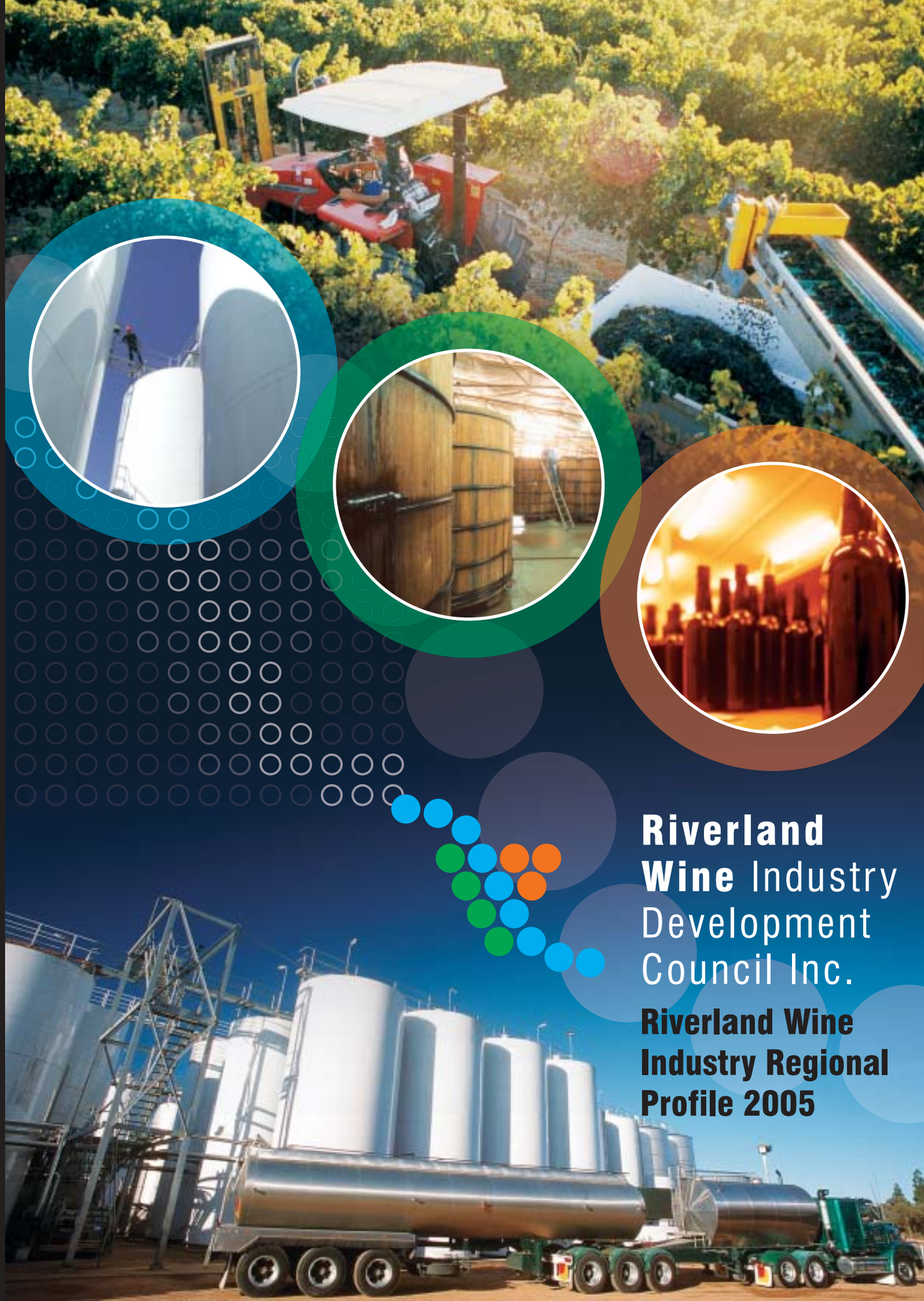

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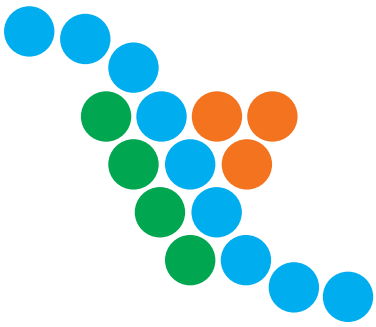
Riverland Wine Industry Regional Profile 2005

Riverland Viticulture Technical Group



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Wine Industry
Development
Council Inc.

The Riverland Wine Industry Development Council facilitates the Riverland Viticulture Technical Group (RVTG), which prioritises wine industry research, development and extension projects for the Riverland.

The aim of the Riverland Viticultural Technical Group is to;

- To provide a forum to exchange information and plan viticulture research projects of particular benefit to the Riverland wine industry.
- To provide a high standard of extension services to Riverland winegrape growers through the Industry Development Officer, Grower Liaison Officers, Viticulturalists, consultants and service providers.

For more information about the Riverland Viticulture Technical Group:

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Copies of this document may be obtained by contacting the Riverland Wine Industry Development Council using the details above.

The development of the Riverland Regional Profile was assisted by funding from the Grape and Wine Research and Development Corporation.

Julie Sippo
Project Manager
Riverland Wine Industry Regional Profile 2005

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Foreword

South Australia's Riverland region has often been referred to as "the engine room" driving the Australian wine industry. It is the largest wine producing region by volume in Australia, making approximately one-quarter of the nation's wine (ABS 2005).

The 2005 crush for the Riverland was over 482,000 tonnes, divided as 278,000 tonnes of red grape varieties (58 percent), and 204,000 tonnes of white varieties (42 percent) (PGIBSA 2005).

The Riverland has over 21,000 hectares of winegrape vineyards, with; shiraz, chardonnay, cabernet sauvignon, and merlot being the principal varieties grown.

Considered planning is a critical component of any wine producing region to be best able to meet its customers' expectations. This Regional Profile document lends to the planning of the Riverland winegrape and wine industry, and assists in clarifying how the infrastructure and human capacity should be developed.

Acknowledgements

The two-hundred and fifty Riverland winegrape growers who participated in the survey.

Riverland Viticulture Technical Group.

Riverland Winegrape Growers' Association.

Tony Clancy, Grape and Wine Research and Development Corporation.

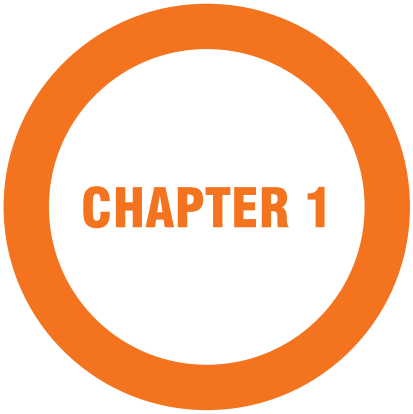
Executive Summary

The Riverland Regional Profile is a report comprising information gathered in a recent survey of winegrape growers as well as numerous secondary sources of data. It draws on a number of industry and regional reports to provide an overview of the land, people, current situation and issues that make up the Riverland wine industry – Australia's largest winegrape and wine producing region.

The survey has been developed by Riverland Wine Industry Development Council and Riverland Winegrape Growers' Association to gather data so that local extension programs can be planned against a background of knowledge about resources and local practices. In a general sense the profile will be a foundation for regional industry development, while highlighting the gaps in grower resources.
PIRSA (2005) estimates that the wine industry makes a direct contribution of
$299 million to the Gross Regional Product of the Riverland and now directly employs in excess of 3,600 people. Renmark, Loxton, Berri and Barmera are the primary residential towns for employees in the wine industry, with very few employees residing outside the Riverland area. The majority of employee expenditure also occurs within the region (Coakes & Fenton 2001).

The Riverland Wine Industry Strategic Plan 2003-2008 is recognised by 'Economic Growth Summit' (Department of Business, Manufacturing and Trade 2004) as "providing a high degree of certainty for the primary industry funding scheme".

The key issues identified by winegrape growers surveyed were clearly reflective of the current slump in prices, loss of contract security and water restrictions. All of the key issues were entered into the Riverland 'Priority Matrix' submitted in September 2005 to Riverlink to advance research and development projects for the winegrape industry.



The Land

History

The first irrigation settlement was established at Renmark in 1887 after an agreement between the Canadian born Chaffey brothers and the South Australian government. Thirty thousand acres were granted to the Chaffey's to initiate the venture, and vineyards and fruit blocks soon spread throughout the area.

During the late 1880's the brothers set up the scheme with canals and channels, bringing life giving water to the rich orange-red alluvial soils. With the addition of this magic ingredient, the region began producing excellent quality crops of citrus and stone fruits. Grape growing and winemaking spread quickly and by the beginning of the new century it was already a substantial contributor to the Australian vintage. Today it is Australia's largest winegrape growing region.

Angove's fast expanding winery and distillery, producing its famous St. Agnes brandies, was the first established in the region in 1910, followed by large Australian companies such as Yalumba, Orlando, Hardy's, Tollana, Normans, Seppelt and Penfold's, which all had vineyards in the region.

The Riverland is home to over 1,300 individual winegrape growers, many of whose families took advantage of the soldier settlement program after the First World War to begin a new life planting their blocks with government assistance, a brilliantly conceived and managed scheme. The second major development in the region came with the post-Second World War European immigration 'flood'. The newcomers with their strong link to wine and hard work developed the region quickly, inspiring others by their success. Such immigrants were the Moularadellis family whose Kingston Estate is a premium wine success story expanding from a 60 tonne crush in 1986 to approximately 40,000 tonnes in 2005, and winning many trophies and gold medals around the world along the way.

A huge success story has been the Hardy's Banrock Station project near Kingston. The vineyards are interspersed by wetlands which have been preserved and enhanced by owners The Hardy Wine Company, every one of the tens of millions of the excellent Banrock Station table and sparkling wines sold helps wetland projects around the world. In March 2001 a new wetlands educational walkway was opened.

Moisture control and minimum irrigation is also contributing to increased wine quality. Winemaking methods and technology combine with top quality grapes to produce some exciting wines in this important Australian wine region.

The region offers much to the visitor as it enjoys a very mild-pleasant climate all year round. The attractions of the river with its water sports, houseboat cruises and the many golf courses on its banks, beckons one to come and have a break anytime.

Location

The Riverland region is defined as the Waikerie and North, South and Lower Murray statistical local areas. It extends for 330 kilometres along the Murray River between Paringa and Blanchetown. The region has an average elevation between 50 and 150 metres above sea level (Spencer & Ashton 2003). For a textual description of Geographical Index (GI) see Appendix 7. Figure 1 shows a map of the Riverland Geographical Index.

Figure 1. Riverland Geographical Index Map

The region encompasses the Local Government Areas of Berri-Barmera, Loxton Waikerie and Renmark Paringa. The 2001 Census identified that the region supports over 33,000 persons, comprising 2.2 percent of the State's population.

Climate

The Riverland climate is continental, resulting in long sunny days and noticeably cooler nights. Modern viticultural and winemaking techniques mean that the climate can be seen as one of the region's strengths. Long sunshine hours ensure fruit ripens fully and low relative humidity results in little incidence of disease (Wine Australia 2005).

The climate can also be described as semi-arid, characterised by hot summers and cool winters. The annual average rainfall of 250 to 300 mm is fairly evenly distributed over the year, with the higher rainfall months occurring from late autumn to early spring. Evaporation greatly exceeds precipitation, particularly in summer.

Class A pan evaporation ranges from 1,600 mm for sites within irrigated areas, to 2,300 mm for flat open dry land sites. Maximum daily temperatures average 32ºC in January and 16ºC in July. The minimum daily temperature averages 15ºC in January and 5ºC in July. Some locations, particularly inter-dune swale areas are prone to frosts from April to November, with most frosts occurring during June, July and August. (Enrich 1984). Gladstones (2002) notes that of the fully irrigated viticultural areas of Australia, this is the coolest during ripening. Ripening temperatures are nearly 2ºC lower than at Griffith and Leeton in New South Wales. On the other hand the average extreme maxima during ripening at Berri are about 1.5ºC higher. The greater variability of the maximum at Berri reflects its marginally south coast/dry Mediterranean climatic type, whereas Leeton and Griffith have slight sub tropical influence, which moderates the summer extremes.

