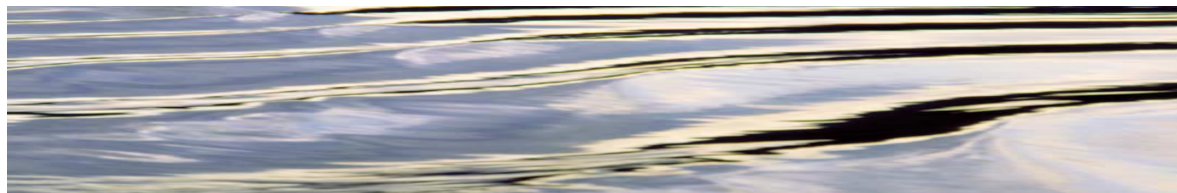


# **IRRIGATOR AND COMMUNITY ATTITUDES TO WATER ALLOCATION AND TRADING IN THE GOULBURN BROKEN CATCHMENT**

**TECHNICAL REPORT  
Report 01/3**

May 2001

**John Tisdell / John Ward / Tony Grudzinski / Geoff Earl**



# **Irrigator and Community Attitudes to Water Allocation and Trading in the Goulburn Broken Catchment**

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Technical Report 01/3  
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## **Preface**

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CRC Project 3.2 is exploring ways of enhancing the water market reform process by conducting a socioeconomic analysis of guidelines and procedures for trading in mature water markets. Existing trading rules and procedures and their impact on regional towns and communities will be evaluated and, in partnership with industry and other interest groups, scenarios and rules and procedures for trade in the year 2010 will be developed.

Phase 1 of the project involves gleaning irrigator and community attitudes to water reform and their expectations of the future. This current report outlines the findings of a survey of community and irrigators on the acceptance of water reform, the impact of water markets on regional communities and towns, and perceptions of the future direction of water markets as a result of trade in the Goulburn Broken catchment.

The survey findings contribute to the overall project in providing vital information on irrigators, attitudes to breaking the nexus between land and water, points of blockage in current water markets, and possible adjustments to trading rules and procedures.

John Tisdell  
Program Leader  
Sustainable Water Allocation Program



## Summary

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The first phase of the CRC for Catchment Hydrology Project 3.2 is to gather information on the nature of water markets and to provide input into water policy development to enhance water trading. This document reports the findings of a survey of irrigators and community members in the Goulburn Broken catchment. The questionnaire elicited attitudes of irrigators and community members to the Council of Australian Governments (COAG) reforms, to temporary and permanent water trading, to the impact and future of water trading, to the role of the water authority in regulating the market and to environmental issues. The survey is developed as part of a multiple catchment project exploring socio-economic issues in water trading and in conjunction with staff from Goulburn-Murray Water.

The survey found that there is general agreement among the irrigators and community members that water reform is necessary and that rights to water should be separated from rights to land and such rights should be traded independently. There is general agreement among irrigators that water entitlements will be more secure and have higher certainty of supply following the reform process. The rules of trade and the allocation of water should be such that they promote the greatest happiness of the greatest number. Adoption of the notion of water as a chattel is evolving, but there is a general consensus that to date, the community is poorly informed about the reform process. The CAP has not made a realised impact on the majority of irrigators or community members surveyed. As expected, where it has impacted is in water availability and usage, decreased production and limited future development. In terms of meeting environmental flow objectives, options that involved a reduction in water entitlements that provided for possible reversibility of habitat degradation are equally ranked, and ranked above no reduction in water allocations for environmental needs.

From an institutional perspective, the number of buyers and sellers, the conditions of and constraint on entry and exit to the market, homogeneity of the product and market knowledge, are important determinants of a water markets performance in achieving the COAG reform objectives.

The number of buyers and sellers in part is determined by who has a right to trade. There is general agreement that the rights to trade should be open to irrigators (including sleeper licences that have not been used for over 5 years), local towns and communities for domestic use and local industries who use water. There is support for restricting trade within channel systems when necessary to maintain infrastructure, when transactions impact on other water users, environmental flow objectives, and the economic viability of local towns and communities. There is similar widespread support for restricting trade when the conditions of trade or the resulting distribution of water is deemed unjust and where a company enters the market solely as a speculator.

Information supplied by the authorities on water market activity is well received by traders. The main source of market information is the water authority and the information is used in making trade decisions. Knowledge and understanding of the actions of other irrigators is generally strong among traders but weak among those water users who do not trade. Increasing non-traders market knowledge will be important in promoting trade in the future. Disclosure and dissemination of market information, including the volume of water traded, the trade price and the traders entitlements and crop mix, is strongly supported by irrigators.

The role of the temporary market is to realise the opportunity cost of water on a season by season basis and allow for surplus water and within season tradeoffs to be made. In theory, temporary markets are a means of achieving a Pareto optimal distribution of the available water supply within a given water year. To this end, there appears to be strong interest in selling surplus water. However, few sellers stated that they made trade decisions on the basis of the opportunity cost of water and few are prepared to consider changing farm practices and using the market to maximise their return from their water. Buyers tend to purchase water to meet overall shortfalls in water requirements and a smaller proportion to meet end of season waterings. Overall, irrigators see the market in the future meeting end of season waterings and the sale of surplus water as the main drivers of the temporary water market. Current traders are generally happy with the administrative costs and time taken to process a trade. Non-traders

however, see administrative and time costs as blockages to entering the water market. It appears that increasing awareness of the actual magnitude of transaction costs and realization of the opportunity costs of current water uses compared to market returns will lead to an increase in market participation.

The main driver of trade in both the temporary and permanent water markets is the availability of surplus water and shortfalls in water allocations. The role of the permanent water market should be to promote long-term structural change in the catchment towards a more efficient distribution of water licences. In other words, the movement of water licences to highest value use. The majority of respondents to the survey expect that trade in the permanent market for the foreseeable future will mainly be in surplus water.

The main blockages to trade, both perceived and actual, include a lack of understanding of how the market operates, associated market expectations, and perceived administrative requirements by new entrants. These impediments may be overcome through applied workshops on water trading procedures and increased information on market activity and price and quantity determinants.

Finally, the respondents see water markets playing a significant role in irrigated agriculture in the future, and will lead to an increase in overall farm income.

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# 1. Introduction

This document reports on the findings of a survey conducted in the Goulburn Broken catchment. The catchment is bounded by the Great Dividing Range in the south and the river Murray in the North, and consists of the northern flowing rivers from the east to the Loddon catchment in the west of the State of Victoria (see Figure 1).

The first part of the report outlines the basic structure of the survey instrument, method of sampling and statistical analysis. The second section outlines the survey findings on COAG reform and the structure, conduct and performance of water markets in the Goulburn Broken catchment.



(Source: Goulburn-Murray Rural Water Authority)

Figure 1 Goulburn-Broken Catchment map.



## **2. Survey Design**

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The survey instrument consisted of a combination of dichotomous choice, constant sum and open answer questions. The questions are grouped into seven sections each dealing with a specific aspect of water reform:

- Water reform general
- Temporary water trading
- Permanent water trading
- Impacts and future of water trading
- The role of the water authority in water markets
- Environmental concerns
- Demographic information



### 3. Method of Sampling

Currently temporary trading occurs within the irrigation and diversion areas of the Goulburn Broken catchment. To account for differences between these areas and minimise sampling error, a proportional stratified random sample of 1,000 water users is drawn from the Goulburn Broken catchment irrigation and diversion areas. In total there are 12,402 individual water users within the 21 irrigation and diversion areas that make

up the Goulburn Broken catchment. Table 1 presents the total number of water users within each stratum, the sample sizes drawn, and the number of valid responses from each stratum. Drawing a proportional stratified random sample requires a stratum sample size ( $n_s$ ) proportional to the size of the stratum ( $N_s$ ) and total population size ( $N$ ), (*viz.*  $n_s = n.N_s/N$ , where  $n$  is the total sample size). The distribution of valid responses returned is consistent with the sampling frame ( $\chi^2=18.954$ ,  $p < 0.05$ ).

Table 1 Stratified random sample: Goulburn Broken irrigators

Goulburn-Murray Water Irrigation and Diversion Areas	Total water users (Stratum)( $N_s$ )	Sample * ( $n_s$ )	Valid responses
Broken River/Creek	219	18	6
Campaspe District	110	9	4
Campaspe River	174	14	5
Central Goulburn	2475	199	40
Goulburn River	653	52	16
Kiewa River	209	17	3
Loddon River	519	42	15
Markwood/Milawa	35	3	1
Mitta River	102	8	3
Murray River	453	36	7
Murray Valley	1490	120	36
Nyah	198	16	4
Ovens River/King River	510	41	11
Pyramid-Boort	683	55	23
Rochester	940	76	20
Shepparton	1473	119	32
Torrumbarry	1869	151	35
Tresco	108	9	2
Wangaratta/Beechworth	182	15	6
<b>Total</b>	<b>12402</b>	<b>1000</b>	<b>269</b>

(Source: Primary data is supplied by Goulburn-Murray Rural Water Authority, 2000)

\* These numbers are rounded

A similar sample is drawn from the community of the Goulburn Broken catchment. Towns have been used as sub-stratums within the irrigation and diversion areas. Table 2 presents the total number of individuals

within each stratum, sample sizes drawn, and number of valid responses received from each stratum. Lists of community members are randomly drawn from 1996 electoral roles.

Table 2 Community sample: Goulburn Broken catchment

Water irrigation and diversion areas	Town name	Total population (sub-stratum)(n <sub>s</sub> )	Sample size (n)	Number of valid responses	Water irrigation and diversion areas	Town name	Total population (sub-stratum)(n <sub>s</sub> )	Sample size (n)	Number of valid responses	
<i>Loddon River</i>	Barham-Koondrook	665	2	0	<i>Goulburn River</i>	Alexandra	1859	7	3	
	Bendigo	59936	222	47		Avenel	546	2	1	
	Boort	805	3	0		Broadford	2350	9	1	
	Bridgewater	282	1	1		Eildon	703	3	2	
	Campbells Creek	833	3	1		Euroa	2697	10	0	
	Carisbrook	579	2	0		Kilmore	2710	10	0	
	Castlemaine	6690	25	8		Kinglake	691	3	0	
	Chewton	393	1	0		Mansfield	2526	9	4	
	Clunes	846	3	1		Marysville	626	2	2	
	Creswick	2327	9	3		Murchison	633	2	0	
	Daylesford	3278	12	6		Nagambie	1335	5	0	
	Dunolly	668	2	0		Rushworth	976	4	0	
	Goornong	265	1	0		Seymour	6294	23	5	
	Harcourt	384	1	1		Tallarook	244	1	0	
	Huntly	612	2	0		Violet Town	580	2	0	
	Inglewood	699	3	1		Wandong-Heathcote Junction	1251	5	3	
	Korong Vale	247	1	0		Yea	960	4	1	
	Maldon	1255	5	1		<i>Campaspe River</i>	Echuca-Moama	10014	37	7
	Maryborough	7381	27	3			Elmore	662	2	1
	Newstead	505	2	0			Heathcote	1565	6	1
Talbot	334	1	0	Kyneton	3757		14	2		
Wedderburn	708	3	0	Malmsbury	514		2	1		
<i>Broken River</i>	Benalla	8582	32	7	Strathfieldsaye		1467	5	2	
	Cobram	3865	14	3	Trentham		658	2	1	
	Dookie	260	1	0	Tylden		247	1	0	
	Glenrowan	343	1	0	Woodend		2974	11	3	
	Katamatite	204	1	0						
	Numurkah	3128	12	3						
	Tungamah	305	1	0						

Table 2 Community sample: Goulburn Broken catchment ...continued

Water irrigation and diversion areas	Town name	Total population (sub-stratum)(n <sub>s</sub> )	Sample size (n)	Number of valid responses	Water irrigation and diversion areas	Town name	Total population (sub-stratum)(n <sub>s</sub> )	Sample size (n)	Number of valid responses
<i>Ovens River</i>	Barnawartha	438	2	0	<i>Central Goulburn</i>	Girgarre	209	1	0
	Beechworth	2953	11	3		Kyabram	5738	21	3
	Bright	1898	7	2		Merrigum	486	2	0
	Chiltern	1080	4	1		Stanhope	565	2	1
	Corowa-Wahgunyah	624	2	0		Tatura	2826	10	0
	Moyhu	235	1	1		Tongala	1164	4	2
	Myrtleford	2705	10	3	<i>Murray Valley</i>	Nathalia	1455	5	1
	Porepunkah	462	2	1		Strathmerton	429	2	0
	Rutherglen	1904	7	1	<i>Pyramid-Boort</i>	Pyramid Hill	527	2	0
	Wangaratta	15527	57	9	<i>Rochester</i>	Lockington	375	1	0
	Yarrowonga-Mulwala	3435	13	3		Rochester	2553	9	0
<i>Kiewa River</i>	Albury-Wodonga	25825	96	23	<i>Shepparton</i>	Shepparton-Mooroopna	31945	118	27
	Mount Beauty	1649	6	1	<i>Torrumbarry</i>	Cohuna	1979	7	0
	Tangambalanga	365	1	0		Gunbower	260	1	0
	Tawonga	236	1	0		Kerang	3883	14	1
	Yackandandah	592	2	1		Leitchville	333	1	0
						Nyah West	519	2	0
<b>Total</b>							<b>270392</b>	<b>1000</b>	<b>210</b>





#### 4. Statistical Analysis and Interpretation

Likert scales are used to determine overall levels of agreement with issue statements concerning water allocation, rights to trade and attitudes to the role of the water authority and the future of water trading. Likert scales consist of statements reflecting positions on a continuum such as strongly disagree to strongly agree. In this study standard 5-point Likert scales have been used.

