data needs to be collected and irrigators need to work with Richard collecting salinity figures. Richard needs more data with the objective to lower salinity readings in the 50cm FullStop and raising the readings in the lower units (100cm).

Appendix "A"

The Chairman told the meeting how the Committee was working with DWLBC and that confidentiality was still a big issue with the Committee. That a district summary report was sent to the RMCWMB and the non-accredited irrigator list was forwarded to DWLBC. A letter was sent to all AB irrigators regarding confidentiality.
The Irrigation Annual Report form, this year, asked irrigators to mark on an aerial photo the location of their revegetation.
The Committee wants feedback from the Community on issues of confidentiality.
Comments from the 'floor' were, individuals information should remain as is and there should be some openness of information within the district.
Several speakers spoke on the need to keep some data in confidence so that irrigators will fill in their Irrigation Annual Reports in an accurate manner.
Chairman pointed out that the accuracy of the reveg. mapping is important to the Community.
Richard Stirzacker asked the meeting if they objected to him using the data he presented, earlier in the meeting, onside of the AB area, there were no objections.
As their was no further comment from the 'floor' the Chairman accepts that the Community is happy with the direction the Committee is taking.

Chairman asked Tony Thomson and Bruce Allnutt to present an interim report on the data collection for 2003 -02004.
Bruce presented the interim data for 2003-04 and Tony provided comment on the data comparing it with the previous year's data.
Chairman thanked Tony and Bruce for their presentation.

Chairman asked Dr. Richard Creswell to give a presentation of the data collected with the 'overfly' of the AB area.
Richard explained to the meeting what the 'overfly' was all about and with the aid of slides showed what had been achieved. That the AB area was one of 5 flown in S.A.
The objective of the project was to get a better idea of what is underground. Images showed the location of good and not so good groundwater, that the Bremer River provides the major recharge to the confined aquifer. A chart was shown of the Cumulative Residual rain mass curves at Mt. Barker and Langhorne Creek with a graph showing the flood events at Langhorne Creek aver the same period. Richard spoke of the differences between the rainfall events at the 2 centres.
Richard then asked the question, where do we go from here? He then stressed the importance of accurate data and the need for the AB water balance data to be proven.

Chairman thanked Richard for his presentation and said that the Committee need direction from the Community. Examples of what the Committee has achieved are the management of the aquifer which is now recovering and data that confirms water tables are higher at the start of the irrigation season than they are at the end of the season. Most of the policies of the Committee, so far, have been on 'repair'. The Committee at the point where they might be on top of things, need further direction from the Community.
The meeting has heard from the 2 Richards what they are doing and Tony Thomson has put in an enormous amount of work in the District. Questions such as 'should more of the AB area be developed'? The aquifer has recovered by approx. 7m, what are the potential issues if the aquifer fully recovers? All the resources available should be pulled together.
Following several suggestions/ questions from the 'floor' the Chairman stated that the groundwater resource should never again be over allocated. Full recovery may mean that the Lake edge could return to salt affected areas. Community debate should be focused on things that should be investigated or done.

Appendix "A"

Dr Creswell mentioned the fact that the Lake is now 0.75m higher than originally which may have an affect on the groundwater.
A show of hands from the 'floor' indicated that the Committee should follow on with the ideas of the 2 Richards.

The Chairman Asked the Treasurer (Mr. Guy Adams) to present the financial report.

In presenting his report, Guy paid tribute to the work done for the Committee by Dr. Kerri Muller, Tony Thomson, Bruce Allnutt and the Community.
Guy tabled his report saying that the books had been audited and found to be correct.
He also mentioned that the Committee had received an award of $700.
As there were no questions about the financial report the Chairman thanked Guy for hi report.

The Chairman announced the results of the election of Committee members. Four Committee members (Rex Jaensch, John Pargeter, Roger Follett and John Follett) stood down at the end of the year had all re-nominated, as well Brian Wyatt had nominated. All five were elected to the Committee on a show of hands from the 'floor'

Chairman called for General Business.
A question was asked as to the status of recharge, in view of the meeting with the EPA and DWLBC. The Chairman replied that as nothing further had been said then irrigators can assume it is OK to recharge.
A further question was asked as to the Kayinga project, the answer being that a report of this project will be included in the AB District Annual Report.

As there was no further business the Chairman thanked everyone for their attendance and invited them to partake of the supper provided and declared the meeting closed at 2155hrs.