TABLE 1. Renmark, Waikerie & Loxton Weather Station data

RENMARK WEATHER STATION 1889-2003 (EASTERN SECTOR)	
Map Coordinates	34°10'S, 140°45'E
Altitude	20m (65.6 feet)
Heat degree days, Oct-Apr	1818 (cut off at 19°C (66.2°F) but otherwise not adjusted)
Sunshine hours	NA
Annual rainfall	261 mm (10.3 inches)
Growing season rainfall	135 mm (5.3 inches)
Mean January temperature	24.6°C (76°F)
Relative humidity, Apr Oct, 3 pm	Average 33 percent
Harvest	Mid Feb-mid Apr
WAIKERIE WEATHER STATION 1896-2001 (WESTERN SECTOR)	
Map Coordinates	34°11´S, 139°59´E
Altitude	30.1m (98.4 feet)
Heat degree days, Oct-Apr	1800 (cut off at 19°C (66.2°F) but otherwise not adjusted)
Sunshine hours	Oct-Apr NA
Annual rainfall	253 mm (10 inches)
Growing season rainfall	133 mm (5.2 inches)
Mean January temperature	24.1°C (75.4°F)
Relative humidity, Apr-Oct, 3 pm	Average 30 percent
Harvest	Mid Feb-Mid Mar
LOXTON RESEARCH CENTRE WEATHER STATION 1984-2003 (SOUTHERN SECTOR)	
Map Coordinates	34°26´S, 140°36´E
Altitude	25m (82 feet)
Heat degree days, Oct-Apr	1724 (cut off at 19°C (66.2°F) but otherwise not adjusted)
Sunshine hours, Oct-Apr	1968
Annual rainfall	267 mm (10.5 inches)
Growing season rainfall	130 mm (5.1 inches)
Mean January temperature	22.8°C
Relative humidity, Apr-Oct, 3 pm	Average 32 percent
Harvest	Mid Feb-Mid Mar

Source: Australian Wine and Brandy Corporation.

Soil factors

In the mid 1980's, the State water licensing authority required that an intensive soil survey be undertaken as a condition of approval of transfers of water allocations. The soil survey categorised the soils in terms of their readily available water holding capacity (RAW), drainage characteristics, presence of lime, and crop type and suitability. The different soil groupings delineated are then used in irrigation system design and irrigation scheduling. Soil properties, such as texture, carbonate (lime) content, and pH was described from sample pit inspections. Field hand texture grade of each soil layer to the crop rooting depth is used to estimate RAW. 261 soils were sampled in the irrigation districts of the River Murray upstream of Morgan in South Australia. These RAW values have been used by soil surveyors when doing surveys in intensive irrigated horticultural areas within South Australia, Victoria, and New South Wales, and for irrigated agriculture elsewhere in Australia (Meissner 2004).

The soils of the Riverland vary significantly throughout the region. Soils from a vineyard near Loxton, whilst having only half the topsoil depth of two near Waikerie, are comparable in water-holding capacity because the soils are less sandy. Topographic difference can cause an additional variation between areas in the same neighbourhood. Highland soils typically develop a dune swale (Brooker 2001).

Shepherd and O'Donnell (1999) describe two main soil types in the region; river valley soils consisting of sandy loams over clay subsoils, and mallee soils on higher ground consisting of wind-blown sands over lime and clay layers. Soils within the river valley, comprising loams and clays, were formed when fine clay and silt particles were deposited over the flood plain by the River Murray. On higher ground the Mallee landscape is characterised by depressions and rises and consists of windblown sands over lime and clay layers (Clancy 1999).

The Atlas of South Australia (1986) describes calcareous earths as having gradational texture profiles that are calcareous throughout. They are widespread in the pastoral districts of South Australia and the drier margins of the agricultural districts. They have indistinct horizons and are typified by the brownish sandy and loamy soils of the 'mallee' lands. Calcium carbonate (lime) may range up to 10 percent in surface soils and 60 percent in subsoils. Some lime is hardened to calcrete (sheet limestone) or may be stony. Surface soils are neutral to alkaline, and subsoils are strongly alkaline. Alkaline soils limit the uptake of important nutrients such as copper, zinc, manganese and iron. Phosphorous will also have low mobility. A comprehensive fertiliser application management based on regular crop nutrition monitoring will reduce nutritional problems associated with alkaline soils (AWE 2002).

A range of textures and soil depths can mean large variations in water storage capacity.
Soils information collated during 1998-1999 were produced as "Land Suitability for Irrigated Horticulture" maps at 1: 50,000 scale between the SA border and Blanchetown by PIRSA.

A soil survey maps the types and distribution of soils on a property. Assessment of the soil data reveals the maximum depth of the crops root zone and the amount of water that the soil can hold within this root zone. A soil profile consists of layers of varying soil types. Colour of the soil is normally a good indication of the boundaries between each soil layer. Each layer is assessed for the presence of tree roots, for soil texture and impermeable layers such as carbonate and clay. Other information such as salinity, pH and structure can be collected. The RVTG Winegrape Grower Survey (2005) found that 61 percent of Riverland growers surveyed had done a soil-type profile on their vineyards.

Soil types differ in their ability to hold water, and how much of this water that can be easily extracted by plant roots. Readily available water (RAW) is defined as the millimetres of water that tree roots can utilise percentimetre of soil depth. RAW varies with texture of the soil. Typical readily available water values for soils in the Riverland are listed below.

TABLE 2. Readily Available Water for Soils in the Riverland

SOIL TEXTURE	Readily available water (-8kPa to -60kPa) (mm/cm)
Sand	0.38
Loamy sand	0.55
Sandy loam	0.65
Light sandy clay loam	0.74
Sandy clay loam	0.71
Clay loam	0.65
Light clay	0.57
Medium clay	0.41

Source: SARDI, 2001

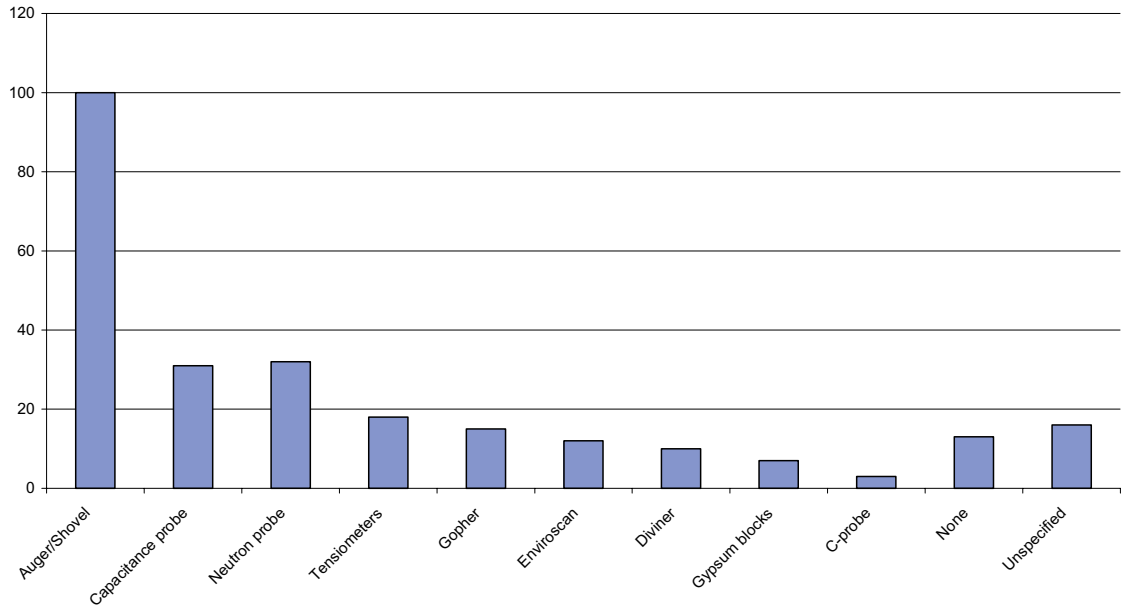
Irrigation water factors

The production of grapes in the Riverland is reliant on irrigation from the River Murray. A report by PIRSA (2005) notes that in South Australia, 91.9 percent of vineyards use irrigation, and while this is highest percentage of vineyards in Australia under irrigation, the usage, in megalitres per hectare, is less than that per hectare when compared to New South Wales or Victoria.

In 2001-2002 the most common methods of irrigating wine grapes in the Riverland region were overhead or low sprinklers – these methods were used by 34 percent and 25 percent of producers respectively. Around 21 percent of producers were using drip irrigation, with a number of producers using more than one method for irrigating wine grapes (Spencer & Ashton 2003).

Seventy-two percent of Riverland growers use weather data to schedule their irrigation (RVTG 2005). In conjunction with this, various irrigation scheduling tools are used by wine grape producers as part of their irrigation management, see figure 2. Irrigation scheduling involves the monitoring of soil moisture and plant water use to determine the optimal timing and volume of irrigation water applications.

Figure 2. Irrigation Scheduling Tools used by Riverland VTG survey respondents



Source: RVTG 2005

The responses received in the RVTG survey vary significantly from those in Spencer and Ashton (2003), see Table 3. The Spencer and Ashton (2003) report also identified that the most common irrigation management practices in the Riverland region included 'regulated deficit' irrigation. Other common methods included irrigating at night to avoid evaporation, and varying the irrigation method to weather conditions.

Table 3. Irrigation characteristics, Riverland region, 2001-02

Application methods	**Share of farms - %**
Wine grape area irrigated using	
– flood	0
– fixed overhead sprinkler	34
– low sprinkler	25
– microjet	14
– trickle/drip	21
– travelling irrigator	0
– movable spray lines	0
– other	6
Irrigation scheduling tools	
Proportion of producers using	
– neutron probes	3
– capacitance probes	40
– tensiometers	23
– gypsum blocks	0
– time domain refrectometer	0
– soil profile sampler	2
– other	26

Source: Spencer & Ashton 2003

Important technological changes leading to improved irrigation management have been:

1. Identifying soil characteristics in detail:
   - crop suitability
   - water holding capacity of the soil
2. Evaluating performance of irrigation system
3. Designing and checking irrigation systems to recognised standards
4. Tools for improved monitoring:
   - soil water monitoring
   - irrigation scheduling
   - watertable monitoring.

Preparing irrigation and drainage management plans and intentions to adopt the techniques is mandatory for new developments where water allocation transfers or amalgamations are involved (Smith 2002). 68 percent of surveyed growers indicated that they have an irrigation and drainage plan (RVTG 2005).

The River Murray Prescribed Watercourse Water Allocation Plan (DWLBC 2002) is a component of the River Murray Catchment Water Management Plan and provides the detailed policies to achieve goals for water allocation, transfer, and conditions of use. The WAP prescribes that from June 2005, "water shall only be taken and used for irrigation so that the use of the water achieves a water-use efficiency of no less than 85 percent".

Hydrogeology

There are three major aquifer systems in the Riverland Region:

- the Renmark Group confined aquifer
- the Murray Group limestone aquifer
- the Loxton-Parilla Sands aquifer

Smith (2002) describes how these aquifer systems are recharged in the higher rainfall areas around the margins of the Murray Basin, mainly the Great Dividing Range, the Grampians and the Mt Lofty Ranges. Groundwater moves very slowly under low gradients in all aquifer systems, from recharge areas at the margins toward the River Murray in the centre of the basin. The rate of movement is estimated to be about 2 m/year, which results, for instance, in a travel time of 200,000 years from the Grampians to the river. Because of its low elevation, the River Murray is the focus of groundwater discharge in all aquifer systems and consequently acts as a drain. The salinity of the river increases dramatically in many downstream reaches as a result of this groundwater discharge. Groundwater salinities next to the river can be high (more saline than seawater - 58 dS/m) after the long journey from the recharge areas where groundwater salinities were low (around 1.8 dS/m) initially.

The table below presents the range of salinities in the three major aquifers.

Table 4. Range Of Salinities in the Three Major Aquifers

Aquifer	**Range of salinities (dS/m)**
Renmark Group	12.6 to 63
Murray Group Limestone	25.2 to 63
Loxton - Parilla Sands	25.2 to 180

Source: Sinclair Knight Merz, 1997.