Conclusions concerning overall respondent agreement or disagreement to a statement are based upon statistical differences between the mean response and indifference or uncertainty. In other words, on a 5-point scale overall indifference or uncertainty on an issue statement would produce a mean response of three. If the mean response is found to be statistically lower than three, at standard levels of confidence (95% or 99% confidence levels), there is deemed to be overall agreement with the statement. The level of significance is symbolised in the tables of results. A single asterisk (\*) signifies significant at 95% confidence levels ( $\alpha = 0.05$ ) and a double asterisk signifies (\*\*) significant at a 99% confidence level ( $\alpha=0.01$ ). The letter *a* is used to signify that the mean is less than three and *b* to signify it is greater than three.

Using Example 1 below to demonstrate, the irrigators' mean rank response to the issue of whether active irrigators who hold water entitlements in adjoining regions is 2.48 and is statistically less than three given a 99% confidence level ( $\alpha=0.01$ ). This is signified by the letter *a* and a double asterisk on the statement's corresponding mean value. From this result it is concluded that irrigators overall agree with the statement. The mean response to local shires being given the right to trade water for recreation use is not statistically different from three and so it is concluded that the respondents overall are indifferent or uncertain. Similarly, it is concluded that because the mean rank of the rights of individuals and companies who do not intend to use water to trade is statistically greater than three given a 95% confidence level ( $\alpha=0.05$ ), there is overall disagreement with the notion.

The Kolmogorov-Smirnov two-sample test (KS-Z) is used to test whether populations differ in their rankings of statements on the basis of the maximum difference in cumulative relative frequencies. In other words, it tests whether the distributions of ranking between the two populations (be they irrigators and community or traders and non-traders) differ. Hence in Example 1, referring to the issue of active irrigators who hold water entitlements in adjoining regions being allowed to trade, the KS-Z value of 1.484 is significant at a confidence level of 95%. That is, the distribution of responses of traders is significantly different to that of non-traders.

Example 1 Rights to trade

	Mean Rank	Mean Response †		MW-U	KS-Z
	Irrigator †	Trader	Non-trader		
Active irrigators who hold water entitlements in adjoining regions	2.48 <sup>a**</sup>	2.22	2.78	5647.5*	1.484*
Local shires to use water for recreation use, such as parks and golf courses	2.98	2.84	3.10	6625.5	0.934
Individuals and companies who do not intend to use water	3.87 <sup>b*</sup>	3.87	3.87	7439.5	0.215

† Scale 1 'strongly agree' 5 'strongly disagree'; \*significant at 0.05; \*\*significant at 0.01  
*a* significantly less than 3; *b* significantly greater than 3

While a significant Kolmogorov-Smirnov test is necessary to conclude rank distribution differences, it is not sufficient to conclude mean differences. The distribution of responses may differ while the means may be equal. To demonstrate, in Example 2 the frequency distributions of irrigators and the community differ significantly, yet the mean responses are equal.

In conjunction with the results of the Kolmogorov-Smirnov test, the Mann-Whitney U test (MW-U) is

used to test whether two independent samples have come from populations with the same mean. Referring to example 1 on the issue of active irrigators who hold water entitlements in adjoining regions being allowed to trade, the mean of irrigators who have traded is statistically different to the mean of irrigators who have not traded given a 95% confidence interval ( $\alpha=0.05$ ). The single asterisk on the MW-U value corresponding to the statement signifies this.

Example 2. Water allocation issue

Rank	Position	Irrigators Frequency	Community Frequency
1	Strongly agree	50	20
2	Agree	0	20
3	Uncertain	0	20
4	Disagree	0	20
5	Strongly disagree	50	20
<b>Total</b>		<b>100</b>	<b>100</b>
<b>Mean Rank</b>		<b>3</b>	<b>3</b>

Example 3 Interpreting significant differences

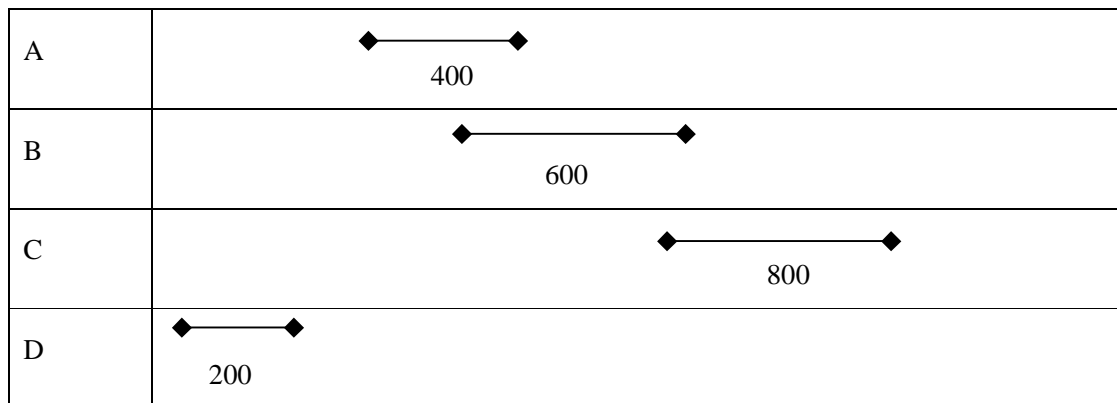
Region	Average water allocation (ML)
A	400 <sup>a</sup>
B	600 <sup>ab</sup>
C	800 <sup>b</sup>
D	200

Note: Numbers sharing the same superscript letter in a column are not statistically different.

Finally, the summary data is generated from sample data. In order to draw conclusions concerning the population with a level of confidence it is necessary to take account of the error arising from the variance in the sample means. Example 3 presents a summary of the water allocations in three regions. The averages with the same symbol are not statistically different when the sample variance is accounted for. In other words, the average water allocation of region A is not statistically different from region B, nor B from C, but average water allocation of region A is different from region C. Region D does have an average water allocation lower than any other region.

To explain this we look at the confidence intervals for each sample mean (shown below). The range of possible population average water allocations of region A derived from the sample data overlaps region B, so the values might be the same. This is represented by the same symbol *a* in the example above. Similarly, the range of possible population average water allocations of region C derived from the sample data overlaps region B, so their values might be the same. This is represented above with symbol *b*. There is no overlap of regions A and C, hence we can state they are ‘different’. Because the range of possible values for region D does not equal any other region it has no symbol.

Confidence intervals shown diagrammatically for each sample mean in Example 3 above





## **5. Analysis of Survey Responses**

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The survey instrument elicited attitudes of irrigators and community members to COAG reforms, to temporary and permanent water trading, to the impact and future of water trading, to the role of the water authority in regulating the market, and to environmental issues. The role of the survey results and analysis is to contribute to the development of an understanding of how water markets are structured and operate in order to develop future trading rules and procedures which will promote trade in the future. To achieve this analysis of the survey responses is structured to specifically explore irrigator and community perceptions of and attitudes towards the structure and conduct of the water markets in the Goulburn Broken catchment as they currently exist and expectations of future performance measures.



## 6. Attitudes to COAG Reform

The Commonwealth of Australian Governments (COAG) introduced a raft of institutional changes to water management in Australia. The first section of the survey dealt with COAG reforms, specifically with issues of water pricing, the definition of water rights and the notion of trading such rights. Effective adoption of these changes requires acceptance by water users and the community at large. Table 3 reports irrigator and community percentage agreement with the need for water reform. 79.0% and 88.3% of irrigators and community respondents respectively agree that water reform is necessary.

### 6.1 Water Pricing

As part of the reform process, water authorities need to move towards cost recovery and in the process introduce full cost pricing. Table 4 presents the irrigator and community support for full cost pricing of water. The mean and distribution of responses from irrigators and the community differ. Irrigators within the catchment overall statistically reject the notion of full cost pricing. The community is more supportive with 49.4% strongly supporting or accepting the notion of full cost pricing and 34.2% rejecting or completely rejecting such a pricing policy.

Table 3 Overall agreement with the need for water reform

	Irrigators		Community	
	Frequency	Percentage	Frequency	Percentage
<b>Yes</b>	196	79.0	173	88.3
<b>No</b>	52	21.0	23	11.7
<b>Total</b>	<b>248</b>	<b>100.0</b>	<b>196</b>	<b>100.0</b>

Table 4 Full cost pricing of water

	Irrigators		Community	
	Frequency	Percentage	Frequency	Percentage
<b>Strongly support</b>	16	6.6	36	18.9
<b>Accept</b>	71	29.1	58	30.5
<b>Indifferent</b>	38	15.6	31	16.3
<b>Reject</b>	82	33.6	45	23.7
<b>Completely reject</b>	37	15.2	20	10.5
<b>Total</b>	<b>244</b>	<b>100.0</b>	<b>190</b>	<b>100.0</b>
<b>Mean Rank</b>	<b>3.22</b>		<b>2.77</b>	

MW-U=18541.0,  $p < 0.000$ ; KS-Z=1.505,  $p < 0.05$  (See Section 4 for explanation of MW-U and KS-Z)



## 6.2 Definition of Rights and Security and Certainty of Supply

A main element of COAG reform involves the definition and specification of water entitlements and the rights attached to those entitlements. Tables 5 and 6 report the opinions of irrigators and the community on the definition of water rights and the trade of such rights.

The primary step in establishing a functional water market is to break the long-standing nexus between land and water rights. A principle aim of the reform process is to change the nature of water rights from one inextricably tied to the land to more of an independent and distinct chattel. There is overall agreement that the nexus between land and water should be broken and water rights be traded as chattels separate to land. This view is equally held by irrigators and the wider community. Within the irrigation community, irrigators who have traded felt stronger about breaking the nexus compared to those who have not traded water.

Issues in the definition of the water right itself include the rights to on-farm runoff, the status of water for the environment, and the rights to sleeper and dozer licences. Overall, the notion of licensing on-farm runoff is rejected by irrigators and the general community. Setting aside water for the environment prior to allocating it to farmers is supported overall, but less by irrigators than the community at large. The irrigators expressed indifference to setting aside water for the environment prior to allocating it for their use. Finally, while there is overall indifference towards the notion of extinguishing sleeper and dozer licences, the community and irrigators attitudes are divided, with irrigators strongly rejecting the notion while the community support extinguishment.

Table 5 Definition of rights - irrigators and community opinions

	Overall Mean Rank <sup>†</sup>	Mean Rank Response <sup>†</sup>		MW-U <sup>‡</sup>	KS-Z <sup>‡</sup>
		Irrigator	Community		
Water entitlements should be allowed to be separated from land and be traded	2.68 <sup>a**</sup>	2.60	2.78	22809.5	1.161
On-farm runoff should be licensed	3.67 <sup>b**</sup>	3.65	3.71	23266.5	0.366
Water for the environment should be set aside prior to allocating water to farmers	2.74 <sup>a**</sup>	2.91	2.50	20338.5 <sup>**</sup>	1.591 <sup>*</sup>
Licences that have not been used for five years should be extinguished	3.08	3.43	2.63	17107.0 <sup>**</sup>	2.720 <sup>**</sup>

<sup>†</sup> Scale 1 'strongly agree' 5 'strongly disagree'; \*significant at 0.05; \*\*significant at 0.01

<sup>a</sup> significantly less than 3; <sup>b</sup> significantly greater than 3

<sup>‡</sup> See Section 4 for explanation of MW-U and KS-Z

Within the irrigation community irrigators who have traded water are more supportive of breaking the nexus between land and water than those who have not traded. The results also suggest that irrigators, whether they have traded or not, do not support the notion of licensing on-farm runoff or extinguishing licences that have not been used for over five years, but are indifferent to setting aside water for the environment prior to allocating it to farmers.