Appendix "B"

A B Chairman's Report 03 / 04

This has been a year of consolidation as we have implemented or completed a number of projects that we have been working on. The EMS project which is being lead by Rick Trezona has progressed well and while that trial is not directly under the auspices of the Angas Bremer Committee I believe it will turn out to be of great benefit to our district and I hope to the wine industry. Another project associated with the prescription of the Eastern Mount Lofty Ranges is the flood diversion study, of which a small group of irrigators are working on, is taking shape well and when the mapping and study is finished I am sure it will be of great benefit to the whole district as it will support and demonstrate how important prescription will be to our region to protect the quantity and quality of the stream flow in the rivers that traverse our district.

The most important project to be implemented though during the year was the community revegetation project. This exercise has consumed an enormous amount of time over the last couple of years and at times has been most frustrating both for Kerri and the sub committee who have been trying to work through the issues and the irrigators who have been waiting for the implementation. I must again thank the sub committee for their time and efforts, the irrigators for their patients and most of all the River Murray Catchment Management Board for their continued support to our committee. Not only does the boards senior project officer in Kerri , with her well known skills , continue to work with us but in the case of this project they have support it by paying for the legal costs of setting up the community scheme which has been one of the stumbling blocks in the past.

Another positive aspect of the year just completed was the concerted effort by all parties to build stronger relationships between the committee and government agencies and I trust that with the changes being implemented all irrigators will see benefits with the River Murray Licenses and associated issues being administered from the Murray Bridge office with Paul Fitzpatrick from that office sitting on our committee.

We are at a point were we have a choice of collecting data from all of the projects we have in place and waiting to see what develops or we can try and look forward and anticipate what might be the next serious issues that we as a community may have to deal with to keep our region viable and sustainable. I will have more on this matter later in the meeting but I strongly urge the community and the committee to consider the latter as it is far better to be visionary than wait and then have to react to problems that develop.

Finally thank you again to the committee for the way they have continued to work for the benefit of the region and to Barb and Bruce for their continued excellent efforts. I am still convinced that the partnership of agency people, with local irrigators who know their area, supported by project officers and admin is the perfect model for resource management.

Rob Giles, Chairman

Appendix "C"

SUB-SURFACE DRAINAGE AT KAYINGA VINEYARD 2003-2004

PERFORMANCE UPDATE PRESENTED TO ANGUS BREMER WATER MANAGEMENT COMMITTEE

INTRODUCTION

Areas of Kayinga Vineyard are threatened by shallow water tables. Sub-surface drainage has been installed to lower the water table in order to sustain vine growth. Funding from the Angus Bremer Water Management Committee (ABWMC) via the Natural Heritage Trust allowed for a trial of varying drain spacing. The aim of the trial is to determine whether closer drain spacing increases their efficiency in dropping the water table. This is the second report and follows on from a detailed report from last year (2003 report).

BACKGROUND

Please refer to the 2003 report.

DESCRIPTION OF THE DRAINAGE SYSTEM

Please refer to the 2003 report.

THE ABWMC TRIAL

Please refer to the 2003 report.

The following 2 graphs show depth to water table for the last two years for the 4 drain spacings at each of the 2 sites. Last years report was written after significant rainfall in late August. It was noted that the narrower drain spacings at both sites were more efficient at keeping the water table depth below the rootzone depth when compared to the wider drain spacings. Following this further significant rainfall occurred in October and again the narrower drain spacings were more efficient at keeping the water table depth at a depth that would unlikely have a detrimental effect on vine roots and therefore vine health. Below average rainfall continued into the beginning of winter 2004 and therefore the system is yet to experience average or above average rainfall. From the rainfall events in August and October 2003 it is likely that similar results would be observed during average or above average rainfall.

Appendix "C"

Figure 1. Graph showing variation in depth to water table over time for the 10m drain spacing and 5m drain spacing.