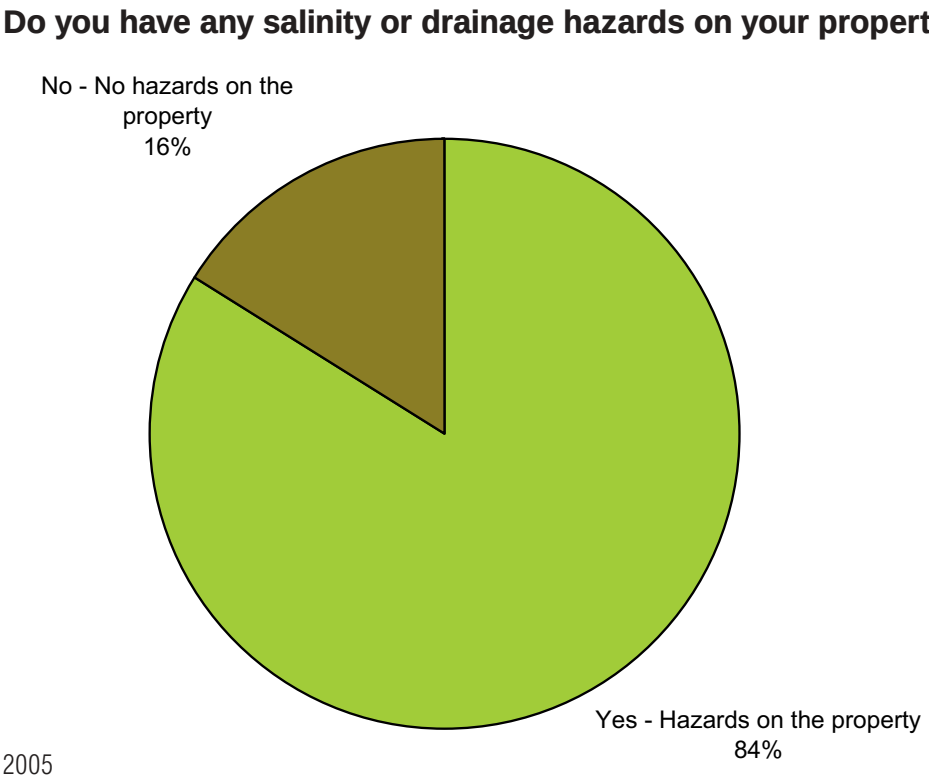
Before river regulation and irrigation developments, groundwater inflows to the river would have been relatively small because of the very low watertable gradients from the distant recharge areas and the seasonal fluctuations in river flow. River regulation structures and irrigation have raised groundwater levels in floodplain areas.

Irrigation on highland next to the river valley has led to relatively low salinity water, excess to evapotranspiration, percolating down to form a mound on top of naturally occurring saline groundwater. This mounding forces much greater volumes of saline groundwater discharges to the river valley, resulting in floodplain degradation and increases in river salinity. In addition the clearing of native vegetation from the Mallee area has enhanced the recharge rate and will cause a rise in watertables and increased salt discharges to the river in the future.

Drainage problems

It is possible for waterlogging and salinisation of soils to occur within a decade of irrigation developments being established. Irrigation has resulted in applications of water as much as five to six times the annual rainfall. Groundwater mounds built up beneath the irrigated areas inducing saline groundwater flows to the river and river valley with subsequent detrimental salinity and environmental impacts. Prior to improved water use efficiency and drainage, waterlogging in the form of perched watertables was prevalent in soils with relatively impermeable subsoils. 16 percent of growers surveyed identified salinity or drainage hazards on their properties (RVTG 2005), see figure 3.

Figure 3. Salinity or Drainage Hazards



Source: RVTG 2005

Smith (2002) reports that before irrigation, Riverland soils contained some salts. The measured electrolyte concentration of the irrigation water as an indicator of the salt concentration, in general ranges from 0.3 to 0.8 dS/m at 25° C at times of high and low river flows respectively. Irrigation results in average applications of salt amounting to 3 tonnes per irrigated hectare every year. The high evaporation rate brings about hazardous concentration of salts in the rootzone thus inhibiting the plant's ability to obtain water.
Cultivation, irrigation and drainage have brought about physical and chemical changes to the soils, which only add to the complexity of drainage problems. Some of these soil changes are being further investigated through Grape and Wine Research and Development Corporation projects.

Principal Varieties

The principal winegrape varieties grown in the region are illustrated in table 5.

Table 5. Principal Winegrape Varieties by Hectare

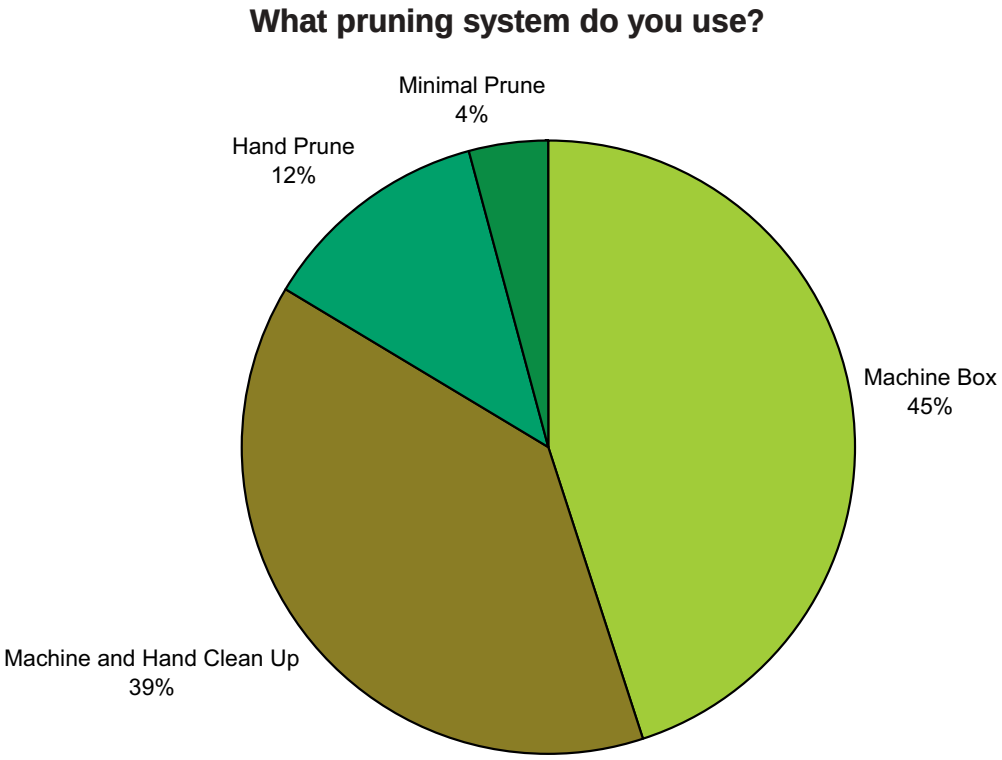
Variety	Area by hectare	Variety	Area by hectare
Reds:		Whites:	
Shiraz	5188	Chardonnay	4404
Cabernet Sauvignon	3510	Muscat Gordo Blanco	1085
Merlot	1146	Colombard	898
Petit Verdot	627	Sultana	455
Ruby Cabernet	620	Semillon	366

Source: PGIBSA 2005

Pruning Systems

Most winegrape growers used machine and/or machine and hand cleanup. Only 12 percent hand pruned. 4 percent of vines (noted as Cabernet Sauvignon) were minimal pruned.

Figure 4. Pruning systems

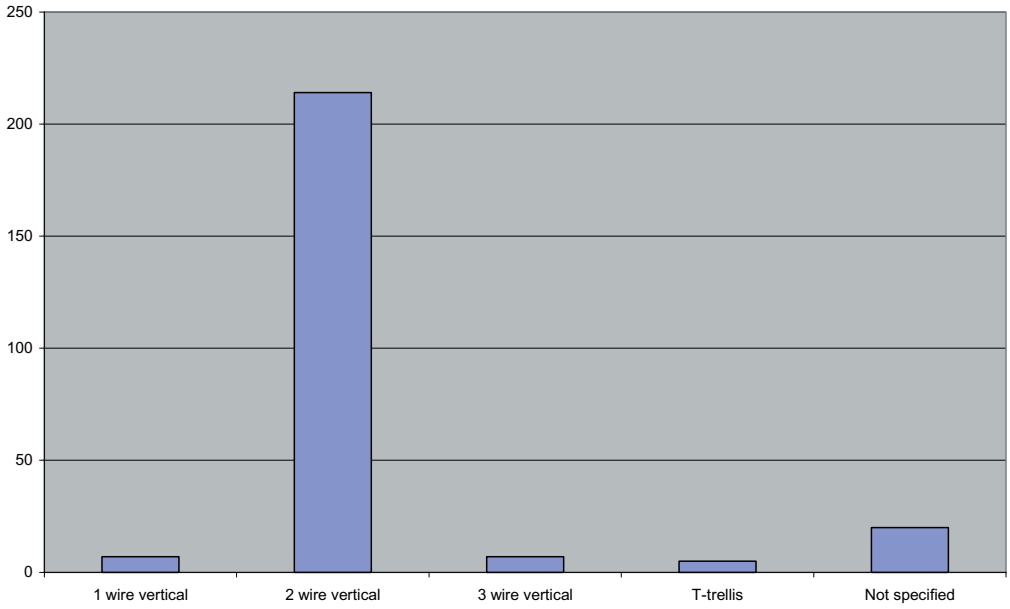


Source: RVTG 2005

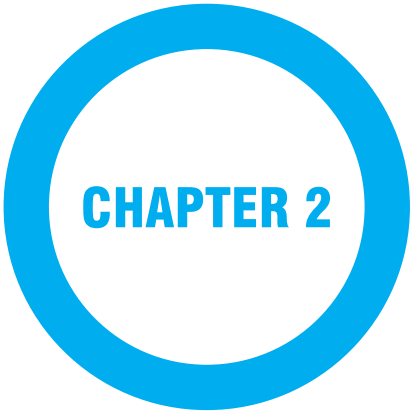
Trellis System

Two-wire vertical is overwhelming the most popular form of trellis system, as illustrated by figure 5.

Figure 5. Trellis systems



Source: RVTG 2005



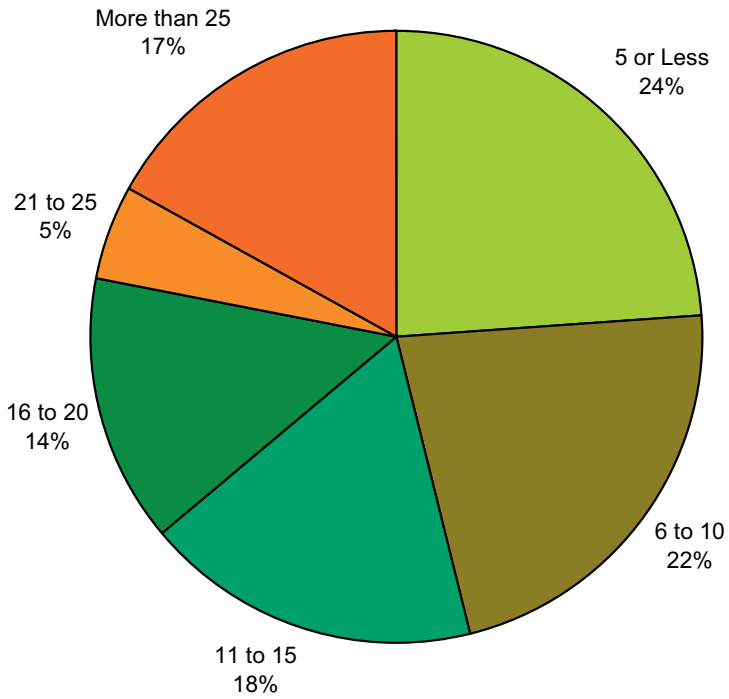
The People

Size of properties

The Riverland wine industry is characterised by a large number of small to medium sized independent vineyards, with a smaller number of large wine producers. The Phylloxera and Grape Industry Board of South Australia (2004) reports that there are 1,303 growers in the Riverland, and 797 have vineyards of less than 10 hectares in area. These properties make up a total of 4,002, or 19 percent, of the 21,018 hectares of vines in the Riverland. The average size of the 797 smaller vineyards is 5 hectares.

The RVTG survey (2005) results of 250 growers by area of bearing vines is presented in Figure 6 below, which shows that 43 percent of surveyed properties have a bearing area of 10 hectares and under. For complete table of figures see Appendix 6.

Figure 6. Surveyed properties by Area of Bearing Vines



Source: RVTG 2005

Size of property information was also gathered by the Truscott report (2005). Their results varied from the RVTG and showed 34 percent of properties under 10 hectares, 61 percent between 10 and 99 hectares and 5 percent over 100 hectares.

During the 1990's the buoyant prices of winegrapes prompted many producers to expand their vineyards, in many cases removing citrus or stonefruit plantings to do so. New plantings also extended into land traditionally used for broadacre (dryland) farming pursuits. As illustrated by table 6, the bearing area of vines significantly increased in the period from 1992 to 2003, and total production more than doubled. This rapid expansion of plantings has now slowed, with the 250 RVTG survey respondents reporting that their new plantings from July 2003 covered 470.8 hectares.

TABLE 6. Riverland Bearing area, total production and yield 1992-2005

YEAR	BEARING AREA – HA	TOTAL PRODUCTION – TONNES	YIELD - TONNES/HA
1992	9 616	206 692	21.5
1993	9 609	169 849	17.7
1994	9 641	197 229	20.5
1995	10 384	183 384	17.7
1996	10 102	214 283	21.2
1997	10 862	190 012	17.5
1998	13 251	237 477	17.9
1999	13 852	250 115	18.1
2000	18 481	313 381	17.0
2001	20 626	426 565	20.7
2002	19 765	346 331	17.5
2003	21 482	431 123	20.1
2004	21 483	440 121	20.5
2005	21 141	482 214	22.8

NB: Up to 1999 the Riverland is defined by the following Principal Grape-Producing Regions: North Murray District, South Murray District, Waikerie and Lower Murray District.