Along with the definition of rights are issues of security and reliability. Table 7 presents opinions on the security and reliability of rights following the water reform process. The results suggest that there is general agreement among irrigators that water entitlements will be more secure and have higher reliability following the reform process. Traders and non-traders alike hold this view.

Table 6 Definition of rights: trader and non-trader opinions

	Mean Rank <sup>†</sup>	Mean Rank Response <sup>†</sup>		MW-U <sup>‡</sup>	KS-Z <sup>‡</sup>
	Irrigators	Trader	Non-trader		
Water entitlements should be allowed to be separated from land and be traded	2.60 <sup>a**</sup>	2.37	2.83	6971.5*	1.259
On-farm runoff should be licensed	3.65 <sup>b**</sup>	3.51	3.76	6851.0	0.741
Water for the environment should be set aside prior to allocating water to farmers	2.91	2.87	2.94	7942.5	0.591
Licences that have not been used for five years should be extinguished	3.43 <sup>b**</sup>	3.41	3.45	8167.0	0.264

<sup>†</sup> Scale 1 'strongly agree' 5 'strongly disagree'; \*significant at 0.05; \*\*significant at 0.01

<sup>a</sup> significantly less than 3; <sup>b</sup> significantly greater than 3

<sup>‡</sup> See Section 4 for explanation of MW-U and KS-Z

Table 7 Security and reliability of rights following COAG reforms: trader and non-trader opinions

	Mean Rank <sup>†</sup>	Mean Rank Response <sup>†</sup>		MW-U <sup>‡</sup>	KS-Z <sup>‡</sup>
		Trader	Non-trader		
Water entitlements will be more secure following the reforms	2.50 <sup>a**</sup>	2.50	2.50	7308.5	0.579
Water entitlements will have higher reliability of supply following the water reforms	2.51 <sup>a**</sup>	2.46	2.55	7004.0	0.549

<sup>†</sup> Scale 1 'strongly agree' 5 'strongly disagree'; \*significant at 0.05; \*\*significant at 0.01

<sup>a</sup> significantly less than 3; <sup>b</sup> significantly greater than 3

<sup>‡</sup> See Section 4 for explanation of MW-U and KS-Z

### 6.3 Community Involvement in COAG Reforms

A key component to ensuring adoption of COAG reforms, and especially voluntary reform mechanisms such as water trading, is empowerment and ownership of the process by irrigators and the community at large. According to the respondents, however, the community at large has been poorly informed in the reform process. Table 8 summarises respondents' attitudes to the community's involvement and acceptance of COAG reforms. 37.7% and 57.5% of the irrigators and community respectively felt that the community had been poorly informed but accepting of the changes. 4.5% and 2.2% respectively felt that the community had been actively informed and embraced it.

to overcome water shortages. The CAP effectively reduced water allocations throughout the catchment. Irrigators and community members were asked whether they had perceived an impact on their farm or business enterprise. Table 9 presents a summary of the results. 26.8% and 5.9% of irrigators and community members, respectively, stated that the CAP had impacted on their farm enterprise or business.

The highest perceived impact of the CAP by irrigators is in the Murray Valley areas with 34.3% of irrigators having been impacted<sup>1</sup>. In contrast, all irrigator respondents from the Goulburn River (16) and 83.9% and 56.3% of irrigators responding from the Torrumbarry and Shepparton areas respectively stated that the CAP had not impacted on them.

### 6.4 The Impact of the CAP

A cap on water entitlements in the Murray-Darling Basin was introduced in June 1995 as part of a strategy

Table 8 Community involvement in the water reform process

	Irrigator		Community	
	Frequency	Percentage	Frequency	Percentage
Actively involved and embraced it	11	4.5	4	2.2
Well informed and accepting	47	19.0	10	5.4
Involved but largely ignored	60	24.3	31	16.7
Poorly informed but accepting	93	37.7	107	57.5
Poorly informed and unhappy	36	14.6	34	18.3
<b>Total</b>	<b>247</b>	<b>100.0</b>	<b>186</b>	<b>100.0</b>

Table 9 Impact of the CAP on-farm enterprises

	Irrigator Farm Enterprises		Community Businesses	
	Frequency	Percentage	Frequency	Percentage
<b>Yes</b>	69	26.8	11	5.9
<b>No</b>	188	73.2	175	94.1
<b>Total</b>	<b>257</b>	<b>100.0</b>	<b>186</b>	<b>100.0</b>

<sup>1</sup> 80% of irrigators in the Campaspe River area stated that they had been impacted, but the number of respondents is limited

The main comments by irrigator respondents concerning the impact of the CAP on their enterprise are listed in Figure 2 below. According to the respondents the CAP

has forced the recognition of water as a scarce resource and more efficient use of it, decreasing production and created uncertainty for future planning regarding the costs and availability of water.

#### CAP knowledge

- Did not know there is a CAP (2)
- Water availability, usage and security
  - There are higher levels of water uptake and usage (1)
  - There is not enough water available (4), in particular for Russell Burbank potatoes (2)
  - There is less water available (14)
  - Particularly from underground sources (3)
  - Fewer options for water storage (3)
  - A decreased sales allocation (3)
  - Less water available in the off season (2)
  - Entitlements have increased security (2)
- Market impact
  - Difficult to get extra water entitlements (1)
  - Need to use trading to secure water entitlements (1)
  - Entitlements being purchased outside the traditional use area (1)
  - Water is more expensive (5) and more valuable (2)
  - Selling water is more valuable than growing crops (1)
  - Temporary transfers have increased profitability (1)
  - Inspired over purchase (2) and more development (1) to establish security
- Concern over costs and restrictions on bores
  - Concern over the costs and restrictions of bore licences (2)
- Forced recognition of water as a scarce resource and more efficient use of it
  - Forcing the recognition of water as a scarce resource and more efficient use of it (10)
  - Incorporating water availability into future planning (3)
  - Monitoring of use (1)
  - Forcing unsustainable practices (1)
- Decreased production
  - Has increased costs of production (5) including admin costs (1)
  - Decreasing production (10)
  - Causing financial hardships/threatening future viability (3)
  - Ceasing production (2)
  - Changing the mix of production (1)
  - Changing patterns of seasonal water use to those inappropriate for crops (1)
- Limited future development
  - Has created uncertainty for future planning regarding the costs and availability of water (6)
- Social perceptions
  - A social perception of a resource being taken away (1)

Figure 2 Impacts of the CAP on irrigators in the Goulburn Broken catchment

The perceived impact of the CAP on individual irrigators and community members depends on the size of their water right and the town they live in, respectively. Table 10 presents the results of applying logistic regression analysis using maximum likelihood estimates to CAP impacts on irrigators and community members.

Figures 3 and 4 present the probability functions for the likelihood of perceiving a CAP impact. As the size of an irrigator’s water allocation increases the likelihood of being impacted by the CAP decreases from over 20% by those irrigators with water rights less than 60ML, to less than 5% for irrigators with water rights over

950ML. Over 1000ML the probability of an irrigator perceiving a CAP impact on their farm enterprise is negligible.

According to community responses smaller towns with populations of less than 1,000 have been most impacted by the CAP. The perceived impact of the CAP on town businesses reduces significantly as the town population increases from 1,000 to 30,000. The probability of a community member perceiving a CAP impact on town businesses falls from over 10% in small towns to less than 2% in towns with populations of 31,000.

Table 10 Logistic regression of CAP impacts on irrigators and community members

	<b>Variable</b>	<b><math>\beta</math></b>	<b>s.e</b>	<b><math>\chi^2</math></b>	<b>p</b>
<b>Irrigator</b>	Constant	-1.29690	0.194700	44.3852	0.0001
	Water Right	0.01740	0.000800	5.0148	0.0008
<b>Community</b>	Constant	-2.03440	0.348400	34.0900	0.0001
	Town Size	-0.00006	0.000019	9.6466	0.0019

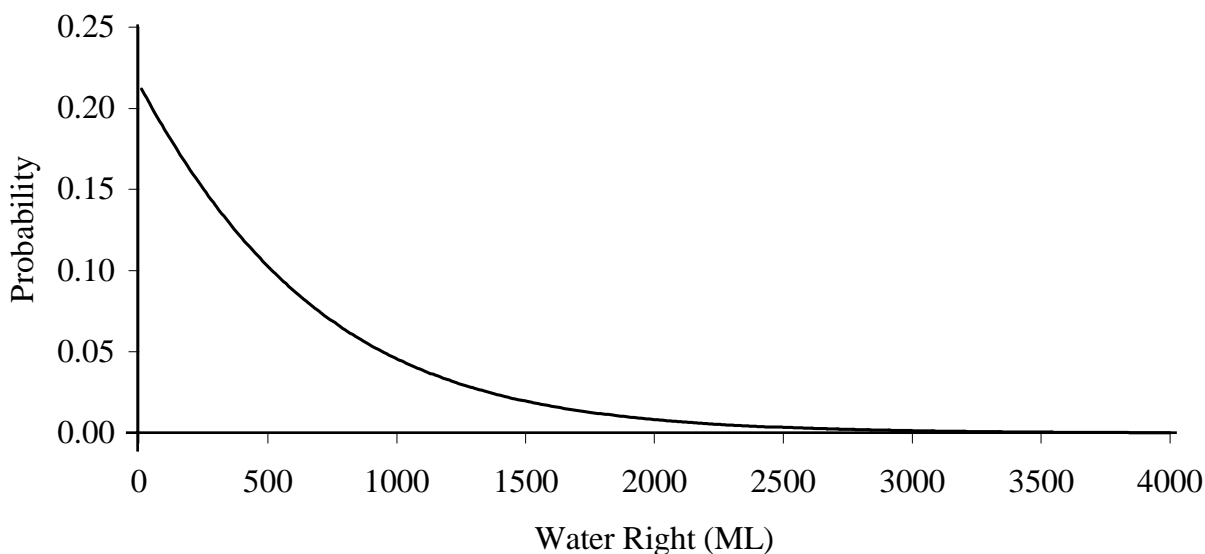


Figure 3 Probability of CAP impact by size of water allocation

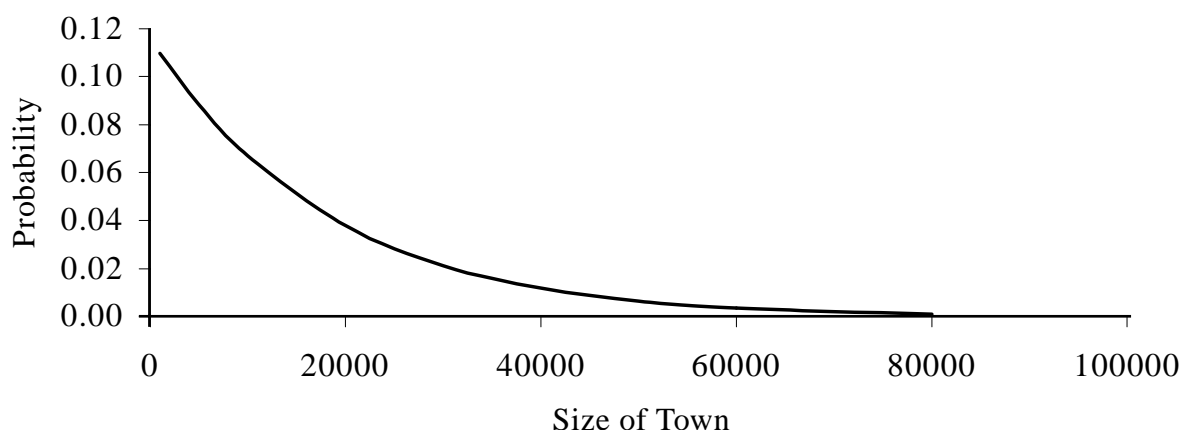


Figure 4 Probability of CAP impact by size of town

Table 11 Analysis of key COAG reform objectives

Issue in Water Reform	Mean Percentage		
	Overall	Irrigator	Community
Maximise farm income	21.81	26.69 <sup>z</sup>	15.82 <sup>x</sup>
Distribute water in fair and just manner	31.62	34.19	28.47
Meet natural flow requirements	27.17	22.82 <sup>z</sup>	32.50
Impact on local towns and communities	17.71	15.73	20.14 <sup>x</sup>

Note: Acsin transformation analysed using type III ANOVA and Tukey HSD tests. Overall, irrigator and community surveys analysed separately. Numbers sharing the same superscript letter in a column are not statistically different. See Section 4 for explanation.