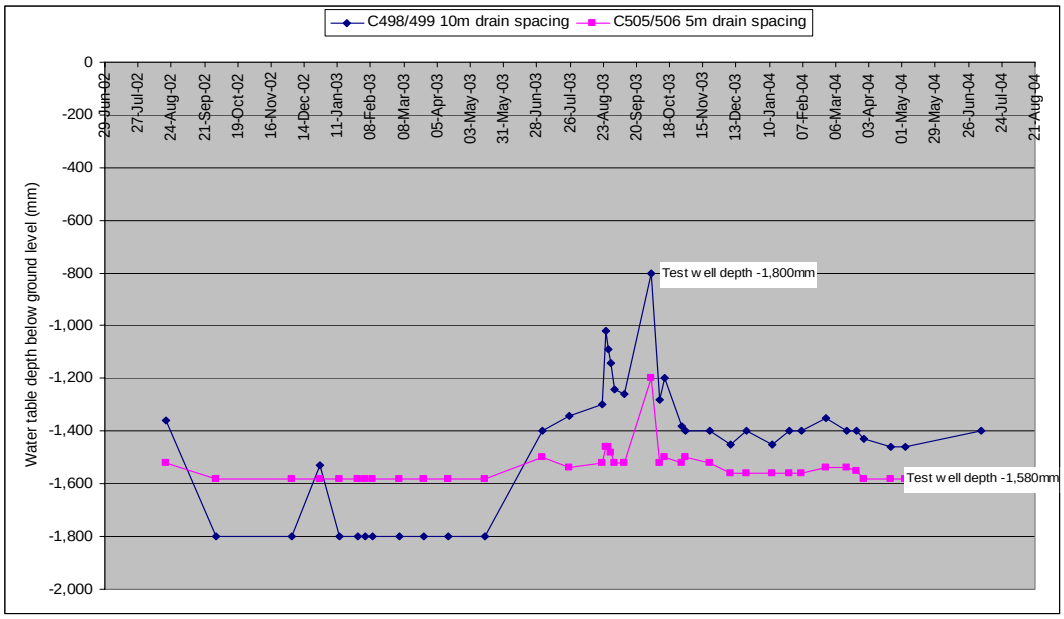
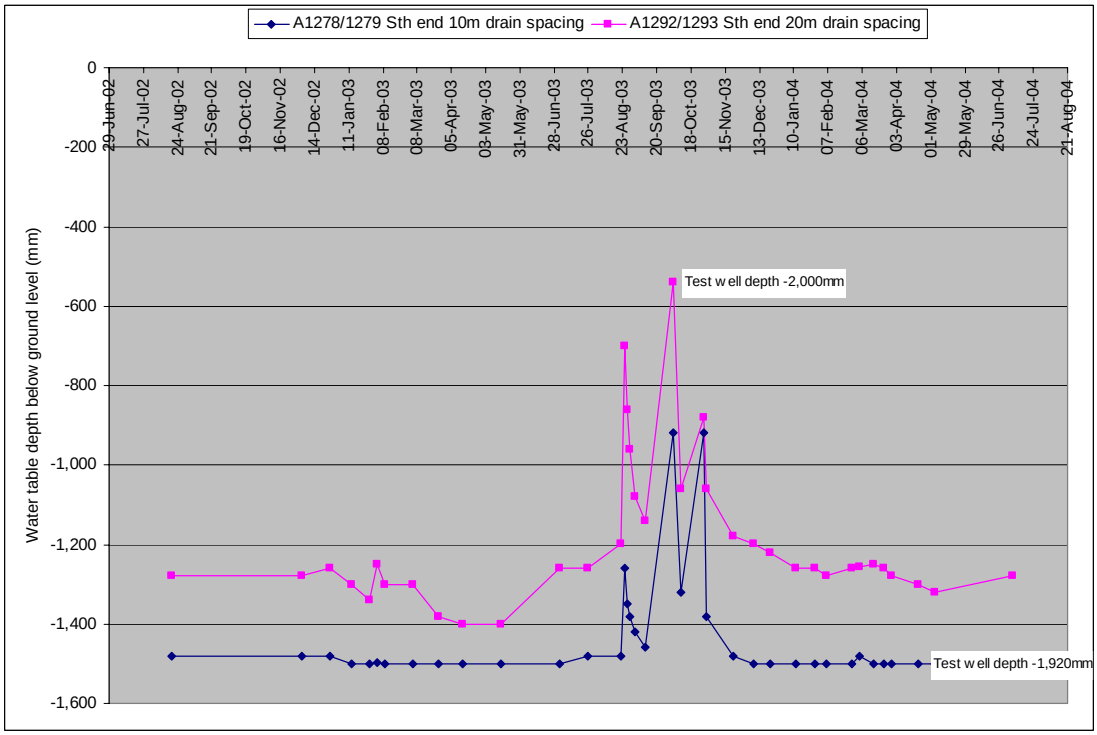