Source: ABS Vineyards Survey, AWBC, PGIBSA.

Business mixes of properties

Table 7, an extract of Coakes & Fenton (2003) shows that only 50 percent of winemaking businesses were identified as family businesses as compared to 94 percent of grapegrowing businesses. Differences in corporate and family ownership of businesses is also evident in relation to business ownership, where only 50 percent of winemaking businesses were operated by the current owners who were interviewed, with all grapegrowing businesses also the owners of the business.

TABLE 7. Riverland vineyard and property characteristics

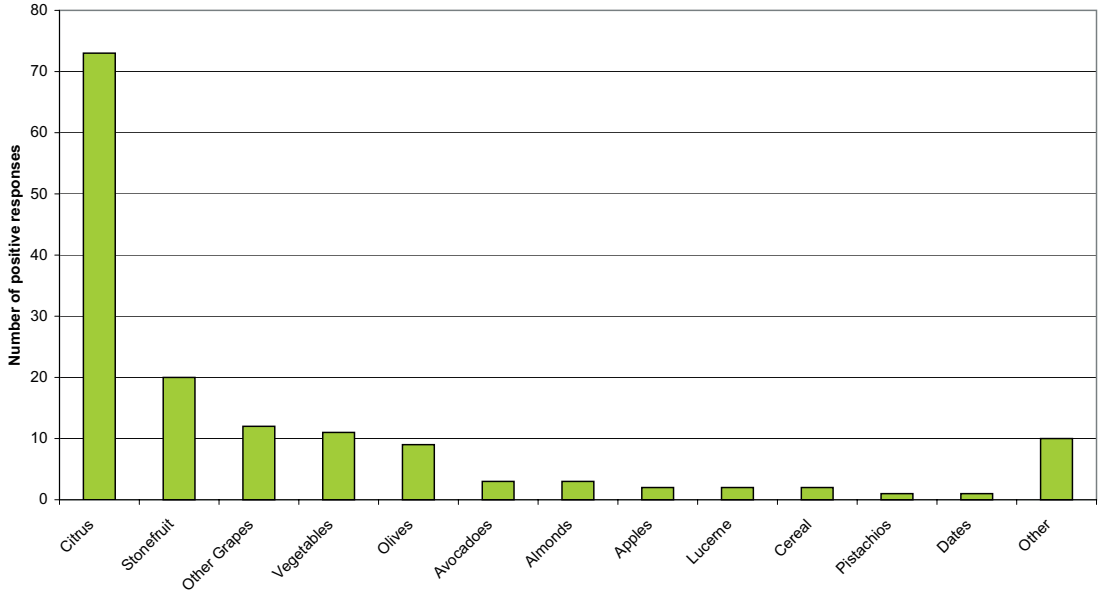
	Winemakers	Grapegrowers
Business Type (%)		
Family Vineyard	50	50
Joint Venture	0	0
Corporate Vineyard	50	50
Business Ownership (%)		
Current Owners	50	100
Lease, manage or other	50	0
Other farm crops		
% other crops	16.7	41.2
Sheep	16.7	0
Cereal	0	5.9
Citrus	0	35
Olives	0	5.9
On property		
Mean years grape production	42.5	39.6
Mean years winemaking	50.4	3.7

Source: Coakes and Fenton 2003

Table 7 also shows that 41 percent of grape growers produced crops other than grapes, with the majority producing citrus crops.

The Riverland Winegrape Growers Survey (RVTG 2005) found somewhat higher than this result, with 54 percent of winegrape growers also producing citrus and other crops, see figure 7.

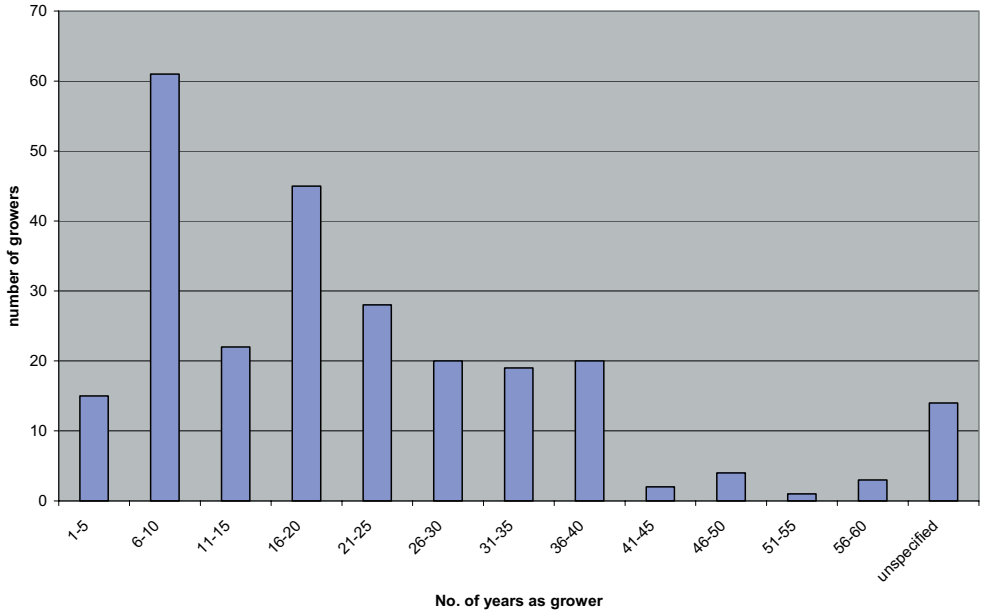
Figure 7. Crops other than winegrapes



Source: RVTG 2005

Table 7 also shows that grape production amongst winemaking businesses has occurred on the property for an average of 43 years and amongst grapegrowing business for an average of 40 years. The more recent RVTG survey data (see figure 8) found that the largest number of growers (25 percent) have been in the industry for between six and ten years, possibly reflecting the expansion of the wine industry in the 1990's.

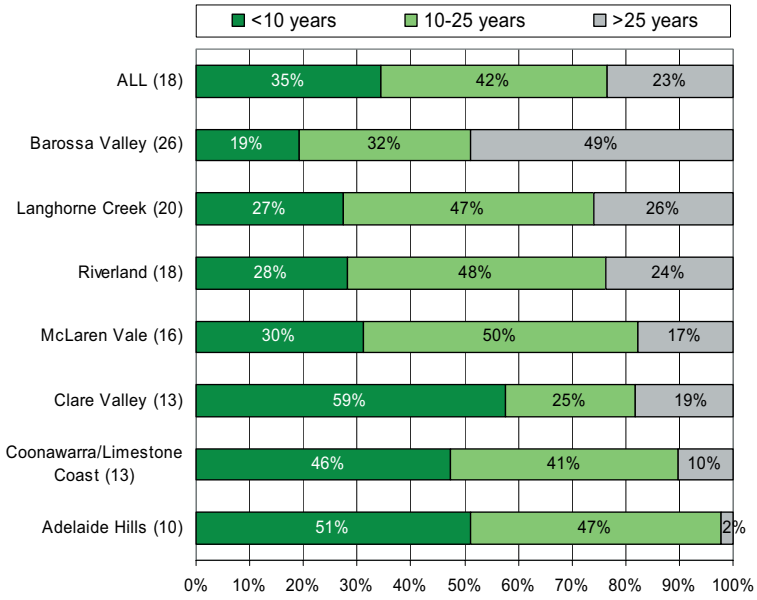
Figure 8. Years as a winegrape grower



Source: RVTG 2005

The Truscott report (2005) conducted research across South Australia for the South Australian Wine Industry Association. It found that 28 percent of Riverland growers had been in the industry under ten years, and that 48 percent had been in industry between ten and twenty-five years. The closest correlation between the two studies were for the section in industry over twenty-five years, which was reported as 24 percent by Truscott and just slightly higher at 28 percent by the RVTG. The Truscott results are displayed in figure 9.

Figure 9. Winegrape Growing Experience (years in industry)

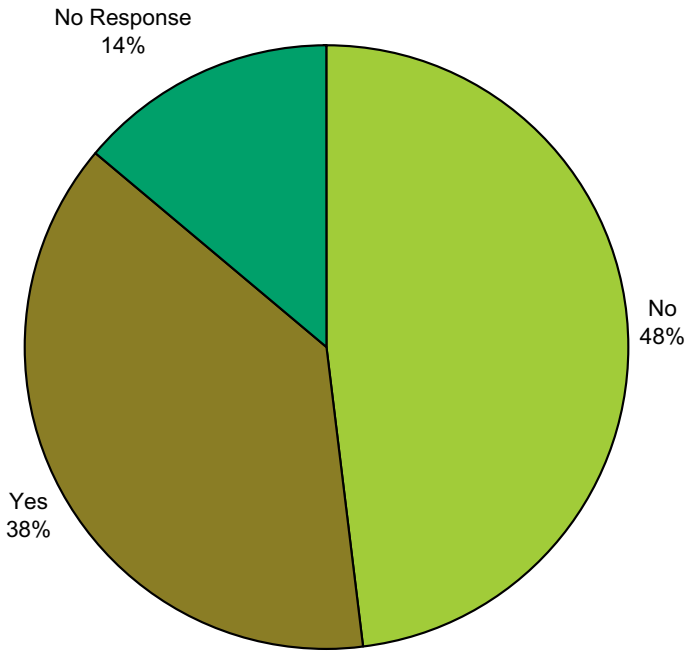


Source: Truscott 2005

Succession Planning

A high number of winegrape growers (48 percent) did not have any succession planning in place, with many not answering the question (14 percent), perhaps a further indication of grower confusion.

Figure 10. Winegrape growers with succession plans in place

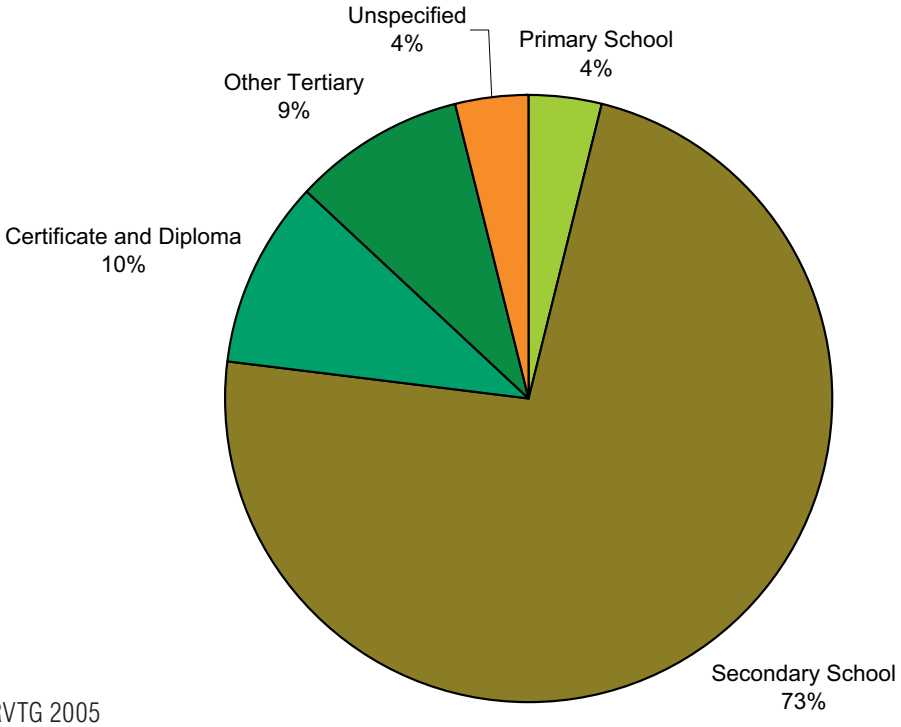


Source: RVTG 2005

Education and training

The RVTG survey results indicated 73 percent of surveyed growers had completed secondary school, and 19 percent had attained tertiary qualifications. Coakes and Fenton (2003) report that educational qualifications and school retention rates in the Riverland were relatively low compared to regional Australia as a whole.