### 6.5 Trade-off of Water Reform Objectives

The reform objectives of maximising the income generated from available water supplies, ensuring an equitable and fair distribution of water, meeting environmental flow requirements and accounting for local economic and social impacts are likely to either be in conflict or not achievable simultaneously. The government may have to determine a hierarchy to prioritise these objectives. Table 11 presents irrigator and community ranking of COAG reform objectives. Overall, respondents ranked the need to distribute water in a fair and just manner higher than all other issues listed. The issues, in relative importance, are

ensuring a fair and just distribution of water, meeting environmental flow objectives, then maximising farm income and finally taking account of local town and community impacts. Irrigators consider ensuring a fair and just distribution of water as most important, maximising farm income and meeting natural flow objectives equally important and above concern for local towns and communities. The community considers meeting natural flow objectives the most important, followed by ensuring a just and fair distribution of water. Maximising farm income and taking account of local towns and communities are equally ranked lowest.

## 6.6 Environmental Water Requirements

Addressing environmental flow requirements is likely to require a trade-off between extractive and environmental use of water. Four *hypothetical* scenarios were presented to the respondents. The scenarios are based in part on the Water Allocation Management Plan (WAMPS) for the Fitzroy Basin and are meant to elicit irrigator and community opinions and attitudes toward foregoing water entitlements for improved environmental flows. It is not claimed that the options presented reflect actual trade-off combinations.

The irrigators were asked to rank their preference from highest (1) to lowest (4). Table 12 presents a summary of their rankings. Overall, given the options presented, there is strong support for reducing the allocation of

water to extractive use to allow for improvements in the riverine environment. Irrigator respondents overall are prepared to accept a reduction in their water entitlement for an improvement in environmental flows. Irrigators ranked highest options that involved a reduction in water entitlements that provided for possible reversibility of habitat degradation. Irrigators ranked no reduction in entitlement with irreversible habitat degradation lowest. The community supports higher levels of entitlement reduction and associated improved environmental flows.

The notion that the government enters the market and purchases water for environmental use is not generally supported.<sup>2</sup>

Table 12 Trade-offs between extractive and environmental uses of water

Hypothetical reduction in water entitlement	Hypothetical impact on the riverine environment	Mean Rank <sup>†</sup>		
		Overall	Irrigators	Community
0%	Irreversible habitat degradation	3.10	2.98	3.24
20%	Habitat degradation, reversibility unknown	2.42 <sup>z</sup>	2.30 <sup>x</sup>	2.58
30%	Reversible habitat degradation	2.09	2.12 <sup>x</sup>	2.05 <sup>y</sup>
40%	No habitat degradation	2.42 <sup>z</sup>	2.68	2.12 <sup>y</sup>

<sup>†</sup> Scale 1 'strongly agree' 5 'strongly disagree'. The irrigators and community results, while presented in the same table have been analysed separately. Analysis conducted using Friedman's non-parametric ANOVA and modified Tukey multiple comparison tests. Symbols represent no statistical differences.

Numbers sharing the same superscript letter in a column are not statistically different. See Section 4 for explanation.

<sup>2</sup> See Appendix A. Environmental Concerns. Question 2.

## 6.7 Social Justice and Equity Objectives

The stated objectives of COAG water reform are to achieve an efficient and equitable distribution of water. If the changes in policy are to be accepted and adopted by the irrigators and the community at large, they need to be empowered in the development of new policies and feel that the outcomes are fair and just. Syme *et al.* (1999) have undertaken studies of peoples' attitudes and standpoints on these issues by presenting them with water allocation statements developed from a variety of philosophical schools of thought. In this study, statements concerning outcomes and procedures for water trading were developed from four philosophical schools of thought - Utilitarianism, Rawls, Kaldor/Hicks and Kant.

Countries, such as Australia, have been seen as utilitarian societies, and as such have tended to develop policies to maximise the greatest happiness of the greatest number. In this study this standpoint is ranked more positively than any other in achieving just outcomes to water trading. In developing trading rules and procedures concern should be for the greatest happiness of the greatest number. Maximising the greatest happiness is more important than ensuring that adequate compensation is available for those who may lose as a result of trade or consideration for the welfare of those worse off. Exploring the lower ranked standpoints further, development of the rules and procedures on a case-by-case basis is seen as equally important as concern for the welfare of those worst off and compensation issues.

Table 13 Social justice and equity objectives for water trading

Philosophical Standpoint	Philosophical Statement	Mean Rank <sup>†</sup>		
		Overall	Irrigator	Community
Utilitarianism	Water trading should benefit the greatest number of people possible	2.00	2.11	1.86
Rawls Theory of Social Justice	If trading rules and procedures cannot provide equal opportunity to access water for all in your region they should protect the rights of those worst off	2.48 <sup>z</sup>	2.71 <sup>x</sup>	2.17 <sup>u</sup>
Kaldor/Hicks	The beneficiaries from water trade should be able to compensate those who feel they have lost because of the transaction	2.78 <sup>y</sup>	3.01 <sup>w</sup>	2.49 <sup>v</sup>
Kant	There should be no general rules of trade as each situation is different and should be considered on a case-by-case basis	2.66 <sup>zy</sup>	2.85 <sup>xw</sup>	2.42 <sup>uv</sup>

<sup>†</sup> Scale 1 'strongly agree' 5 'strongly disagree'. The irrigators and community results, while presented in the same table have been analysed separately. Analysis conducted using Friedman's non-parametric ANOVA and modified Tukey multiple comparison tests. Symbols represent no statistical differences.

Numbers sharing the same superscript letter in a column are not statistically different. See Section 4 for explanation.





## 7. Market Structure, Conduct and Performance

From an institutional perspective, the number of buyers and sellers, the conditions of and constraint on entry and exit to the market, homogeneity of the product and market knowledge, are important determinants of a market's performance in achieving the COAG reform objectives. These aspects of market analysis can form a basis to judge market performance. Market performance, *viz.* achieving an efficient and equitable distribution of the resource, is arguably a key variable in constructing public policy on water trading. To effectively achieve the efficiency objectives of COAG reforms, water markets need to be as competitive in economic terms as possible. To be competitive a market needs to have a large number of buyers and sellers, a well-defined homogeneous property right and good

market knowledge. The economic basis of COAG water reforms is for the water authority to only intervene when necessary and to promote as close to a free trade environment as possible.

The number of buyers and sellers in the market will in part depend in part on who is allowed to trade. Constraints on such rights may be spatial, sectoral or use related. Table 14 summarises irrigator and community opinions on who should have a right to trade in water. Overall, there is support for trade between irrigators, local towns and communities and local shires, but not with individuals or companies who do not intend to use the water. Irrigators feel stronger about allowing trade between active irrigators within a region and by sleeper licencees than the community. Conversely, the community feels stronger about allowing farmers who wish to start an irrigation enterprise, and local shires and communities being allowed to trade. The community also feels indifferent to trade in sleeper licencees.

Table 14 Rights to trade: irrigator and community opinions

	Mean Rank †	Mean Response †		MW-U ‡	KS-Z ‡
		Irrigators	Community		
Active irrigators who hold water entitlements within your region	1.82 <sup>a**</sup>	1.60	2.10	18142.0**	2.164**
Active irrigators who hold water entitlements in adjoining regions	2.55 <sup>a**</sup>	2.48	2.64	21758.5	0.941
Farmers who wish to start an irrigation enterprise in your region	2.73 <sup>a**</sup>	3.00	2.39	18438.0**	2.270**
Farmers who have not used their entitlement in the last five years	2.59 <sup>a**</sup>	2.31	2.96	17542.5**	2.410**
Local towns and communities for domestic use	2.37 <sup>a**</sup>	2.53	2.17	19974.0**	1.413*
Local shires to use water for recreation use, such as parks and golf courses	2.87 <sup>a*</sup>	2.98	2.73	21308.0*	1.027
Local industries who use water	2.29 <sup>a**</sup>	2.31	2.26	23552.5	0.502
Environmental groups and agencies	2.79 <sup>a**</sup>	2.85	2.72	22128.5	0.627
Individuals and companies who do not intend to use water	3.85 <sup>b**</sup>	3.87	3.82	23115.0	0.591

† Scale 1 'strongly agree' 5 'strongly disagree'; \*significant at 0.05; \*\*significant at 0.01 *a* significantly less than 3; *b* significantly greater than 3 ‡ See Section 4 for explanation of MW-U and KS-Z

Table 15 summarised differences between traders and non-traders opinions on the rights to trade. Spatially, there is strong support by irrigators for active irrigators within their region to trade, and positive, but less so, support for trade with people in adjoining regions. On both these issues irrigators who traded are more supportive than those who do not trade, and the distribution of responses between these two groups differ. Irrigators are supportive of trade with local towns and communities for domestic and local industrial use, but indifferent to local shires using trading to acquire

water for recreation use, such as parks and golf courses. They are also indifferent to trade with environmental groups and agencies and farmers who wish to start an irrigation enterprise. There is overall agreement among irrigators that companies who do not intend to use water should not be allowed to enter the market. Excluding such companies will remove non-use speculators from the market. Further exploration of this issue is necessary to determine whether such exclusion is legal under competition and trade practices.

Table 15 Rights to trade: trader and non-trader opinions

	Mean Rank <sup>†</sup>	Mean Response <sup>†</sup>		MW-U <sup>‡</sup>	KS-Z <sup>‡</sup>
	Irrigator	Trader	Non-trader		
Active irrigators who hold water entitlements within your region	1.60 <sup>a**</sup>	1.44	1.76	5874.0**	2.008**
Active irrigators who hold water entitlements in adjoining regions	2.48 <sup>a**</sup>	2.22	2.78	5647.5**	1.484*
Farmers who wish to start an irrigation enterprise in your region	3.00	2.95	3.07	7244.0	0.461
Farmers who have not used their entitlement in the last five years	2.31 <sup>a**</sup>	2.26	2.34	7279.5	0.496
Local towns and communities for domestic use	2.53 <sup>a**</sup>	2.42	2.63	6762.0	0.581
Local shires to use water for recreation use, such as parks and golf courses	2.98	2.84	3.10	6625.5	0.934
Local industries who use water	2.31 <sup>a**</sup>	2.27	2.33	7097.0	0.566
Environmental groups and agencies	2.85	2.73	2.97	6471.0	1.283
Individuals and companies who do not intend to use water	3.87 <sup>b*</sup>	3.87	3.87	7439.5	0.215

<sup>†</sup> Scale 1 'strongly agree' 5 'strongly disagree'; \*significant at 0.05; \*\*significant at 0.01

<sup>a</sup> significantly less than 3; <sup>b</sup> significantly greater than 3

<sup>‡</sup> See Section 4 for explanation of MW-U and KS-Z

The nature of water rights in the future is going to influence market performance. Apart from the legislative or administrative definition of the tradeable good (or right), there is the issue of whether the irrigators perceive their water entitlement as a tradable chattel. Table 16 summarises irrigator attitudes on this issue. Irrigators agreed that in the future water would become a chattel and be traded. Finally, the security of a right is important in determining its value and as irrigators agreed that they would be willing to pay more for high security water over general security water. This price differential suggests that there may in fact be a split market for different security levels in the future.

Another aspect to the structure of a market is the level of concentration. Market concentration involves measuring the number and relative size of traders in the market. A market dominated by a few traders is unlikely to achieve a Pareto optimal distribution of water. In such circumstances, the traders need to anticipate the actions

of others. Table 17 summarises irrigator perceptions of market concentration. Irrigators were asked a series of questions on this issue in different forms throughout the survey. While the respondents considered it unlikely that the market will consist of a few players who may act strategically by anticipating the actions of other traders, they are undecided whether the actions of individuals would greatly influence the market price. The traders felt stronger that there would be a large number of active traders than those who do not trade and their distribution of responses differed from those who do not trade.

Historically, the role of the water authority has been to engineer dams, weirs and channels and regulate water use according to the hydrological characteristics of the system. Maturing water economies, and associated water reform, is likely to result in a broadening role for water authorities to deal with the social, economic and hydrological dimensions of catchment management.