Figure 1. Graph showing variation in depth to water table over time for the 10m drain spacing and 5m drain spacings



Appendix "C"

GENERAL RESULTS OF DRAINAGE

The Shiraz in the larger drainage site suffered from salt uptake last year to the detriment of the crop. This vintage the symptoms of salt uptake were not as prevalent. Vine shoot length was still shorter than desired, however leaves remained healthier than last year leading up to harvest. This is likely to be due to the deeper irrigations applied leading up to harvest helping to leach accumulated salt from the root zone. General observations indicated there was also minimal salt symptoms for Cabernet Sauvignon and Merlot growing in the drainage areas. Over the past two years satellite images of Kayinga Vineyard have been taken which show different levels of vine biomass (an indicator of shoot length). When visually comparing the images for 2004 and 2003 there appears to be little difference in shoot length for the 3 varieties in the drainage areas.

The electrical conductivity (EC) of drainage water has been measured over the past 2 years. Whilst not statistically significant, generally there appears to be an apparent decline in EC for drainage water from all 3 sites. However, much more work is required to determine whether this decline is statistically significant. If there is a significant decline then this would be very encouraging as it may suggest the salt that has accumulated in the soil profile is being slowly leached into the drains.

A total of approximately 23,491kL of drainage water has been pumped from the system for both sites since installation. The larger drainage site varies in the rate of drainage water pumped according the season. In the drier summer months approximately 1.9kL of water is pumped each day for each hectare of drainage. In winter this rate increases to approximately 9.5kL/day/ha. The smaller drainage site seems to have a more constant rate of pumping which is not dependant on the season. At this site the rate of pumping is approximately 3.3kL/ha/day.

FUTURE DIRECTIONS

Further plantings in low lying areas near to the drainage sites have taken place however the effect the trees may have on the water table is unlikely to be observed for a number of years.

Expansion of the larger drainage site is expected to take place this financial year. This project will involve increasing the number of drains in the larger site therefore bringing all drain spacings to 5m. At the same time more test wells will be installed along the vine rows adjacent to the drains to allow closer monitoring of the performance of the drains.

Deeper irrigations to the drainage sites will be investigated earlier in the growing season to try to leach salts from the root zone in an attempt to minimise the effect this salt has on shoot growth thereby increasing shoot length. However, much care would be required with this approach as significant spring rainfall events combined with deeper irrigations may cause the water table to rise into the vine root zone and severely affect shoot growth. Soil samples will be taken to determine the soil salinity and the amount of leaching requirements.

Appendix "D"

Angus Bremer Irrigators Revegetation Association Inc.

Secretary - Simon Chinner
RSD 547
Langhorne Creek 5255
Ph 0428 830 080
Fax 8537 3248

The Angus Bremer Irrigators Revegetation Association Incorporated (ABIRA) has been formed to serve as the "Community Tree Scheme", formerly promoted by the Angus Bremer Water Management Committee.

ABIRA provides for its members, who have insufficient spare land to meet vegetation requirements, an avenue for meeting their vegetation needed under the Water Allocation Plan.

Landholders with vacant land to revegetate in the Angus Bremer area have been sought and some 36 plus Hectares are planted or will be planted over the next year, or so.
The revegetated land will be protected with an agreement, similar to a Heritage agreement, using a section of the recently enacted River Murray Act. The Minister for the Environment will enter into an agreement with the landholder for the planted areas and the title will be altered so these areas will be protected from clearing in perpetuity. Interim agreements have been made between ABIRA and the landholders.

ABIRA has raised the funds, from its members, to undertake the revegetation works. Preliminary costings have suggested an upper price of approximately $5,000 per Ha over 3 years. Funding through the Goolwa – Wellington LAP has been sought for various stages of the project and we have successfully secured funding for fencing costs. E-tree, have funded some tube stock to improve the species mix of the plantings. Funding from these outside sources will help ease the cost to members.

Members have paid $3,000 per Hectare for the area they require to cover the 2004/2005 financial year. They are issued with a certificate of currency for their financial commitment to the vegetation and this is attached to the annual irrigators report. The Angus Bremer Water Management Committee has the revegetated land details lodged with them.

The future will possibly see the Office of the Minister for the Environment become involved to take over all costs and management of the revegetation work. This process is underway but may take some time to eventuate.