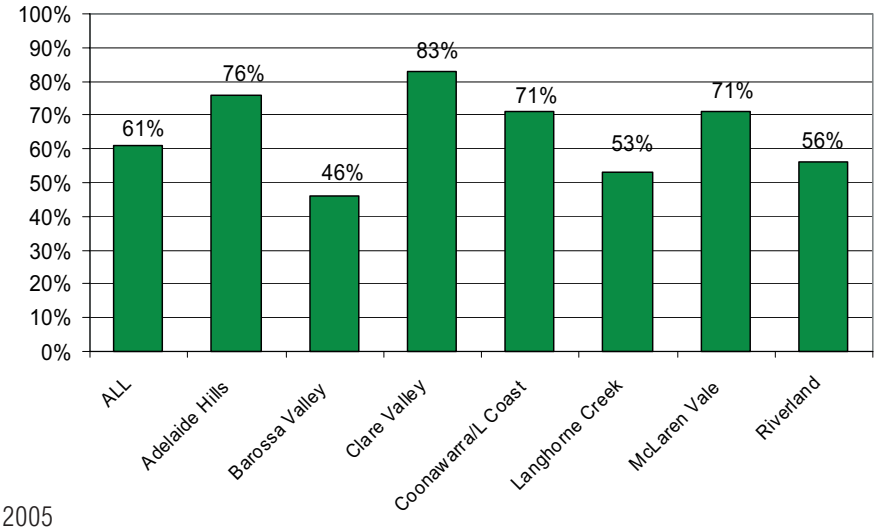
Figure 11. Education levels of Riverland Winegrape Growers



Source: RVTG 2005

The Truscott report varied from both of these reports through recognition of trade qualifications, with 56 percent trade and professional qualifications reported (figure 12).

Figure 12. Trade/professional qualifications



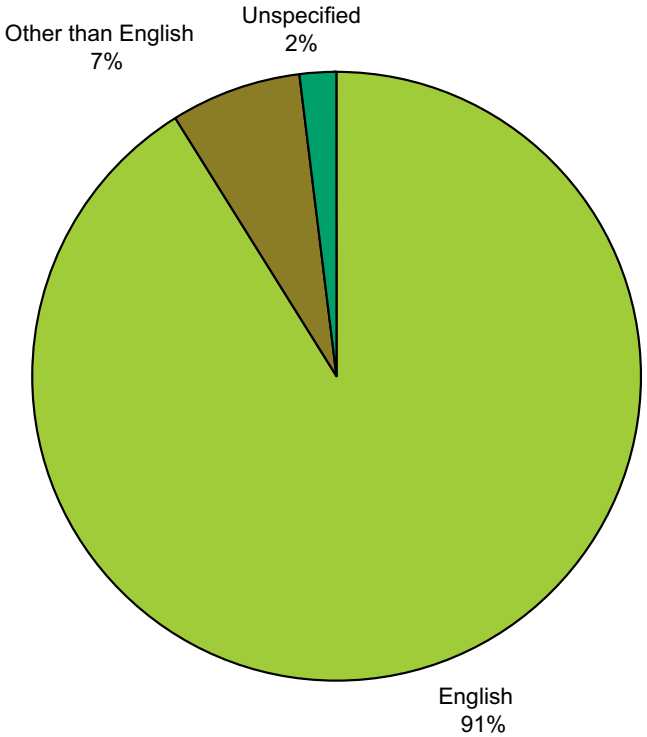
Source: Truscott 2005

Spencer and Ashton (2003) also report that around 90 percent of producers reported attending field days, demonstration sites, workshops or short courses during the two years to June 2002.

Language

The Riverland population is more ethnically diverse than most other areas of regional Australia. Although the Riverland recorded a slightly lower proportion of people born overseas than regional Australia (11.4 percent compared to 11.7 percent) in 1996, a higher proportion of the Riverland's population were from non-English speaking backgrounds (7.2 percent compared to 5 percent)(Coakes & Fenton 2001). The RVTG survey asked 250 winegrape growers if English was their first language (see figure 13). The result (7 percent) are fairly consistent with the results of the 2001 census, which indicated that approximately 6 percent of respondents had a first language other than English.

Figure 13. First Languages



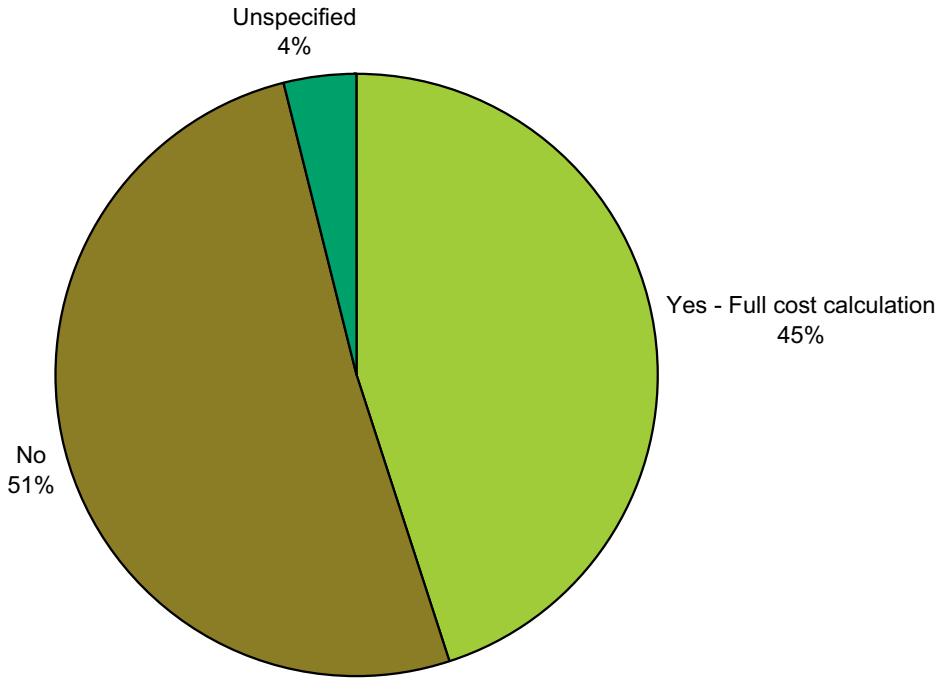
Source: RVTG 2005

Business Management

In light of difficult economic circumstances experienced by growers in the early- and mid 2000's, the RVTG survey examined growers' business management practices by ascertaining the extent to which regularly performed cost calculations were undertaken on their businesses by winegrape variety, examining costs such as; labour hire, water, fertilisers, and bank interest.

Figure 14. Winegrape growers that calculate costs of production

Do you regularly calculate your costs of production for each variety of vines by factoring in costs such as labour hire, water, fertilisers, finance (bank interest)?

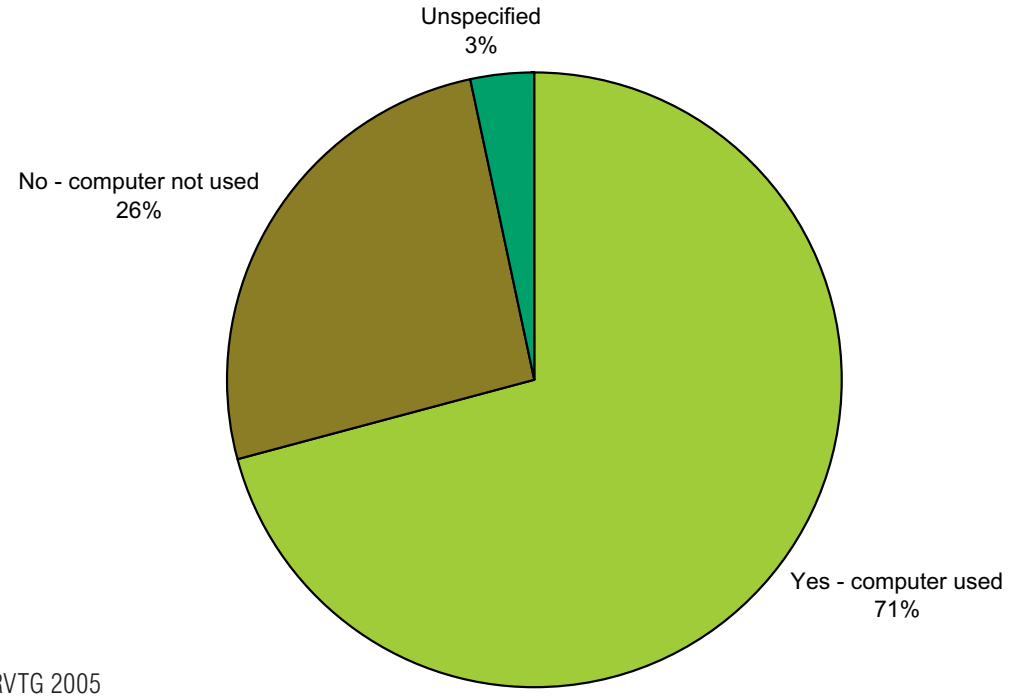


Source RVTG 2005

Computer Use

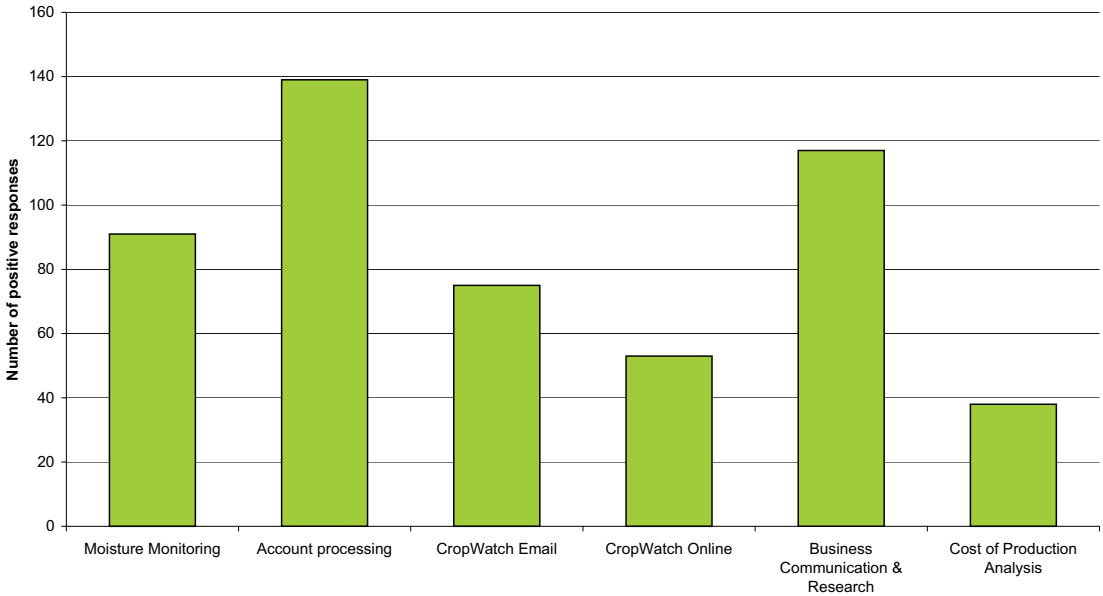
The majority of vineyard businesses now have computers (see figure 15), most commonly used for account processing and business research and communication. Viticultural tools were also accessed, including soil moisture monitoring and CropWatch pest and disease alerts and information (see figure 16).

Figure 15. Computer used in vineyard businesses



Source: RVTG 2005

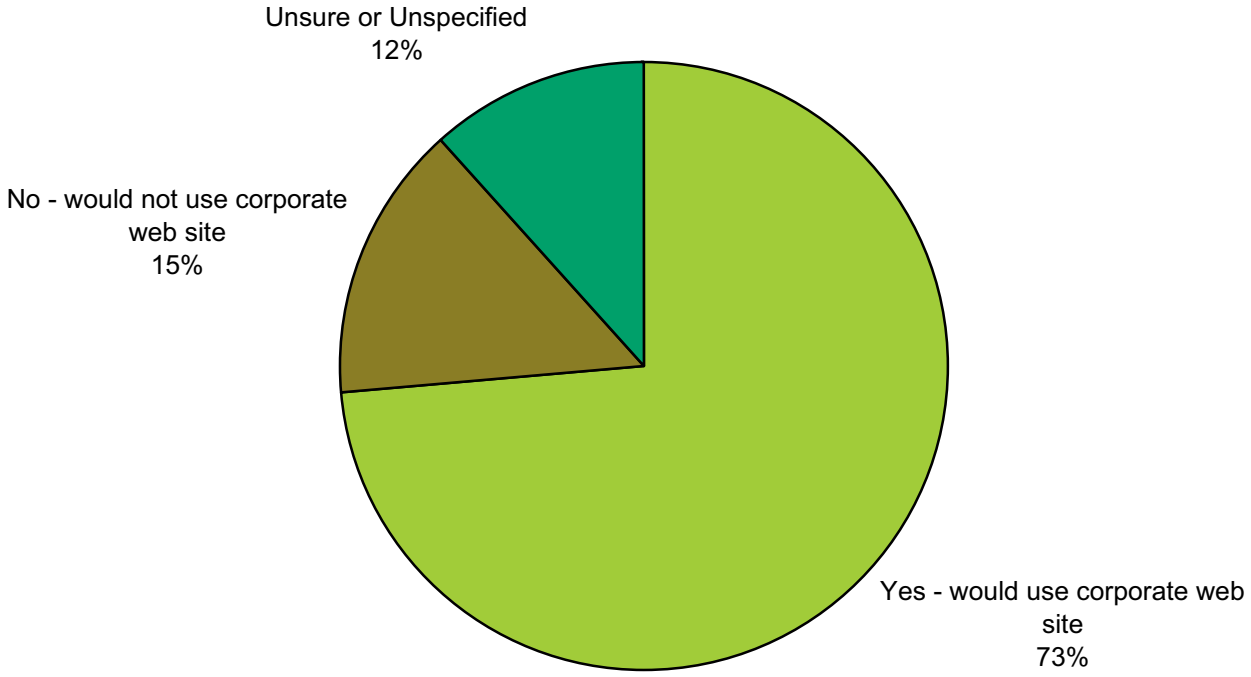
Figure 16. Vineyard Business Computer Use



Source: RVTG 2005

The RVTG survey (2005) also asked winegrape growers if they would access a secure internet site to receive information (i.e sample information, cartnote details, financial information, historic records) and send information (spray diary, update estimates). The majority of growers responded favourably. The high level of those "unsure" indicates the need for more information and possibly training in new technology (see figure 17).