Table 16 The nature of water entitlements in water markets: trader and non-trader opinions

	Mean Rank <sup>†</sup>	Mean Response <sup>†</sup>		MW-U <sup>‡</sup>	KS-Z <sup>‡</sup>
		Trader	Non-trader		
Water trading will become like buying fertilizer in that a farmer will buy and sell it in on a need basis	2.81 <sup>a**</sup>	2.75	2.89	7813.5	0.556
Farmers will pay more for high security water than for general security	2.34 <sup>a**</sup>	2.24	2.46	7049.0	0.661
Water entitlements will no longer be an inherent asset in farming	4.13 <sup>b**</sup>	4.15	4.12	7716.5	0.608

<sup>†</sup> Scale 1 'strongly agree' 5 'strongly disagree'; \*significant at 0.05; \*\*significant at 0.01

*a* significantly less than 3; *b* significantly greater than 3

<sup>‡</sup> See Section 4 for explanation of MW-U and KS-Z

Table 17 Perceptions of market concentration: trader and non-trader opinions

	Mean Rank <sup>†</sup>	Mean Response <sup>†</sup>		MW-U <sup>‡</sup>	KS-Z <sup>‡</sup>
		Trader	Non-trader		
Markets will consist of only a few traders, farmers will anticipate what others may offer and buy	3.31 <sup>b**</sup>	3.47	3.15	6363.5**	1.421*
There will be a lot of traders and the actions of individuals will not greatly influence the market price	3.05	2.99	3.12	7205.0	1.017

<sup>†</sup> Scale 1 'strongly agree' 5 'strongly disagree'; \*significant at 0.05; \*\*significant at 0.01

*a* significantly less than 3; *b* significantly greater than 3 <sup>‡</sup> See Section 4 for explanation of MW-U and KS-Z

The water authority plays a key role in formulating the structure of a market. Irrigator and community attitudes to the role of the water authority in water markets are presented in Tables 18 and 19. There is strong support among irrigators for the water authority to intervene in trade if the system is not capable of supplying water to the buyer. There is also unilateral support among irrigators and the community for the water authority to intervene in the market when trade has the potential of impacting on third parties, the economic viability of local towns and communities, environmental flow objectives, and when the negotiated conditions of trade or resulting distribution from trade is seen as unjust or unfair. While these views are strong among both community and irrigators, they are held more strongly among the community than irrigators.

Within the irrigation community, support is equal among traders and non-traders. Implementing these findings would require a more interventionist approach than has been currently prescribed and adopted. The dominant academic stand on trade in Australia is to promote free trade and limit intervention. The commonly held standpoint on water trading is to minimise water authority and state intervention and allow the market to redistribute water entitlements. Academic arguments for a more interventionist approach would be based on

the notion that water is a common pool resource and that such intervention is necessary to achieve a Pareto optimal outcome or some form of Pareto improvement in the distribution of water. The argument would be that markets do not naturally internalise the social costs and benefits to regional towns and the environment, or consider distributive consequences of trade. Markets will redistribute resources based solely on private benefits and costs. The case would have to be made that trade in water has consequences beyond that of private benefits and costs associated with trade in other goods.

Of specific concern to the water authority is the possibility that trade will result in infrastructure isolation if large volumes of water trade out of a channel system. The policy to deal with this issue is important in determining the definition of rights to trade by those within channel systems, and, in the process, the structure of the market. Options open to the water authority include continuing to supply to those remaining, imposing exit fees on those trading out of the system, compensating those remaining and closing the system, or restricting trade to within the system. Table 20 presents a breakdown of irrigator support for each option. 48.0% of irrigators support restricting trade to within the system, compared to at most 18.7% for any other option.

Table 18 The role of the water authority in regulating water markets: irrigator and community opinions

	Overall Mean †	Mean Rank Response †		MW-U ‡	KS-Z ‡
		Irrigators	Community		
If the trade impacts on the economic viability of local towns and communities	2.08 <sup>a**</sup>	2.33	1.76	15583.5**	2.996**
If the trade impacts on the environmental river flow objectives	1.99 <sup>a**</sup>	2.20	1.72	16256.5**	3.598**
If the resulting distribution of water in the catchment is not considered fair and just	1.94 <sup>a**</sup>	2.13	1.70	16806.0**	2.960**

† Scale 1 'strongly agree' 5 'strongly disagree'; \*significant at 0.05; \*\*significant at 0.01

<sup>a</sup> significantly less than 3; <sup>b</sup> significantly greater than 3

‡ See Section 4 for explanation of MW-U and KS-Z

Table 19 The role of the water authority in regulating water markets: trader and non-trader opinions

	Mean †	Mean Rank Response †		MW-U ‡	KS-Z ‡
		Trader	Non-trader		
Only when the system is not capable of supplying the water to the buyer	1.85 <sup>a</sup>	1.79	1.93	7287.0	0.437
If there is a possible impact on other water entitlements	1.91 <sup>a**</sup>	1.94	1.88	7224.5	0.497
If the trade impacts on the economic viability of local towns and communities	2.33 <sup>a**</sup>	2.46	2.21	6695.5	0.775
If the trade impacts on the environmental river flow objectives	2.20 <sup>a**</sup>	2.21	2.19	7568.5	0.489
If the resulting distribution of water in the catchment is not considered fair and just	2.13 <sup>a**</sup>	2.19	2.09	6904.0	0.686
If the conditions and price negotiated are not considered fair and just	2.55 <sup>a**</sup>	2.60	2.51	7171.5	0.368

† Scale 1 'strongly agree' 5 'strongly disagree'; \*significant at 0.05; \*\*significant at 0.01

*a* significantly less than 3; *b* significantly greater than 3

‡ See Section 4 for explanation of MW-U and KS-Z

Table 20 Remedies to infrastructure isolation resulting of trade

	Frequency	Percentage	Cumulative Percentage
Continue to supply	46	18.7	18.7
Impose exit fees	43	17.5	36.2
Compensate and close system	25	10.2	46.3
Restrict trade to within system	118	48.0	94.3
Other	14	5.7	100.0
<b>Total</b>	<b>246</b>	<b>100.0</b>	

The final determinant of market structure is the level of market knowledge. Market knowledge is important in maintaining competitive markets. Understanding of the interactions between market prices, quantities and the actions of other traders define market knowledge in this context. Providing a public register of trade is one way the water authority could increase market knowledge. Table 21 presents a summary of irrigators' opinions on the disclosure of market information. Irrigators overall are supportive of disclosure of the volume and price of water as well as traders' entitlements and crop mixes on a public register.

In terms of acquiring market information there is general agreement that market information is readily available. 94.7% and 91.7% of respondents in Rochester and Central Goulburn irrigation areas, respectively, stated that they have been able to gain good information on how temporary water markets operate. 53.3% and 37.5% of Goulburn River and Murray Valley irrigator respondents did not consider they are able to gain good information.

Sources of information are listed in Figure 5 below. The main sources include the Goulburn-Murray Water and the media, especially newspapers.

Table 21 Disclosure of market information in public register: trader and non-trader opinions

	Mean †	Mean Rank Response †		MW-U ‡	KS-Z ‡
		Trader	Non-trader		
The volume of water traded.	1.58 <sup>a**</sup>	1.62	1.54	7603.5	0.309
The price at which the water traded	2.08 <sup>a**</sup>	2.13	2.02	7659.0	0.828
The traders entitlements and crop mix	2.27 <sup>a*</sup>	2.36	2.18	6895.5	0.659

† Scale 1 'strongly agree' 5 'strongly disagree'; \*significant at 0.05; \*\*significant at 0.01

*a* significantly less than 3; *b* significantly greater than 3

‡ See Section 4 for explanation of MW-U and KS-Z

- Authorities (151) of which respondents specified:
  - Goulburn-Murray Water (136)
  - Water bailiff (5)
  - Swan Hill Water Office (1)
  - State Water Resources (1)
  - Rural Water Commission (8)
- Media (47), of which respondents specified:
  - local news (4)
  - newspapers (17)
  - radio (5)
  - newsletters (9)
  - agricultural papers (1)
  - farm journal (1)
  - advertisements (2)
- Agents (15) of which respondents specified:
  - private agent (10)
  - planwright (private broker) (5)
- Water market participants (4) of which respondents specified:
  - traders (3)
  - private sale pool (1)
- Locals (11) of which respondents specified:
  - farmers/neighbours (8)
  - local estate agent (2)
  - local stock and station agent (1)
- Management consultants (2) of which respondents specified:
  - land management services (1)
  - agricultural advisor (1)

The structure of a market is by no means the sole determinant of how a market will perform. Another key determinant is how the traders conduct themselves, in other words, the behaviour of sellers and buyers in the market. How they act will also be determined by perceived, as well as the actual actions of other traders.

Table 22 gives a breakdown of perceptions of why other farmers trade and compares the results with stated reasons for trade. The temporary market predominately redistributes surplus water allocations to meet shortfalls in allocations and end of season waterings. 74% of water sold is surplus to needs, while 25% of sellers considered the opportunity cost of selling as opposed to using their water on their farm. 76% bought water because their existing entitlement did not meet their needs and 18% bought water to meet their end of season watering needs. 32.6% considered the actions of other traders influenced how they traded.<sup>3</sup>

Overall, the proportion of irrigators who believe others buy water because their water allocation does not meet requirements is not consistent with actual stated reasons for trade. This is largely due to the perceptions

of those who do not trade. The overall and trader perceptions concerning buying water to meet end of season waterings are accurate, but not by those who do not trade. Selling water that is surplus to needs or because more can be earned by selling than using the water on-farm is correctly perceived overall by both traders and non-traders.

80.0%, 65.0% and 59.1% of irrigators in the Campaspe River, Rochester and Pyramid-Boort areas respectively gave the opportunity cost of water as the main reason why others temporarily sell water on the temporary market. In all other areas surplus water is seen as the main reason why other farmers traded. Of the stronger results, 86.7% and 73.3% of irrigators in the Goulburn and Lodden rivers, respectively, considered surplus water as the main reason why others sell water.

While 71.4% of irrigator respondents from the Goulburn River considered the fact that an allocation would not meet crop requirements as the main reason why other farmers buy water, 35.0% and 31.3% of Rochester and Shepparton irrigator respondents considered the end-of-season water needs as the main driver for other farmers buying water.

Table 22 Perceptions of temporary trading: trader and non-trader opinions

	<b>Perception</b>	<b>Overall</b>	<b>Traders</b>	<b>Non-traders</b>	<b>Actual</b>
<b>Buy</b>	Water allocation does not meet requirements	0.6221	0.6894 <sup>b</sup>	0.5590	0.7625 <sup>b</sup>
	End of season waterings	0.2366 <sup>a</sup>	0.1515 <sup>b</sup>	0.3149	0.1875 <sup>ab</sup>
<b>Sell</b>	Surplus water	0.6145 <sup>a</sup>	0.6165 <sup>bd</sup>	0.6190 <sup>cd</sup>	0.7451 <sup>abc</sup>
	Earn more by selling than using	0.3321 <sup>a</sup>	0.3383 <sup>bd</sup>	0.3175 <sup>cd</sup>	0.2549 <sup>abc</sup>

Note: Numbers sharing the same superscript letter in a column are not statistically different. See Section 4 for explanation.

<sup>3</sup> See Appendix A. Question 8



Tables 23 and 24 outline reasons for trade and expected conduct of farmers in water markets in the future. When traders are asked why they may buy water in the future, security and acquiring water to finish a crop are the dominant answers. When asked about selling water in the future, 75.6% of traders indicated that they would sell their surplus water. 24.4% indicated that they will consider changing farm practices in order to trade water.

Finally, while there is an expectation that farmers will be reluctant to trade and rely on their entitlement to meet watering requirements, irrigators agreed that in the future farmers will follow water prices as they do crop and input prices and react accordingly. This result may be seen to be an indication that there is a continued place for temporary markets to meet within season distribution issues.

Table 23 Reasons for trading water in the future

Buy/Sell	Reason	Count	Percentage of Responses
<b>Buy</b>	Prior to making a cropping decision	61	17.9
	To finish a crop should water become short	108	31.7
	To acquire more secure water supply	103	30.2
	Prior to next irrigation	17	5.0
	Purchase regularly according to watering regime	52	15.2
	<b>Total</b>	<b>341</b>	<b>100.0</b>
<b>Sell</b>	Only sell water surplus to requirements	204	75.6
	Change crop to use less water	9	3.3
	Run all or some of the crop dryland	17	6.3
	Reduce the area planted	15	5.6
	Not crop that year	13	4.8
	Other	12	4.4
	<b>Total</b>	<b>270</b>	<b>100.0</b>

Note: Respondents could give more than one answer. The results are therefore presented in a multiple response table.

Table 24 Expected conduct of farmers in water trading: trader and non-trader opinions

	Mean Rank <sup>†</sup>	Mean Response <sup>†</sup>		MW-U <sup>‡</sup>	KS-Z <sup>‡</sup>
		Trader	Non-trader		
Farmers will be reluctant to trade and rely on their entitlement to meet their water requirements	2.70 <sup>a**</sup>	2.95	2.43	5857.0**	1.709**
Farmers will follow water prices as they do crop and input prices	2.25 <sup>a**</sup>	2.12	2.39	6994.5*	0.980
There will be no temporary trading as all trades will be permanent.	4.04 <sup>b**</sup>	4.23	3.83	5927.0**	1.417*

<sup>†</sup> Scale 1 'strongly agree' 5 'strongly disagree'; \*significant at 0.05; \*\*significant at 0.01

<sup>a</sup> significantly less than 3; <sup>b</sup> significantly greater than 3

<sup>‡</sup> See Section 4 for explanation of MW-U and KS-Z

## 7.1 Use of Market Information

Use of market information can impact significantly on the nature and performance of the market. The uses of market information are listed in Figure 6 below. The main use is in trade: determining volumes to buy or sell and at what price.