Membership to ABIRA is open to all irrigators, especially in the Angus Bremer area, and there is a mixture of individual, family and corporate members investing in the project.

Contributors to ABIRA and its revegetation works are; The Murray River Catchment Board, Goolwa to Wellington LAP, Angus Bremer Water Management Committee Inc, E-tree, Eastern Fleurieu Langhorne Creek Campus and Strathalbyn Scout Group.
Special thanks are extended to Dr Kerri Muller and Rob Giles, with his committee who helped to bring about the evolution of ABIRA. Equally glad to see our committee take it off their hands!

Appendix "E"

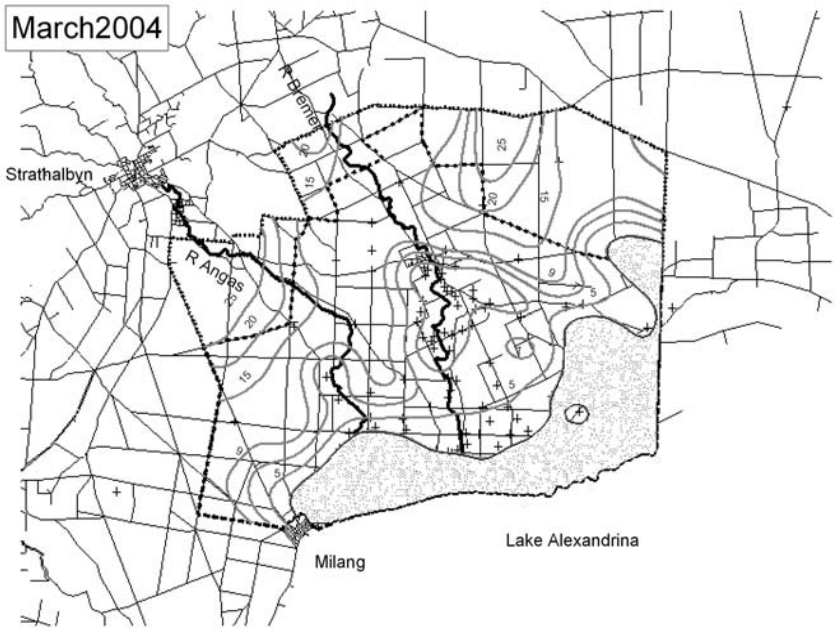
Depth to Un-confined water –table Angas Bremer 2003-2004

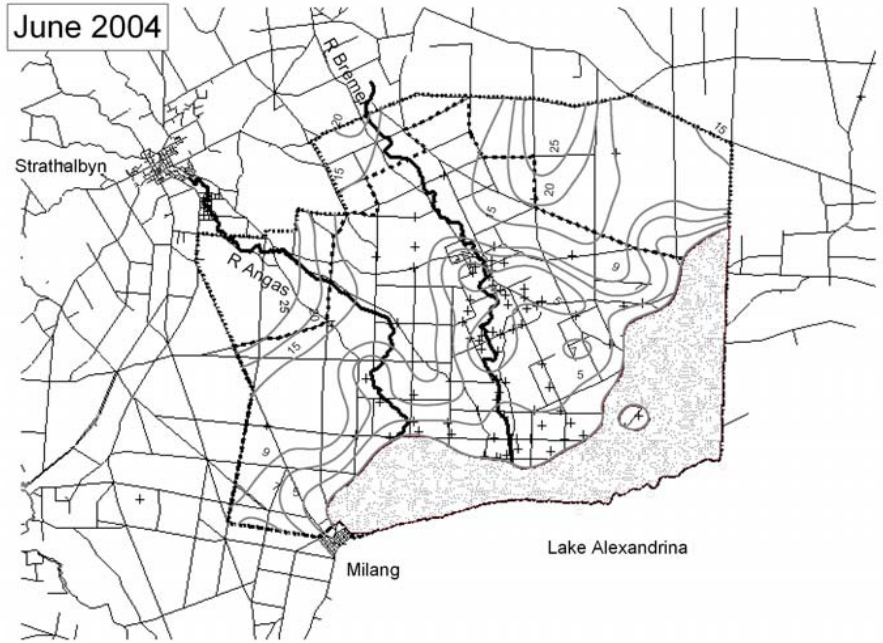
Shaded area shows where the water table is less than 3m to the surface – Contours are in meters

Appendix "E"

Depth to Un-confined water –table Angas Bremer 2003-2004

Shaded area shows where the water table is less than 3m to the surface – Contours are in meters