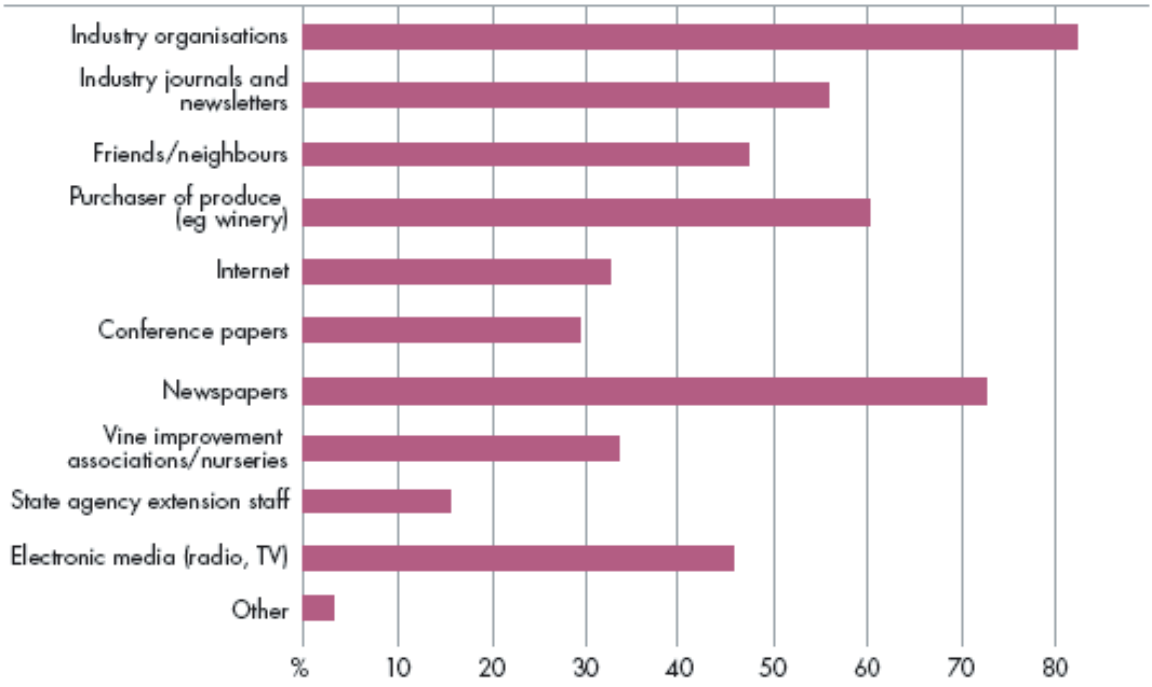
Figure 17. Winegrape growers who would use the internet to send and receive business information



Information Sources

The most common source of information on farm management and practices used by wine grape producers in the Riverland region was obtained from industry organisations. Around 73 percent of wine grape producers in the region sourced information from newspapers and 60 percent sourced information from major wineries (Spencer and Ashton 2003).

Figure 18. Sources of Information, Riverland Region 2001-2002



Source: Spencer and Ashton 2003

Dignam (2003) delivered a rather different result in his 'Winegrape growers training needs survey'. In this he asked growers to nominate preferred sources for a series of types of information. The results are summarised in table 8.

Table 8. Preferred Sources for each Type of Information

Issue/ Topic	Wine co's %	Grape growers Council %	Local Association %	Consultants %	Govt. Depts %	Res'chInst. %	Suppliers %
1. Financial management including tax	5	5	9	6	4	4	4
2. Water management	19	4	19	21	33	22	27
3. Labour management	3	4	18	5	13	8	12
4. Learning and skills development	16	4	21	16	21	33	9
5. Environmental management, chemical usage, runoff etc	16	8	22	32	34	27	32
6. Production management, nutrition, irrigation, pest and disease control etc	27	6	23	27	29	27	28
7. Computing, Internet and communication technology	8	4	10	8	7	17	34
8. Workplace and public health and safety	15	4	17	5	21	6	10
9. Operations management and systems (methods, systems)	13	6	16	11	20	12	25
10. Grape quality and factors affecting it	57	6	22	21	20	26	8
11. Industry co-operation and communication	37	14	40	9	19	17	10
12. Research and development initiatives	26	7	35	12	31	36	11

Source: Dignam 2003

In his analysis, Dignam identified that no one source was notably prominent, rather a range were mentioned where any one grower would typically mention multiples for one source.

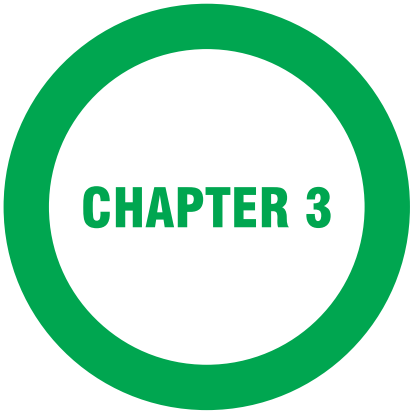
It was stated that there was also demand for local information on the basis that they do not know if information from other regions (especially cooler regions) is applicable to them. Thus local associations, consultants and local government agencies tend to be relied on more than others, as well as third parties like suppliers and sometimes other growers.

Regional industry trends

Coakes and Fenton (2001) identified that the Riverland region has experienced several major shifts in the wine industry over the past decade. These include:

- A shift from fortified wine to table wine production;
- A shift in wine consumer tastes and the subsequent demand for different grape varieties and higher quality fruit;
- Considerable expansion in the wine industry throughout the 1990s, fuelled by the development of export opportunities;
- A shift from small-scale family owned operations to large-scale wine corporations;
- The establishment of boutique wineries and the identification of wine tourism opportunities;
- A shift from manual fruit picking to mechanical harvesting;
- A shift in irrigation practices from flood irrigation to overhead sprinklers and drip irrigation;
- An increase in certification and quality controls in grape production.

Several years on, many of these trends still hold true. As noted earlier, the rate of plantings subsided from the turn of the millennium.



The Riverland Wine Industry

Destiny of grapes

The wine produced in the Riverland mainly falls into the bulk and popular premium price categories. A number of the world's leading brands are derived from Riverland fruit. Coakes and Fenton (2003) list these as including; Banrock Station, Jacob's Creek, Nottage Hill, Kingston and some lower priced Penfold's range. While there are some wines from the region that have moved into the super premium categories, this is not high in terms of either volume or value to the region.

It is anticipated that the destiny of grapes will be further explored in the next phase of the Riverland Wine Industry Regional Profile.

Wine Industry Employment

The wine industry in the Riverland has seen considerable growth in employment since 1991. It has experienced improvements in the unemployment rate above the national average and has a lower youth unemployment rate than the average for South Australia.

In 2001, there were 30,093 persons employed across Australia in wine manufacturing and grape growing. This was a substantial increase of 20,066 persons from 1991 (ABS). 85 percent of the total number of persons employed in wine manufacturing and grape growing were working in South Australia, Victoria and New South Wales.
There was strong employment in wine manufacturing and grape growing in the GI zones of North West Victoria, Barossa, Limestone Coast, Hunter Valley, Lower Murray and South West Australia (Coakes and Fenton 2003). Across the wine producing Statistical Local areas, more than 25 percent employment in wine manufacturing and grape growing occurred in the small Statistical Local Areas of:

- Swan Hill (RC) – (30.3 percent, North West Victoria GI zone);
- Barossa (DC) – (28.2 percent, Barossa GI zone);
- Berri and Barmera (DC) – (26.3 percent, Riverland GI zone);
- Barossa (DC) – (25.2 percent, Barossa GI zone); and
- Wattle Range (DC) – (25.0 percent, Limestone Coast GI zone).

The overall growth in employment can be partially attributed to private sector investment in the wine industry throughout the 1990's, creating opportunities in wine making and production. Labour requirements have increased with the expansion of vine plantations, particularly during the establishment phase. The wine industry has also generated local employment opportunities in supply and supplementary businesses.

While economic growth has stimulated temporary work in the wine industry and local employment in other sectors, the mechanisation of the industry over the past decade has reduced demand for manual labour. Employment opportunities for seasonal workers are restricted to vine training and planting, with the possibility of some hand pruning work in winter.

Regional Infrastructure

In 2005, the Riverland Development Corporation was undertaking a comprehensive review of infrastructure in the region. The expansion of the wine industry has also been associated with significant public sector investment in more efficient irrigation systems, environmental rehabilitation, storage (grain) and infrastructure provision (e.g. sealing roads in order to reduce dust on fruit) (Centre for Economic Studies, 1999).

Regional Economy/value of production

The FoodSA Scorecard (below) summarises the direct and total economic impacts that the grape and wine industry has on the economy of the Murray Lands region and compares it with that of the agri-food sector. It estimates that the Riverland agri-food industries were valued at $1.561 billion or around 12 percent of the State's Gross Food and Wine Value. Wine contributed $995 million or around two thirds of agri-food revenue to the region. Table 9 below summarises details of the composition of the regions agri-food revenue and value-chains from the farm-gate to final consumption.

Table 9. Food SA Riverland Scorecard 2001-2002

	Total Farm Value ($m)	Comm Exports ($m)	Comm Imports ($m)	Proc Value ($m)	Proc Exports ($m)	Proc Imports ($m)	Retail & Food	Net Food Rev ($m)	Gross Food Rev ($m)
Field Crops	36.9	32.2	0.0	4.1	0.0	13.8	42.3	60.7	74.5
Livestock	29.3	11.1	0.5	26.3	17.2	4.3	38.3	61.8	66.6
Dairy	0.0	0.0	0.0	0.0	0.0	6.5	12.2	5.7	12.2
Horticulture	199.6	3.8	46.5	358.1	352.2	7.2	30.1	332.0	386.1
Seafood	0.2	0.0	0.0	1.5	1.1	3.4	5.0	2.7	6.1
NOA							19.8	19.8	19.8
Food Total	266.1	47.1	47.4	390.0	310.5	35.3	147.8	482.7	565.4
Wine	292.4	39.7	0.0	951.5	949.1	0.3	6.3	994.8	995.1
Total Food and Wine	**558.5**	**86.8**	**47.4**	**1341.5**	**1319.6**	**35.5**	**154.1**	**1477.5**	**1560.5**

Agriculture, manufacturing and retail and wholesale trade are the mainstays of the Riverland economy. Within these sectors, economic growth has been most dramatic in horticulture, grape growing, and wine manufacturing. Encouraged by export growth, wine production in the Riverland accelerated throughout the 1990s and many properties were converted from citrus and stone fruit to grape vine production.

Coakes and Fenton (2003) report that the expansion of the wine industry has been a boom for the Riverland economy. This is evident in an increase in the value of agricultural production between 1991 and 1998 (from $209.6m to $466.9m), a rise in median incomes relative to other non metropolitan regions, an increase in property values, a decline in unemployment and the stabilisation of the Riverland population (ABS, 2000). In terms of regional economic development, expansion in the wine

industry has resulted in the establishment of new supporting industries. Economic and employment growth has occurred in support industries such as irrigation systems, tractor and machinery suppliers, engineering, quarrying, nurseries, treated pine posts, and financial planners.

However, in the past couple of years economic growth in the wine industry has plateaued. Just as expansion in the industry has been tied to economic prosperity, the recent slowdown has had an impact on economic confidence in the region. This is evident in the drop in fruit prices, a reduction in profit margins, a slowdown in purchases of equipment and machinery, and the scaling back of supplier businesses.

For growers, a concern is the surplus of fruit on the market due to an increase in speculators in the national industry over the past five years who have planted vines without securing contracts with wine makers. Businesses that based their business forecasts on prices of the late 1990s are now experiencing a reduction in profit margins while servicing high levels of debt. This situation is more comprehensively explored in the PIRSA report 'A Report On The Impact Of Current Grape-Pricing Trends On The Riverland Region' (2005).