## 7.2 Transaction Costs

Transaction costs, be they the actual monetary costs or the time taken to complete a trade are often perceived as a major inhibitor to trade. Tables 25 and 26 present a summary of transaction costs incurred by traders and their opinions on the time taken to complete their last trade.

- Nothing (22)
  - information specified from: G-MW (20); agricultural papers (1); other farmers (2)
- Traded (86)
  - Information specified from info from:
    - G-MW (63); radio (1); private agent (5); planwright (2); RWC (2); local estate agent (1); local stock and station agent (1); ads (2); other farmers (1); land management services (1); traders (2)
- Sold water (28)
  - Information specified from:
    - G-MW (20); private agent (3); RWC (1); local estate agent (1); other farmers (1); traders (1)
    - Sold through specified as: G-MW (3); private agent (3); traders (1); privately (1)
- Sold specified temporary (6)
  - Connected with information from
    - G-MW (2), connected with info from private agents (3); sold specified entitlement (1), connected with info from other farmers (1)
- Sold specified entitlement (1)
  - Connected with info from other farmers (1)
- Bought water (51)
  - Information specified from: G-MW (40); radio (1); private agent (2); planwright (1); RWC (1); local stock and station agent (1); ads (2); land management services (1); traders (1)
  - Bought through specified as: G-MW (3); private agent (2); privately (4); planwright (1); traders (1)
  - Bought specified temporary (12) – connected with information from G-MW (12)
  - Bought specified permanent (1) – connected with information from G-MW (1)
- Used for business planning (15) info specified from G-MW (14); traders (1)
  - Specified as following market prices (5) – connected with info from G-MW (1)
  - Specified as plotting potential returns from sales (1) – with information from G-MW (1)

Figure 6 Use of market information

Table 25 Level of transaction costs

Mean Transaction Cost <b>\$68.03</b>	Frequency	Percentage	Cumulative Percentage
Satisfactory	109	80.7	80.7
Excessive	26	19.3	100.0
<b>Total</b>	<b>135</b>	<b>100.0</b>	

Traders see neither of these issues as an inhibitor to trade, with 80.7% of traders considering the level of transaction costs to be satisfactory and 96.3% considering the time taken to complete a trade as reasonable or better.

### 7.3 Permanent Trading

Table 27 summarises perceptions of buying and selling in the permanent water market. Respondent views on permanent water trading are that most traders purchased

water because their existing water entitlement does not meet current needs. 63.3% of irrigator respondents believe that the reason other farmers permanently sell water is that it is surplus to needs. 33.2% believe that other farmers trade water by making some form of structural change to their farm operation. 61.4% and 18.5% perceive others buying water to meet existing water requirements or increasing water security respectively. 17.3% see others buying water to increase their irrigation enterprise.

Table 26 Time to complete trade

Mean Time 6.92 days	Frequency	Percentage	Cumulative Percentage
Excellent	45	33.6	33.6
Reasonable	84	62.7	96.3
Unacceptable	5	3.7	100.0
Inhibited the final use of the water	0	0	
<b>Total</b>	<b>134</b>	<b>100.0</b>	

Table 27 Perceptions of permanent trading

		Frequency	Percentage	Cumulative Percentage
<b>Buy</b>	Entitlement does not meet existing water requirements	159	64.1	64.1
	Land development	43	17.3	81.5
	Increased security of supply	46	18.5	100
	<b>Total</b>	<b>248</b>	<b>100</b>	
<b>Sell</b>	Surplus to needs	162	63.3	63.3
	More by selling than crops	63	24.6	87.9
	Dryland alternative	10	3.9	91.8
	Retiring	12	4.7	96.5
	Other	9	3.5	100
	<b>Total</b>	<b>256</b>	<b>100</b>	

#### 7.4 Blockages and Impediments to Trade

Table 28 outlines the perceived reasons why others do not trade water. There is general agreement that farmers will be reluctant to trade and rely on their entitlement to meet watering requirements. This feeling is stronger among traders than those who do not trade. Nevertheless, to meet additional water requirements there is general agreement that farmers would follow water market prices. On all these issues those who traded felt stronger than those who do not trade.

While there is general acceptance of the notion of breaking the nexus between land and water, the main perceived reason why others do not trade, beyond a need basis, is that they see their own entitlement as an integral part of their farm. This is seen as the main blockage to trade. Institutionally breaking the nexus between land and water will not lead to trade unless farmers see water entitlements as a tradeable asset.

Table 28 Perceived reasons why others do not trade: trader and non-trader opinions

Reason	All Irrigators		Traders		Non-traders	
	Count	%	Count	%	Count	%
Do not need additional water	157	36.6	96	43.0	59	29.5
They do not know enough about the market	66	15.4	34	15.2	32	16.0
They view water as an integral part of their farm and not for sale	124	28.9	58	26.0	63	31.5
They do not wish to barter with other farmers	15	3.5	7	3.1	8	4.0
They are philosophically opposed to trading	36	8.4	14	6.3	22	11.0
They find the administration costs and delays associated with trade too great	31	7.2	14	6.3	16	8.0
<b>Total</b>	<b>429</b>	<b>100.0</b>	<b>223</b>	<b>100.0</b>	<b>200</b>	<b>100.0</b>

Note: Respondents could give more than one answer. The results are therefore presented in a multiple response table.

Blockages, as outlined in Figures 7 and 8 below, can be classified as institutional and system based, or market behaviour and knowledge based. The main institutional blockages to trade are seen to be the process of having a trade approved (14), lack of water in the system (8) and the 30% trading rule (5), and the cost of having trade approved (5). Beyond abolishing the 30% trading rule there is no commonly expressed views on solving these problems.

The second form of blockage includes individual perceptions of markets and market behaviour. The main blockages are knowledge of how markets operate and fear that trade may result in loss of entitlement.

Knowledge of how the market operates inhibits trade directly as those who do not understand it shy away, and those who trade exit the market as a result of unrealised expectations.

In aggregate, the comments on the blockages to trade suggest that irrigators do not adequately understand the market system. There is limited understanding of how the price and quantity traded is determined by the interaction of supply and demand. Buyers believe that the price is set by sellers, or the water authority, and is set too high. Similarly, sellers believe that there are not enough buyers to sell all their water. In both cases the comments demonstrate limited understanding

- Lack of water in the system (8)
  - Solutions: storage (1); monitor water in the catchment (1); suspend trading (1)
- Limited distribution infrastructure (2)
- Technology (1)
  - Solutions: ability to get prices on line (1)
- High costs involved (4)
  - Solutions: decrease commission (1); increase price (1)
- No legal support/enforcement (1).
- No ability to transfer leftover entitlements from one year to the next (1) or store (1)
- Non uniform trading/administration systems (5)
  - Solution: simplify process (1)
- Red tape (14) involving staff (1), administration and paperwork (3), and delays in trade and allocation (3); the auction sale system of G-MW inhibits results (1)
  - Solutions: information of costs and prices (1); improved IT systems (1); better communication between buyers and sellers (1)
- Commercial interests have more influence (1)
  - Solutions: restrict trade to farmers (1)
- Difficulty of, or restrictions on transferring water between local areas (3); zones (1)
  - Solutions: agreement between authorities (1); rostering reticulation (1)
- No sales allowed on diversions (2)
- Purchases of water for development purposes (1);
  - Solutions: restrict trade to only to crops in the ground (1)
- Movement of water to unrelated systems (1)
  - Solutions: restrict trade to licensed farmers and only within the same system (1) (what system is not clear); NSW should not get VIC water (1)
- Not allowing enough water trade through the region (6) specified trade upstream on unregulated water (2)
  - Solutions: allow licensed farmers on the same river to trade (1); let trade apply across the whole catchment (1); monitor water volumes and movement across the region (1)
- The 30% trading rule (5)
  - Solutions: abolish (5)
- State government attitudes/actions in disallowing trade
  - Solutions: decrease government involvement (3); simplify methods (1)

Figure 7 Perceived institutional and system blockages to trade

of the relationship between supply and demand and equilibrium price and quantities traded. A possible cause of this may be the nature of the market and the fact that the traders do not have direct contact when trading through the exchange. The solution is to provide information on how the exchange operates and what a trader could expect to gain from the exchange.

The second main blockage is a fear that by trading surplus water the irrigator may lose that entitlement in the future. Position statements and public meetings to clarify the working of the market and the status of traded entitlements may assist in overcoming these blockages.

- Knowledge (13) regarding who to approach (1); value of water in different industries (1); the health of the system and sustainability (1); local entitlement holders (1); on the trading system (2)
  - Solutions: increased communication (2); education (3); promotion and campaigns (2)
- Uncertainty of seasonal supply and consequent water requirements (5)
  - Solutions: storage (2)
- Uncertainty of farm requirements and usage (2)
  - Solutions: submit monthly balance sheets of usage (1); impose external monitoring of use and impose efficiency requirements - hence deducing entitlements (1)
- Lack of experience (1)
  - Solution: time (1)
- Farmers with water not wanting to trade (1); too lazy to trade (1); conservative (5); lack incentive (1)
  - Solutions: decrease their entitlement by 15% of their surplus annually (1); increase understanding/education of the benefits of trade (6); impose a fee or deposit on supply or sale water (1)
- Fear and uncertainty regarding continuing entitlements if involved in trade (8)
  - Solutions: settle reform (1); promote trading (1); increase security (5)
- Lack of demand (2)
- Price (19) specified: severe fluctuations (3); unrealistically high (8); unknown (2)
  - Solutions: ceilings (3); restrict how much extra water a farm can purchase as a proportion of its total water right (2); and in terms of water channel capacity (1); set price (2); run listings of going prices (1)
- Water availability in the market (5)

Figure 8 Blockages to trade: market expectations and behaviour



## 8. Social Impacts of Water Trading

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The community survey asked whether they are aware of changes in social capital as a direct result of water trading. The indicators of social capital and a summary of their responses are presented in Table 29. Hospital facilities and services and banking facilities are seen as being in decline while there has been no significant change in small businesses, school and educational opportunities, or real estate values. The community saw no changes in the future in these as a result of water trading.

Table 29 Social capital impacts of water trading

Measure of Social Capital	Mean Response by the Community <sup>†</sup>
School and education opportunities	2.94
Crime and disorderly behaviour	3.08
Closures of small businesses	3.04
Hospital facilities and services	2.90 <sup>a*</sup>
Town real estate values	2.92
Banking facilities	2.69 <sup>a**</sup>
Expectations for the future of your community	3.01

<sup>†</sup> Scale 1 'strongly agree' 5 'strongly disagree'; \*significant at 0.05; \*\*significant at 0.01  
*a* significantly less than 3; *b* significantly greater than 3





## 9. Future Performance Expectations of Water Markets

Finally, given the structure and conduct of the market, respondents are asked their opinions on the performance of the market in the future. Tables 30 and 31 present a summary of their opinions. While overall there is consensus that trade in the future will be limited and within their region, non-traders held this view stronger than traders. The distribution of opinions also differed between traders and those who do not trade. Despite the possible regional nature of trade, traders and non-traders

agreed that water trading would become significant in the future and have a significant influence on agriculture. There is overall agreement that while trade will lead to an improvement in overall farm income in their region, and thus achieve a COAG objective, although they also agreed to the notion that trade may lead to reduced announced sales to all irrigators. The irrigators are uncertain of the impacts trade may have on the water supply of other regions and environmental health of the system overall, and reject the notion that trade will reduce the well-being of local businesses and towns and increase salinity in their region.