Legend

- Rivers
- Roads
- Prescribed Area Boundary
- Management Area Boundary
- D GROWERS wells
- E OBSWELL wells

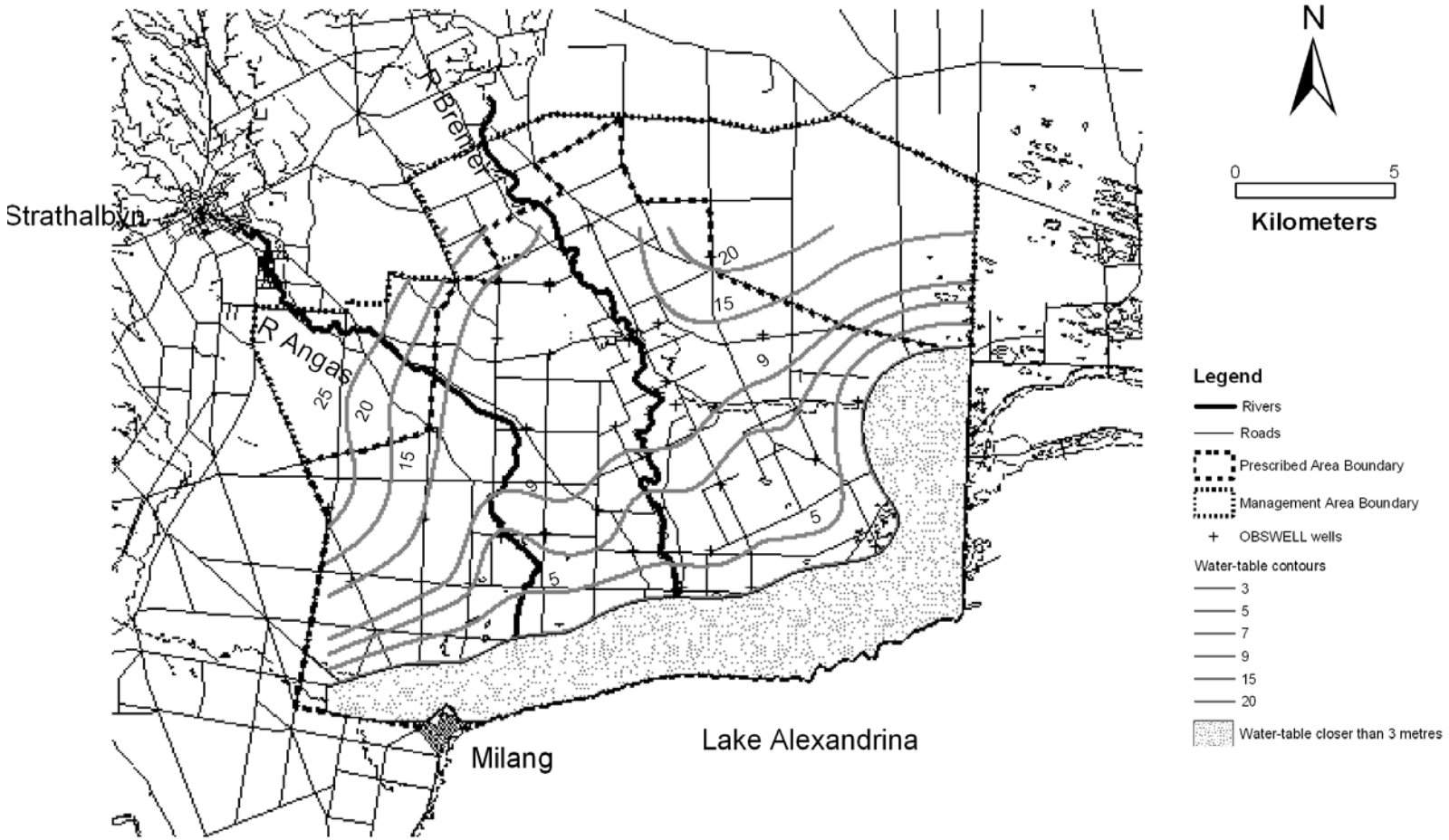
Water-table contours

- 3
- 5
- 7
- 9
- 15
- 20
- Water-table closer than 3 metres

Appendix "F"