Tourism

Tourism is also an industry of growing importance to the Riverland region as reflected in the recent development and upgrade of restaurants and accommodation in the area.
The Research Unit of the South Australian Tourism Commission notes that is estimated that in 2004, the Riverland attracted 352,000 overnight visitors that stayed over 1.2 million nights in the region.

Nine percent (9 percent) of all overnight visits in regional SA (excludes Adelaide tourism region) include stays in the Riverland and the region accounts for 9 percent of all visitor nights in regional SA. On average, overnight visitors to the region stayed 3.5 nights; length of stay varies from 6.3 nights for interstate visitors, 2.4 for South Australians and 5.7 nights for internationals. In 2004 the Riverland had the longest average length of stay by interstate visitors of all of SA's tourism regions.

41 percent of all overnight visits to the region are for holiday/leisure purposes, 38 percent for visiting friends and relatives, 15 percent for business and 6 percent other purposes. Domestic same day visitors contributed 235,000 additional visits in the region in 2004 with nearly half (47 percent) of these day trips by Adelaide residents and 22 percent by residents of the Riverland region.

Spending by domestic overnight visitors to the region in 2003 was estimated to be $72 million.

Around half (50 percent) of domestic holiday or those visiting friends and relatives (VFR) visitors to the Riverland between 2002-2004 were from Adelaide and 23 percent from regional SA. Victoria and NSW/ ACT form significant interstate markets accounting for 12 percent and 10 percent respectively of overnight domestic holiday/VFR visits to the region.

The most common age group of visitors was 45-64 years (38 percent) and the region had a higher proportion in this age group than most other SA tourism regions.

As with most other regions, the three most common activities for domestic holiday/VFR visitors to the Riverland in 2002-2004 were visiting friends and relatives, sightseeing and eating out. Wineries provide an important attraction, with 11 percent of tourists stopping at a cellar door operation during their trip.

Significant activities for the region include water sports/activities (15 percent), fishing (14 percent), picnics/barbecues (13 percent), bushwalking (13 percent), visiting wineries (11 percent) and other outdoor activities (11 percent). Activities, for which a higher proportion of visitors to the Riverland participate than for any other region, include visiting botanic/public gardens (5 percent), playing golf (6 percent) and attend festivals/fairs etc (5 percent). (SATC)

Socioeconomic Characteristics

Expenditure by farm families in country towns and regional centres is an important source of income for many non-farm businesses. Service industries such as retail and wholesale trade, transport and storage, finance and machinery repairs are all affected by farmers' spending patterns. Employment opportunities for town residents and off-farm employment for farmers are also likely to be related to expenditure in country towns.

Spencer and Ashton (2003) report that on average, over two-thirds of total household expenditure of wine grape producers in the Riverland region was spent in the nearby regional centre and district, while only 5 percent was spent in the local town and district, see table 10. The remainder (27 percent) of household expenditure was outside the local or regional district.

TABLE 10 Proportion of Household Expenditure, Riverland 2001-2002

Source: Spencer and Ashton (2003)

Local Town and District	5	15	0
Regional Centre and District	68	39	95
Elsewhere	27	46	5

PIRSA (2005) reports that the Riverland recorded one of the lowest median household income ranges for the Australian wine industry. Shiraz, Cabernet Sauvignon and Chardonnay – amongst the highest priced varieties in the Riverland in 2001-02 contributed around 75 percent of wine grape receipts.

The major part of farm receipts in the Riverland region were from wine grape sales – accounting for around 72 percent of total cash receipts for wine grape producers in 2001-02 (table 11). Citrus contributed a further 18 percent and other crops contributed 8 percent to total cash receipts. Wages for hired labour were the most significant components of total cash costs in 2001-02, followed by chemicals, crop contracting, repairs and maintenance and interest payments.

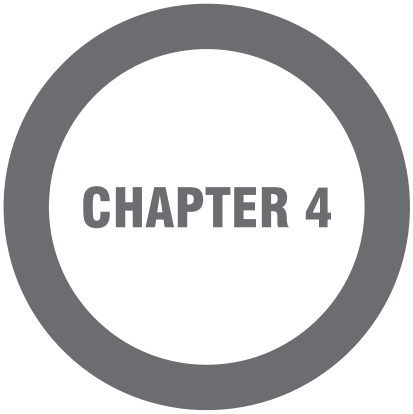
In 2001-02, all producers surveyed in the Riverland region received positive cash incomes (that is, total cash receipts minus total cash costs).

TABLE 11. Receipts and costs Riverland Region 2001-2002 Average per farm

Cash Receipts	
Wine grapes	190 553
Other grapes	5 247
Citrus	47 478
Other crops	20 178
Livestock sales	201
Off farm contracts	928
Other cash receipts	1 808
Total cash receipts	**266 392**
Cash costs	
Hired labor	28 011
Fertiliser	4 787
Chemicals	8 441
Fuel oil and grease	4 153
Repairs and maintenance	11 029
Electricity	4 886
Tree and vine packing materials	3 706
Tree and vine replacement	1 321
Cropping contracts	10 327
Lease payments	8 562
Accountancy fees	2 724
Administration	6 880
Insurance	4 296
Plant hire	426
Rates	8 787
Off farm packing	17 156
Freight	5 557
Handling and marketing	458
Interest payments	22 457
Other cash costs	8 181
Total cash costs	**162 145**

Source: ABARE 2003

Farm business profit per farm averaged $68 130 in 2001-02, with a rate of return to capital and management (excluding capital appreciation) of 8.5 percent. In comparison, average farm business profit for all broadacre farms in 2001-02 was $50 500 with a return of return of 4.3 percent (Spencer & Ashton 2003).



Current Issues

Viticulture Issues

The RVTG survey results identify that the diseases most difficult for growers to manage are;

- Powdery Mildew,
- Australian Grapevine Yellows (AGY),
- Restricted Spring Growth (RSG); and
- Bunchrots including Botrytis.

The most prevalent pest was; Light Brown Apple Moth (LBAM), followed by birds and snails (RVTG 2005).

Winegrape growers responded to the RVTG survey on the most important issues facing them as grapegrowers; see table 12.

Table 12. Winegrape grower issues in order of importance

Water Availability/Restrictions	146
Selling my grapes	122
Irrigation water quality	97
Prices	75
Producing quality grapes	63
Pest & Disease control	50
Deciding which varieties to plant	47
Weed control	44
Financial management	43
Restriction on new development	37
Vine nutrition	34
Irrigation scheduling	32
Managing Vine Vigour	26
Yield estimation	24
Rootstock selection/evaluation	18
Finding Labour	17
Bud fruitfulness	12
Sourcing planting material	9
Quality of planting material	6

These issues of importance were incorporated into the Riverland Research and Priority Matrix for 2005 (see table 13 for 2004 matrix) to develop new projects to address these industry issues.

Table 13.
Riverland Viticulture Technical Group Research And Development Topics (2005)

Production and Quality Consistency: optimising highly consistent production	Vine Improvement	Sustainable Management of Soil and Water	Disease and Pest Management
Understanding managing risks associated with deficit irrigation practices.	Clonal and varietal suitability for warm inland regions.	Salinity: Management of drip irrigation and the benefits of drainage alternatives.	Australian Grapevine Yellows; Determine its source and means of spread with a view to developing a management strategy.
Long term influence of mechanical pruning (benchmarking).	Improvement and management of existing rootstocks, and the evaluation and selection of new rootstocks for planting.	Appropriateness of irrigation systems relative to varying soil types.	Scaly Bark Stunt; Define the disease and determine any links with AGY.
Vineyard microclimate modification – canopy and vineyard floor management.		Environmental impact of long term soil decline.	Powdery Mildew; Refining the role of primary inoculum, especially flagshoots, to develop a management model for the disease.
Nutrient relationship to grape and wine attributes (colour, tannin, ethyl carbamate, etc.).		Soil structure stability.	Disease and pest field keys; Developing an industry standard sampling protocol for warm inland regions including provision for scoring both incidence and severity.
Climate change: developing plans to adjust to conditions, risk assessment, disease and pest management, and irrigation adaptation.			Downy Mildew; Controls: Research and registration of products.
Low input viticulture			Downy Mildew; Further investigate primary infection processes to upgrade the disease simulator 'DMODEL' in AusVit, to improve predictions from CropWatch.
Precision viticulture			Develop a predictive model for the primary infection of Downy Mildew
			Management of mites.
			Management of mealy bugs.
			Biosecurity risk assessment, early detection, and development of contingency plans to manage incursions.
			Vine decline: Investigating the role of soil borne pathogens.

Environmental issues

Spencer and Ashton (2003) reported that around 21 percent of wine grape producers in the Riverland region indicated that salinity was a significant environmental problem. Other concerns for producers in the region included waterlogging and falling groundwater levels. Other environmental problems were considered to be relatively minor for most of the producers surveyed. An estimated 49 percent of producers indicated that they considered spray drift was a key environmental consideration when preparing to spray chemicals around the vineyard. Providing efficient delivery and rotating chemicals to reduce resistance were also important considerations. Around 36 percent of wine grape producers had reduced overall chemical use per hectare over the previous three years, and 78 percent had attended a chemical course during that time.

The South Australian Murray Darling Basin Natural Resource Management Plan (SA MDB NRM) identifies that the major environmental issues associated with the Riverland are land degradation and loss of wildlife habitat due to land clearance, salinity, decline in water quality, and global environmental concerns such as the effect of greenhouse gas emissions. The main environmental concerns in relation to the wine industry are further land clearance and conversion from dry-land farming to irrigated land. The dramatic shift into grape production over the past two decades has placed additional pressure on the region's salt load through the expansion of irrigated land. However, the economic wealth generated through wine industry expansion has also provided growers with the financial means to install more efficient irrigation systems thus reducing water wastage. Computer monitoring and the application of spray and drip irrigation techniques have been important in terms of improved water efficiency and environmental recovery.

Chemical usage in horticulture is also a concern for the maintenance of water quality. For major wine companies, continued expansion into export markets is dependent on improved quality and a clean product. Consequently, there is greater monitoring by wine companies of chemical usage in grape production. Wine companies insist that growers have ISO 9002 accreditation and that they maintain spray diaries. Some growers in the region are producing organic grapes. (Coakes & Fenton 2001).

Substantial diversions of water to support development in the upstream states have significantly reduced river flows and changed the source and timing of flow to South Australia. The quality of water in the River Murray and its tributary streams has declined. Turbidity and nutrient concentrations are high, and disease-causing micro-organisms are a particular problem in the Lower Murray. But perhaps the most important issue is the rising salt level in the River and on the land, a problem that will take many decades to solve. Addressing dryland and irrigation-induced salinity is the most obvious and pressing problem that requires a significant, sustained commitment from the governments and community within the Basin (RMCWMB 2003).

Over-allocation within and upstream of South Australia have brought about four primary changes to the catchment's natural resources:

- The frequency, size, and duration of natural flows have been altered.
- Native vegetation continues to be lost, disrupting ecological processes and the catchment's water balance.
- The water quality is now poor, being significantly affected by salinity, as well as turbidity and nutrients.
- The land is showing signs of degradation, such as waterlogging, salinisation, or erosion.

The Riverland has many wetlands and anabranches, with the region of the River Murray from the South Australian border to Overland Corner contains the highest density per square kilometre of riverine wetlands in the State. The region's wetlands and floodplains provide habitats, breeding sites, and drought refuges for a diversity of birds and other biota. Rising salinity and changes to the water content of floodplain soils (including both waterlogging and abnormally dry soil) adversely affect the health of riparian vegetation. The frequency, magnitude, and duration of floods on the floodplain have been greatly reduced. Other areas have been cleared, logged, or overgrazed by domestic and feral animals, and the spread of willows is a major threat. However, despite these environmental changes, the region still supports a high diversity of biota. Weir pools and regulated water flow have greatly moderated flows in the River Murray, resulting in the permanent flooding of previously low-lying temporary wetlands, while wetlands at higher elevations away from the River Murray suffer because flooding is less frequent than before river regulation. It is evident that irrigation and drainage developments can be implicated in both historical and future salinity impacts on the River and its floodplain.

The SA MDB NRM plan recognises that a key outcome of Land and Water Management Plans (LWMPs) has been a link between on-farm irrigation practices and the provision of infrastructure, together with policies to manage irrigation development to achieve salinity outcomes. Ultimately, these actions are vital to reducing the off-site impacts of irrigation, and to improving the water quality and condition of the River Murray, its wetlands and floodplain. LWMPs and salinity mitigation measures must also be considered with other initiatives (such as flow management) that can affect river and wetland water regimes and salinity impacts.