Table 30 Opinions on the future performance of water markets: trader and non-trader opinions

	Mean Rank <sup>†</sup>	Mean Response <sup>†</sup>		MW-U <sup>‡</sup>	KS-Z <sup>‡</sup>
		Trader	Non-trader		
Be limited and within a region	2.65 <sup>a**</sup>	2.85	2.43	5929.5**	1.576*
Become a significant market and influence on irrigated agriculture	2.24 <sup>a**</sup>	2.29	2.20	7524.5	0.389
Impact on the water supply of farmers in other regions	2.92	2.93	2.91	7710.0	0.101
Reduce the announced sales to all irrigators	2.74 <sup>a**</sup>	2.73	2.78	7009.0	0.562
Improve overall farm income in the region	2.66 <sup>a**</sup>	2.60	2.72	7405.0	0.420
Move water out of my reach of the river or channel system	3.33 <sup>b**</sup>	3.38	3.29	7201.0	0.577
Significantly impact on the environmental health of river systems	3.08	3.17	2.98	6857.0	0.856
Significantly reduce the well-being of local towns and businesses in my area	3.25 <sup>b**</sup>	3.35	3.14	6874.0	1.093
Be dominated by a few large players	3.15 <sup>b*</sup>	3.31	2.97	6415.5**	1.483*
Significantly increase salinity in your region	3.33 <sup>b**</sup>	3.48	3.19	6540.5*	0.893

<sup>†</sup> Scale 1 'strongly agree' 5 'strongly disagree'; \*significant at 0.05; \*\*significant at 0.01

<sup>a</sup> significantly less than 3; <sup>b</sup> significantly greater than 3

<sup>‡</sup> See Section 4 for explanation of MW-U and KS-Z

Table 31 Opinions on future performance of water markets: irrigator and community opinions

	Mean Rank †	Mean Response †		MW-U ‡	KS-Z ‡
		Irrigator	Community		
Be limited and within a region	2.56 <sup>a**</sup>	2.65	2.45	21808.0	1.113
Become a significant market and influence on irrigated agriculture	2.15 <sup>a**</sup>	2.24	2.04	21570.5**	1.258
Impact on the water supply of farmers in other regions	2.69 <sup>a**</sup>	2.92	2.39	16972.0**	2.627**
Improve overall farm income in the region	2.56 <sup>a**</sup>	2.66	2.43	21574.0*	0.996
Move water out of my reach of the river or channel system	3.22 <sup>b**</sup>	3.33	3.07	20344.0**	1.409*
Significantly impact on the environmental health of river systems	2.66 <sup>a**</sup>	3.08	2.13	12624.0**	4.589**
Significantly reduce the well-being of local towns and businesses in my area	3.14 <sup>b**</sup>	3.25	3.00	21767.0*	1.112
Be dominated by a few large players	2.94	3.15	2.66	19098.0**	2.013**
Significantly increase salinity in your region	3.09	3.33	2.77	17556.0**	2.318**

† Scale 1 'strongly agree' 5 'strongly disagree'; \*significant at 0.05; \*\*significant at 0.01  
<sup>a</sup> significantly less than 3; <sup>b</sup> significantly greater than 3

‡ See Section 4 for explanation of MW-U and KS-Z

## **10. Sub-Catchment Breakdown**

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A stratified random sample of irrigators is conducted on the a priori assumption that irrigators' attitudes to trade would differ across sub-catchments. Trade is largely restricted to within sub-catchments and trade levels differ significantly between sub-catchments. The most active sub-catchment is the Central Goulburn. Table 32 gives a break down of key question responses by sub-catchment. As expected those sub-catchments that have active markets differ in key opinions and attitudes to those that have yet to develop such markets.

On the issue of extinguishing sleeper licences (defined as not used in five years) Central Goulburn irrigators support their extinguishment, which statistically differs from the views of irrigators in the Goulburn River, Loddon River, Ovens and King rivers, and Pyramid Hill/Boort and Torrumbarry areas. The irrigators in the Central Goulburn and Pyramid Hill/Boort areas feel more strongly that water markets will be significant and influence irrigated agriculture than irrigators in the Goulburn River region.

Irrigators in the Rochester do not support farmers who wish to start an irrigation enterprise buying water from the market. This is statistically different to irrigators in Shepparton and Torrumbarry areas. Farmers in Pyramid Hill/Boort agree more strongly than irrigators in the Goulburn River that in the future farmers will follow water prices as they do crop and input prices.

On the issue of on-farm runoff being licensed, irrigators drawing from the Ovens or King Rivers more strongly reject the notion of licensing farm runoff than irrigators in Central Goulburn or Torrumbarry. Finally, irrigators in Central Goulburn feel stronger about the water authority intervening in trades if the conditions and price negotiated are not considered fair and just.

Table 32 Differences in attitudes across sub-catchments of the Goulburn Broken catchment

		Central Goulburn	Goulburn River	Lodden River	Murray Valley	Ovens/King Rivers	Pyramid Hill/Boort	Rochester	Shepparton	Torrumbarry	$\chi^2$	P
		(cg)	(gr)	(l)	(mv)	(ok)	(pb)	(r)	(s)	(t)		
<b>COAG reform</b>	On-farm runoff should be licensed	3.49 <sup>ok</sup>	3.67	3.93	3.94 <sup>t</sup>	4.70 <sup>t,cg</sup>	3.67	3.85	3.53	2.87 <sup>ok,mv</sup>	24.905	0.002
	Licences that have not been used for 5 years should be extinguished	2.59 <sup>gr,l,ok,pb,t</sup>	3.93 <sup>cg</sup>	3.93 <sup>cg</sup>	3.31	4.55 <sup>cg,s</sup>	3.65 <sup>cg</sup>	3.26	3.23 <sup>ok</sup>	3.60 <sup>cg</sup>	32.301	0.000
<b>Traders in water markets</b>	Farmers who wish to start an irrigation enterprise in your region.	3.11	2.56	2.64	3.52	3.00	2.73	3.60 <sup>t</sup>	3.33 <sup>t</sup>	2.34 <sup>t,s</sup>	22.587	0.004
<b>Actions of traders</b>	Farmers will follow water prices as they do crop and input prices	2.18	2.80 <sup>pb</sup>	2.29	2.21	2.20	1.82 <sup>gr</sup>	2.25	2.26	2.35	16.819	0.032
<b>Water market impacts</b>	Become a significant market and influence on irrigated agriculture	2.13 <sup>gr</sup>	3.00 <sup>cg,pb</sup>	2.43	2.26	2.09	1.86 <sup>gr</sup>	2.45	2.23	2.27	17.893	0.022
<b>Water authority constraints on water trading</b>	If the conditions and price negotiated are not considered fair and just	2.03 <sup>l</sup>	2.80	3.00 <sup>cg</sup>	2.58	2.82	2.76	2.75	2.44	2.68	16.311	0.038

Note: Differences between sub-catchment are analysed using Kruskal Wallis test. Dunn's multiple comparison test is used to draw paired differences. Letters signify sub-catchments that are significantly different. 1 "strongly agree". 5 "strongly disagree".

## 11. Demographics of Respondents

The results of the survey give a detailed picture of irrigators and community attitudes to water allocation and trading issues. Adoption of the findings depends on the stability of the aggregate attitudes through time. An important determinant of that is the age distribution of the respondents. Overall the farming community is ageing and there is the possibility that the views of future farmers may differ through time as farmers retire. A breakdown of the age of respondents presented in Table 33 shows 65.7% of the irrigators responding to the survey are under 54 and therefore have potentially ten or more working years on their farm. Their attitudes and opinions will therefore impact on the adoption of water reform and trading for some years to come.

Table 34 presents a breakdown of the issues which are statistically different in attitudes were found between irrigators less than 54 years old compared to those 54 years or older. Respondents over 54 years old feel stronger that on-farm runoff should not be licensed, that water users should not be charged the full cost of supply and that in the future farmers will be reluctant to trade and rely on their entitlement to meet their water requirements than farmers less than 54 years old.

In distributing 100 points between the four aspects of water reform, (*viz.* maximising farm incomes, distributing water in a fair and just manner, meeting environmental flow objectives, and accounting for local community and town impacts) irrigators over 54 proportionally rated maximising farm income higher than irrigators under 54 years old ( $t=-2.948$ ,  $p < 0.000$ ).

Table 33 Age distribution of respondents

Age	Irrigators %	Community %
15-24	0	1.9
25-34	4.6	16.4
35-44	19.2	18.4
45-54	41.4	22.2
55-64	18.8	15.9
65-74	12.3	15.0
74 and over	3.8	10.1

Note: \* significant at 0.05; \*\* significant at 0.01

Table 34 Breakdown of irrigator attitudes by age

	Age		MW-U	KS-Z
	<54	≥54		
On-farm runoff should be licensed	3.49	3.94	5473.0**	1.160
Water users should be charged the full cost of water supply	3.08	3.41	5363.5*	0.827
Farmers will be reluctant to trade and rely on their entitlement to meeting their water requirements	2.80	2.53	6058.0*	.942



## **12. Conclusion**

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The survey of the Goulburn-Murray irrigators and community members has found general agreement that water reform is necessary and that rights to water should be separated from rights to land and such rights should be traded independently. There is general agreement among irrigators that water entitlements will be more secure and have higher certainty of supply following the reform process. The rules of trade and the allocation of water should be such that they promote the greatest happiness of the greatest number. Adoption of the notion of water as a chattel is evolving but there is a general consensus that to date, the community is poorly informed about the reform process. The CAP has not made a realised impact on the majority of irrigators or community members surveyed. As expected, where it has impacted is in water availability and usage, decreased production and limited future development. In terms of meeting environmental flow objectives, reductions in water entitlements that provided for possible reversibility of habitat degradation are possible.





**APPENDIX A.**  
**Frequency tables arising from the survey  
of irrigators in the Goulburn Broken  
catchment**

**The Impact of Water Reform in Australia**

The planning process for water policy reform for the next decade is underway. This survey provides a great opportunity for you to be part of that process. All answers are confidential and will only be used to gain an overview of opinions in the catchments. Researchers at Griffith University are conducting this survey. The University will not release information from individual surveys. The role of Universities is to provide informed and independent comment on government policy. A report on the findings of this study will be given to the water authority governing your region for consideration and released as a public document for comment.

**Your Views on Water Reform**

The COAG is promoting water reform in Australia. State Governments are currently reviewing water laws and policies. The reforms involve the definition of rights to water, water pricing and the introduction of trade in water entitlements. We are interested in how these reforms impact on you, as an irrigator and member of the rural catchment community, and your family, friends and community.

**1. Do you believe the system of water management needs to be reformed?**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	yes	196	72.9	79.0	79.0
	no	52	19.3	21.0	100.0
	Total	248	92.2	100.0	
Missing	System	21	7.8		
Total		269	100.0		

Note: "Missing System" signifies non-response to question

**2. This question lists a number of statements concerning water reform.**

- **Water entitlements should be allowed to be separated from land and be traded**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	strongly support	70	26.0	26.7	26.7
	accept	92	34.2	35.1	61.8
	indifferent	19	7.1	7.3	69.1
	reject	34	12.6	13.0	82.1
	completely reject	47	17.5	17.9	100.0
	Total	262	97.4	100.0	
Missing	System	7	2.6		
Total		269	100.0		

- **On-farm runoff should be licensed**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	strongly support	19	7.1	7.5	7.5
	accept	36	13.4	14.2	21.7
	indifferent	39	14.5	15.4	37.2
	reject	80	29.7	31.6	68.8
	completely reject	79	29.4	31.2	100.0
	Total	253	94.1	100.0	
Missing	System	16	5.9		
Total		269	100.0		

- **Water for the environment be set aside prior to allocating water to farmers**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	strongly support	39	14.5	15.1	15.1
	accept	83	30.9	32.0	47.1
	indifferent	38	14.1	14.7	61.8
	reject	60	22.3	23.2	84.9
	completely reject	39	14.5	15.1	100.0
	Total	259	96.3	100.0	
Missing	System	10	3.7		
Total		269	100.0		

- **Water users should be charged the full cost of water supply**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	strongly support	16	5.9	6.6	6.6
	accept	71	26.4	29.1	35.7
	indifferent	38	14.1	15.6	51.2
	reject	82	30.5	33.6	84.8
	completely reject	37	13.8	15.2	100.0
	Total	244	90.7	100.0	
Missing	System	25	9.3		
Total		269	100.0		

- **Licences which have not been used for five years should be extinguished**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	strongly support	24	8.9	9.2	9.2
	accept	49	18.2	18.8	28.0
	indifferent	42	15.6	16.1	44.1
	reject	82	30.5	31.4	75.5
	completely reject	64	23.8	24.5	100.0
	Total	261	97.0	100.0	
Missing	System	8	3.0		
Total		269	100.0		

- **Water entitlements will be more secure following the reforms**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	strongly support	45	16.7	18.3	18.3
	accept	81	30.1	32.9	51.2
	indifferent	79	29.4	32.1	83.3
	reject	34	12.6	13.8	97.2
	completely reject	7	2.6	2.8	100.0
	Total	246	91.4	100.0	
Missing	System	23	8.6		
Total		269	100.0		

- **Water entitlements will have higher reliability of supply following the water reforms**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	strongly support	35	13.0	14.1	14.1
	accept	98	36.4	39.4	53.4
	indifferent	77	28.6	30.9	84.3
	reject	33	12.3	13.3	97.6
	completely reject	6	2.2	2.4	100.0
	Total	249	92.6	100.0	
Missing	System	20	7.4		
Total		269	100.0		