Depth to Water-table Confined (T1) Aquifer 2004

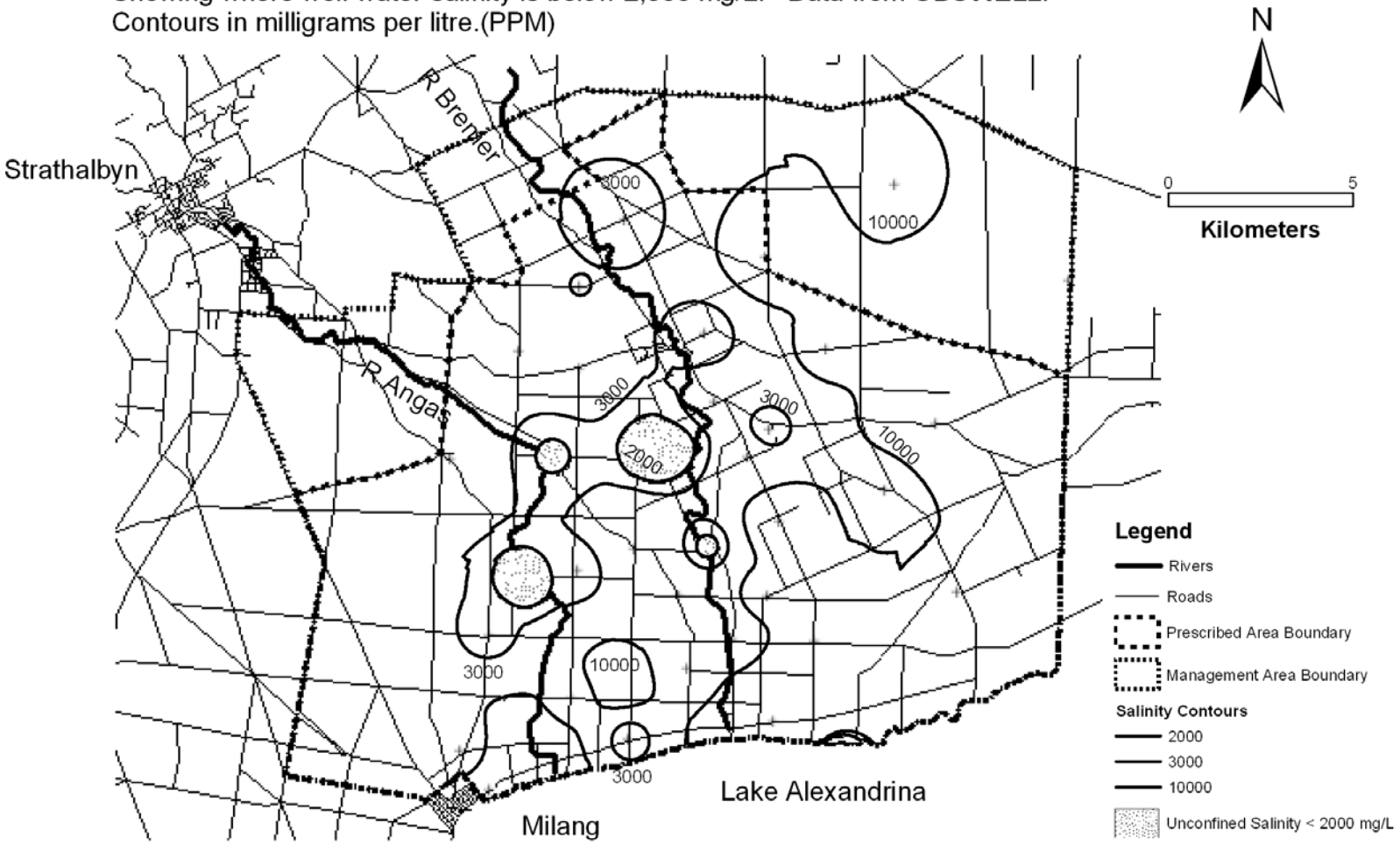
Showing where well-water-table is below 3 metres. Data from OBSWELL.
Contours in metres.



Appendix "G"

Salinity of Unconfined (Q) Aquifer Angas Bremer 2004

Showing where well-water-salinity is below 2,000 mg/L. Data from OBSWELL.
Contours in milligrams per litre.(PPM)



Appendix "H"

Salinity of Confined (T1) Aquifer Angas Bremer 2004

Showing where well-water-salinity is below 2,000 mg/L. Data from OBSWELL.
Contours in milligrams per litre.