Under the Murray-Darling Basin Act 1993, South Australia is entitled to minimum flow of 1850 gigalitres per year (plus or minus traded water allocations). In most years, rather more than the entitlement flows into the state, although the mean annual flow into South Australia has been reduced to around 44 percent of its natural level. This is a consequence of progressive development in the upstream states. Regional irrigation development of the river started in the region in the 1880s with diversions steadily increasing from that time. Currently, South Australian irrigators are allocated around 75 percent of the water available from the river for consumptive uses. However, only 63 percent of the total permitted diversion is presently utilised. The SA Water Corporation has a licence to divert 180 gigalitres per year (on average) to metropolitan Adelaide

and country towns (NRM 2004). Achieving irrigation efficiency targets of 85 percent in the Riverland and 65 percent along the reclaimed swamps of the Lower Murray could reduce the volume of drainage water directly entering the river by around 39 GL each year.

Threats to industry

In terms of bio-security risks to the wine industry; phylloxera and fruit fly are the major threats (McGrath-Kerr, 2001).

Winegrape growers were asked if their businesses would be affected by the salinity zoning policy of the South Australian Government. Fifty percent of growers were unsure of the impact of the zoning, a clear indication of the need for more community education and consultation (RVTG 2005).

Legislation that affects the industry

Environment Protection Act, 1993
Integrated Natural Resource Management Act, 2003
Water Resources Act, 1997
Irrigation Act, 1994
Murray-Darling Basin Act, 1993
Murray River Act, 2003
Native Vegetation Act, 1991
Crown Lands Act, 1929
Pastoral Land Management and Conservation Act, 1989
Environment Protection and Biodiversity Conservation Act, 1999 (Cth.)
Soil Conservation and Land Care Act, 1989
Crown Lands Act, 1989
Pastoral Land Management and Conservation Act, 1989
Development Act, 1993
Dangerous Substances Act, 1979
Controlled Substances Act, 1984
Fruit and Plant Protection Act, 1992
Animal and Plant Control (Agricultural Protection and Other Purposes) Act, 1986
Biological Control Act, 1986
Quarantine Act, 1908 (Commonwealth)
Gene Technology Act, 2001
Plant Breeder's Rights Act, 1994 (Commonwealth)
Country Fires Act, 1989
Aboriginal Heritage Act, 1988
Heritage Act, 1993
(PIRSA 2003)

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Appendix 1

Research Methodology
This project was undertaken in two phases;

- A desktop survey of secondary information; and
- A survey of two-hundred and fifty winegrape growers.

Surveys were generally undertaken with face-to-face interviews on-farm, although a small number were completed on the telephone.

Growers at thirty different localities across the Riverland were included in the survey, see listing in Appendix 4.

The growers surveyed supplied a number of different wineries, listed in Appendix 5.

Appendix 2

Riverland Wine Industry Development Council Inc.

6 Vaughan Court
PO Box 520 Berri SA 5343
Phone: (08) 8582 2952
Fax: (08) 8582 3309
Mobile: 0427772185
julie.sippo@riverlandwine.org.au

Dear Winegrape Grower,

The Riverland Wine Industry Development Council and the Riverland Winegrape Growers' Association are developing the first Riverland Wine Industry Regional Profile.

The survey you have been asked to complete will provide industry with a snapshot of winegrape grower practices, training and information needs.
A better understanding of grower needs and practices will mean that your Riverland Wine Industry fund money is spent in the most appropriate way to benefit growers.

If you have any suggestions to make on future research, communicating with growers or training and information ideas, you can let us know in the "additional comments" section at the end of the survey, or you can call me directly on the numbers listed above.

The information you provide will be absolutely confidential and only amalgamated survey data will be released.

Yours truly,

Julie Sippo
Riverland Wine Industry Development

Appendix 3

RIVERLAND WINE INDUSTRY REGIONAL PROFILE 2005

WINEGRAPE GROWERS' SURVEY

(Name and address optional)

Name.....

Address .....

Telephone/ Fax/ Mobile/email .....

Which wineries do you supply (with approximate tonnes) .....

.....

1. Where are your vineyards located in the region? .....

2.a. What is the area of 'bearing' vines? .....

2.b. How many hectares or acres have been planted since 1st July 2003? .....

.....

3. How many different winegrape varieties do you grow? Please list:.....

.....

.....

.....

4. Do you grow grapes or crops other than winegrapes? Yes / No
If 'Yes', which? (tick)

- ❑ Grapes other than winegrapes
- ❑ Citrus
- ❑ Almonds
- ❑ Stone Fruit
- ❑ Olives
- ❑ Other

5. What trellis system do you use? .....

6. What pruning system do you use? .....

7. Do you use a computer for your business as it relates to winegrape growing?

   Yes / No

   If 'Yes', for what purpose?

   - ❑ Account processing using accounts software (e.g. MYOB, Quicken)
   - ❑ Receipt of CropWatch reports by e-mail
   - ❑ CropWatch Online
   - ❑ Moisture Monitoring using appropriate monitoring software
   - ❑ Cost of Production analysis using vineyard management software (e.g. AusVit, GrowData)
   - ❑ Business communication and research using the Internet (e.g. e-mail, web browsing)

8. If your winery set up a secure internet site that enabled you to receive information (i.e sample information, cartnote details, financial information, historic records) and send information (spray diary, update estimates) about your vineyard, would you access it?

9. In terms of a proportion of your vineyards' total area what is the mix of types of irrigation?

   .....% Drip

   .....% Overhead sprinkler

   .....% Under-vine sprinkler

   .....% Micro-Jet

   .....% Furrow

10a. Have you done a soil-type profile on your vineyards? .....

10b. Do you have an irrigation and drainage management plan? .....

11. Do you use weather data when scheduling irrigation? .....

12. Do you use any scheduling tools? (tick where appropriate)

- ❑ Neutron probe
- ❑ Capacitance probe
- ❑ Tensiometers
- ❑ Gypsum blocks
- ❑ Auger/shovel
- ❑ Other

13. Do you have any salinity or drainage hazards on your property?.....

14. Do you calculate your pre-vintage estimated crop size by relying on your past experience and intuition alone, or do you also apply a scientific or mathematical approach?

- ❑ Intuition and experience
- ❑ Intuition, experience, scientific / mathematical analysis

15. Do you regularly calculate your costs of production for each variety of vines by factoring in costs such as labour hire, water, fertilisers, finance (bank interest)?

Yes / No

If so, how accurate would you assess your calculations to be?

Approximate / Precise

16. Will your business be affected by the salinity zoning policy of the South Australian government?

Yes / No / Do not know

17. Over the next 12 months, what do you think will be the most important issues facing you as a grapegrower?

- ❑ Pest and disease control
- ❑ Water availability/restrictions
- ❑ Rootstock selection/evaluation
- ❑ Producing quality grapes
- ❑ Irrigation scheduling
- ❑ Sourcing planting material
- ❑ Selling my grapes
- ❑ Vine nutrition
- ❑ Financial Management
- ❑ Managing vine vigour
- ❑ Irrigation water quality
- ❑ Quality of planting material
- ❑ Weed control
- ❑ Bud fruitfulness
- ❑ Yield estimation
- ❑ Finding labour
- ❑ Deciding which varieties to plant
- ❑ Restriction on new development
- ❑ Other (describe).....

18. Of the following pests and diseases, which have been the most difficult to manage in the last 12 months?

- ❑ Birds
- ❑ Boring insects
- ❑ Downy mildew
- ❑ Eutypa
- ❑ Grapevine Yellows (AGY)
- ❑ Leafroll and other viruses
- ❑ Nematodes
- ❑ Botrytis and other bunch rots
- ❑ Powdery mildew
- ❑ Restricted spring growth
- ❑ Snails
- ❑ Light brown apple moth
- ❑ Other (describe).....

19. Is English your first language? Yes / No

20. a) How many years have you been growing winegrapes? .....

b) Do you have a succession plan for your vineyard? .....

21. What is your highest educational level? (tick)

- ❑ Primary
- ❑ Certificate II
- ❑ Diploma
- ❑ Post Graduate
- ❑ Secondary
- ❑ Certificate IV
- ❑ Degree
- ❑ Other

22. Are there any other issues or concerns you wish to raise in regard to the Riverland Wine Industry?

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

Appendix 4

Surveyed Grower Property Locations

Barmera
Berri
Bookpurnong
Chaffey
Cobdogla
Cooltong
Glossop
Kingston on Murray
Loxton
Loxton East
Loxton North
Loxton South
Loveday
Lowbank
Lyrup
Monash
Moorook
Murtho
New Residence
Overland Corner
Paringa
Pike River
Pyap
Renmark
Renmark North
Renmark West
Rilli
Taylorville
Waikerie
Winkie

Appendix 5

Wineries growers supply to

Hardy Wine Co.
McGuigan Simeon
Kingston Estates
Orlando Wyndham
Southcorp
Angoves
Tandou
Casella
uncontracted
Grant Burge
Peter Lehmann
Taylors
Yalumba
Rivers
Salena
McLaren Vale
Patritte
Bonneyview
Lion Nathan
Organic Vignerons
Banksia
Robinvale Organic
Angas Park

Appendix 6

Area of bearing vines (Ha)	No. of growers
0 – 5	52
6 –10	53
11 – 15	43
16 – 20	35
21 – 25	13
26 – 30	10
31 – 35	8
36 – 40	6
41 – 45	2
46 – 50	4
51 – 55	4
56 – 60	1
61 – 65	5
66 – 70	1
71 – 75	0
76 – 80	1
81 – 85	2
86 – 90	0
91 – 95	0
96 – 100	1
101 – 105	1
105 – 150	0
151 – 155	1
155 – 435	0
436 – 440	1

Appendix 7

Textual description of Geographical Index

A Geographical Indication (GI) is an official description of an Australian wine zone, region or sub-region, which has been defined, by the Australian Wine and Brandy Corporation. The Riverland GI region is within the Lower Murray Zone, within the State of South Australia, Australia. The beginning point of the boundary is situated on Map Renmark (Sheet SI 54-10) at 139°35'E 34°00'S, being the north west corner of the region, then proceeds east in a straight line to 140°00'E 34°00'S, then proceeds south in a straight line to 14°00'E 34°08'S, then proceeds east in a straight line to 140°38'E 34°08'S, then proceeds north in a straight line to 140°38'E 34°02'S, then proceeds east to the South Australia Victoria border at 140°57.8'E 34°02'S, then proceeds south along the South Australia Victoria border to 140°57.8'E 34°20'S, then proceeds west in a straight line to 140°45'E 34°20'S, then proceeds south in a straight line to 140°45'E 34°30'S, then proceeds west in a straight line to 140°15'E 34°30'S, then proceeds north in a straight line to 140°15'E 34•15'S, then proceeds west in a straight line to 139•40'E 34°15'S, then proceeds south in a straight line to 139°40'E 34°21'S, then proceeds west in a straight line to 139°35'E 34°21'S, then proceeds north in a straight line to 139°35'E 34°00'S, which is the descriptor starting point. (AWBC website: www.awbc.com.au/winelaw/gi/gi.asp?RECORD _ KEY=Record _ number=52)

Appendix 8

Soils in the Riverland

The potential amount of water available to a tree depends on the depth to which tree roots can grow in the soil type present and the texture of soil within this depth.

Effective rooting depth is determined by the crop type and the presence of impeding layers of soil to root growth. Rooting depth is generally regarded as that to the deepest easily observed roots. Where root growth is restricted by an impeding layer, (eg. heavy clay, carbonate, sandstone, ironstone), the effective rooting depth is the depth to this layer. Soil texture is a description of the relative amounts of clay, sand and silt present in the soil. Soil texture determines the amount of water a soil can make available for plant growth. Soil texture of each layer in the soil profile must be assessed individually.

Soil texture is assessed by taking a small portion of soil which will fit comfortably into the palm of your hand. The soil is moistened with water, a little at a time, (the soil must be damp not sodden), and kneed into the shape of a ball (bolus) until the soil just starts to stick to your fingers. The feel of the soil and the length of ribbon which can be produced from it provide an indication of the proportions of clay, sand and silt present, that is, the texture of the soil. The table below lists the feel and ribboning characteristics which allow texture of a soil to be identified. Experience is required to determine the texture of soils properly.

Abbreviations

ABARE	Australian Bureau of Agriculture and Resource Economics
AWBC	Australian Wine and Brandy Corporation
DOTARS	Department of Transport and Regional Services
GI	Geographical Indication
GWRDC	Grape and Wine Research and Development Corporation
NRM	Natural Resource Management
PGIBSA	Phylloxera and Grape Industry Board South Australia
PIRSA	Primary Industries and Resources South Australia
RAW	Readily Available Water
RDC	Riverland Development Corporation
RMCWMB	River Murray Catchment Water Management Board
RVTG	Riverland Viticulture Technical Group
RWIDC	Riverland Wine Industry Development Council
RWGA	Riverland Winegrape Growers Association
SA MDB	South Australian Murray Darling Basin
WAP	Water Allocation Plan