- **Water trading should benefit the greatest number of people possible**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	strongly support	68	25.3	26.6	26.6
	accept	134	49.8	52.3	78.9
	indifferent	24	8.9	9.4	88.3
	reject	18	6.7	7.0	95.3
	completely reject	12	4.5	4.7	100.0
	Total	256	95.2	100.0	
Missing	System	13	4.8		
Total		269	100.0		

- **If trading rules and procedures cannot provide equal opportunity to access water for all in your region, they should protect the rights of those worst off**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	strongly support	35	13.0	13.7	13.7
	accept	91	33.8	35.5	49.2
	indifferent	63	23.4	24.6	73.8
	reject	47	17.5	18.4	92.2
	completely reject	20	7.4	7.8	100.0
	Total	256	95.2	100.0	
Missing	System	13	4.8		
Total		269	100.0		

- **The beneficiaries from water trade should be able to compensate those who feel they have lost because of the transaction**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	strongly support	20	7.4	8.0	8.0
	accept	68	25.3	27.3	35.3
	indifferent	76	28.3	30.5	65.9
	reject	60	22.3	24.1	90.0
	completely reject	25	9.3	10.0	100.0
	Total	249	92.6	100.0	
Missing	System	20	7.4		
Total		269	100.0		

- **There should be no general rules of trade as each situation is different and should be considered on a case-by-case basis**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	strongly support	45	16.7	17.3	17.3
	accept	75	27.9	28.8	46.2
	indifferent	39	14.5	15.0	61.2
	reject	76	28.3	29.2	90.4
	completely reject	25	9.3	9.6	100.0
	Total	260	96.7	100.0	
Missing	System	9	3.3		
Total		269	100.0		

**3. Overall, during the water reform process the community at large has been:**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	actively involved and embraced it	11	4.1	4.5	4.5
	well informed and accepting	47	17.5	19.0	23.5
	involved but largely ignored	60	22.3	24.3	47.8
	poorly informed but accepting	93	34.6	37.7	85.4
	poorly informed and unhappy	36	13.4	14.6	100.0
	Total	247	91.8	100.0	
Missing	System	22	8.2		
Total		269	100.0		

**4. Below are four aspects of water reform. Please allocate 100 points among these aspects to reflect the relative importance you attach to each of them. The more points a statement receives, the more important that statement is to you. If you think the statement is not at all important, give it zero points. If one statement is twice as important as some other statement, it should receive twice as many points.**

**The reforms should:**

Aspect of Water Reform	Average (%)	s.e
Maximise farm income only, given available supplies	26.69	1.26
Distribute water entitlements in a fair and just manner	34.19	1.14
Meet the requirements of natural river flow	22.82	0.98
Account for the impact of trading on local towns and communities	15.73	0.70

**5. Part of the COAG reform is the CAP on water entitlements in 1993/94. Has the CAP impacted on your farm or business?**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	yes	69	25.7	26.8	26.8
	no	188	69.9	73.2	100.0
	Total	257	95.5	100.0	
Missing	System	12	4.5		
Total		269	100.0		



<b>Your Views on Temporary Water Trading</b>
--

**1. What is the most important reason why other farmers temporarily buy water?**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Not meet crop requirements	163	60.6	62.2	62.2
	They need water to meet end of season	62	23.0	23.7	85.9
	other	37	13.8	14.1	100.0
	Total	262	97.4	100.0	
Missing	System	7	2.6		
Total		269	100.0		

**2. What is the most important reason why other farmers temporarily sell water?**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	They have surplus water	161	59.9	61.5	61.5
	Sell because they could make more by selling	87	32.3	33.2	94.7
	other	14	5.2	5.3	100.0
	Total	262	97.4	100.0	
Missing	System	7	2.6		
Total		269	100.0		

**3. What do you see are the main reasons other farmers do not temporarily trade water?**

- **They do not need additional water, or have surplus to sell**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	yes	157	58.4	59.0	59.0
	no	109	40.5	41.0	100.0
	Total	266	98.9	100.0	
Missing	System	3	1.1		
Total		269	100.0		

- **They do not know enough about the market**

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid				
yes	66	24.5	24.8	24.8
no	200	74.3	75.2	100.0
Total	266	98.9	100.0	
Missing				
System	3	1.1		
Total	269	100.0		

- **They view water as an integral part of their farm and not for sale**

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid				
yes	124	46.1	46.6	46.6
no	142	52.8	53.4	100.0
Total	266	98.9	100.0	
Missing				
System	3	1.1		
Total	269	100.0		

- **They do not wish to barter with other farmers**

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid				
yes	15	5.6	5.6	5.6
no	251	93.3	94.4	100.0
Total	266	98.9	100.0	
Missing				
System	3	1.1		
Total	269	100.0		

- **They are philosophically opposed to trading**

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid				
yes	36	13.4	13.5	13.5
no	230	85.5	86.5	100.0
Total	266	98.9	100.0	
Missing				
System	3	1.1		
Total	269	100.0		

- **They find the administration costs and delays associated with gaining approval for trade too great**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	yes	31	11.5	11.7	11.7
	no	235	87.4	88.3	100.0
	Total	266	98.9	100.0	
Missing	System	3	1.1		
Total		269	100.0		

**4. Have you been able to gain good information on how temporary water markets operate?**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	yes	183	68.0	72.0	72.0
	no	71	26.4	28.0	100.0
	Total	254	94.4	100.0	
Missing	System	15	5.6		
Total		269	100.0		

**5. If you are to temporarily buy water in the future would you look to the water market:**

- **Prior to making your cropping decision for the season**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	yes	61	22.7	23.6	23.6
	no	198	73.6	76.4	100.0
	Total	259	96.3	100.0	
Missing	System	10	3.7		
Total		269	100.0		

- **To finish a crop should water become short**

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid yes	108	40.1	41.7	41.7
no	151	56.1	58.3	100.0
Total	259	96.3	100.0	
Missing System	10	3.7		
Total	269	100.0		

- **To acquire more secure water supplies for the season**

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid yes	103	38.3	39.8	39.8
no	156	58.0	60.2	100.0
Total	259	96.3	100.0	
Missing System	10	3.7		
Total	269	100.0		

- **Prior to the next irrigation**

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid yes	17	6.3	6.6	6.6
no	242	90.0	93.4	100.0
Total	259	96.3	100.0	
Missing System	10	3.7		
Total	269	100.0		

- **To purchase water regularly according to your watering regime**

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid yes	52	19.3	20.1	20.1
no	207	77.0	79.9	100.0
Total	259	96.3	100.0	
Missing System	10	3.7		
Total	269	100.0		

**6. If you planned to sell water temporarily prior to planting, would you:**

- **Only sell water surplus to requirements**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	yes	204	75.8	79.4	79.4
	no	53	19.7	20.6	100.0
	Total	257	95.5	100.0	
Missing	System	12	4.5		
Total		269	100.0		

- **Change crops to use less water**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	yes	9	3.3	3.5	3.5
	no	248	92.2	96.5	100.0
	Total	257	95.5	100.0	
Missing	System	12	4.5		
Total		269	100.0		

- **Run all or some of the crop as a dryland enterprise**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	yes	17	6.3	6.6	6.6
	no	240	89.2	93.4	100.0
	Total	257	95.5	100.0	
Missing	System	12	4.5		
Total		269	100.0		

- **Reduce the area planted and leave some land fallow**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	yes	15	5.6	5.8	5.8
	no	242	90.0	94.2	100.0
	Total	257	95.5	100.0	
Missing	System	12	4.5		
Total		269	100.0		

- **Not crop that year**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	yes	13	4.8	5.1	5.1
	no	244	90.7	94.9	100.0
	Total	257	95.5	100.0	
Missing	System	12	4.5		
Total		269	100.0		

- **Other**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	yes	12	4.5	4.7	4.7
	no	245	91.1	95.3	100.0
	Total	257	95.5	100.0	
Missing	System	12	4.5		
Total		269	100.0		

## 7. Who should be allowed to trade in the temporary water market?

- **Active irrigators who hold water entitlements within your region**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	strongly agree	130	48.3	51.0	51.0
	agree	111	41.3	43.5	94.5
	uncertain	5	1.9	2.0	96.5
	disagree	5	1.9	2.0	98.4
	strongly disagree	4	1.5	1.6	100.0
	Total	255	94.8	100.0	
Missing	System	14	5.2		
Total		269	100.0		

- **Active irrigators who hold water entitlements in adjoining regions**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	strongly agree	59	21.9	23.7	23.7
	agree	97	36.1	39.0	62.7
	uncertain	35	13.0	14.1	76.7
	disagree	30	11.2	12.0	88.8
	strongly disagree	28	10.4	11.2	100.0
	Total	249	92.6	100.0	
Missing	System	20	7.4		
Total		269	100.0		

- **Farmers who wish to start an irrigation enterprise in your region**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	strongly agree	32	11.9	12.7	12.7
	agree	79	29.4	31.5	44.2
	uncertain	44	16.4	17.5	61.8
	disagree	48	17.8	19.1	80.9
	strongly disagree	48	17.8	19.1	100.0
	Total	251	93.3	100.0	
Missing	System	18	6.7		
Total		269	100.0		

- **Farmers who have not used their entitlement in the last five years**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	strongly agree	69	25.7	27.3	27.3
	agree	102	37.9	40.3	67.6
	uncertain	35	13.0	13.8	81.4
	disagree	28	10.4	11.1	92.5
	strongly disagree	19	7.1	7.5	100.0
	Total	253	94.1	100.0	
Missing	System	16	5.9		
Total		269	100.0		

- **Local towns and communities for domestic use**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	strongly agree	39	14.5	15.7	15.7
	agree	112	41.6	45.0	60.6
	uncertain	44	16.4	17.7	78.3
	disagree	35	13.0	14.1	92.4
	strongly disagree	19	7.1	7.6	100.0
	Total	249	92.6	100.0	
Missing	System	20	7.4		
Total		269	100.0		

- **Local shires to use water for recreation use, such as parks and golf courses**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	strongly agree	23	8.6	9.2	9.2
	agree	88	32.7	35.3	44.6
	uncertain	46	17.1	18.5	63.1
	disagree	56	20.8	22.5	85.5
	strongly disagree	36	13.4	14.5	100.0
	Total	249	92.6	100.0	
Missing	System	20	7.4		
Total		269	100.0		

- **Local industries who use water**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	strongly agree	35	13.0	14.0	14.0
	agree	144	53.5	57.6	71.6
	uncertain	43	16.0	17.2	88.8
	disagree	15	5.6	6.0	94.8
	strongly disagree	13	4.8	5.2	100.0
	Total	250	92.9	100.0	
Missing	System	19	7.1		
Total		269	100.0		



- **Environmental groups and agencies**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	strongly agree	29	10.8	11.8	11.8
	agree	83	30.9	33.7	45.5
	uncertain	62	23.0	25.2	70.7
	disagree	40	14.9	16.3	87.0
	strongly disagree	32	11.9	13.0	100.0
	Total	246	91.4	100.0	
Missing	System	23	8.6		
Total		269	100.0		

- **Individuals and companies who do not intend to use water**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	strongly agree	13	4.8	5.2	5.2
	agree	45	16.7	18.1	23.4
	uncertain	26	9.7	10.5	33.9
	disagree	42	15.6	16.9	50.8
	strongly disagree	122	45.4	49.2	100.0
	Total	248	92.2	100.0	
Missing	System	21	7.8		
Total		269	100.0		

- **Other**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	strongly support	1	.4	6.7	6.7
	indifferent	4	1.5	26.7	33.3
	reject	2	.7	13.3	46.7
	completely reject	8	3.0	53.3	100.0
	Total	15	5.6	100.0	
Missing	System	254	94.4		
Total		269	100.0		

**8. Have you traded water in the temporary water trading market in the last three years?**

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid	yes	134	49.8	50.6
	no	131	48.7	100.0
	Total	265	98.5	100.0
Missing	System	4	1.5	
Total		269	100.0	

• **What is the main reason you traded water?**

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Not meet crop requirements	61	22.7	46.2
	water to finish crop	15	5.6	57.6
	water surplus to needs	39	14.5	87.1
	more by selling	13	4.8	97.0
	overused entitlement	4	1.5	100.0
	Total	132	49.1	100.0
Missing	System	137	50.9	
Total		269	100.0	

• **Did the actions of other water traders affect how you traded?**

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid	yes	43	16.0	32.6
	no	89	33.1	100.0
	Total	132	49.1	100.0
Missing	System	137	50.9	
Total		269	100.0	

- **What costs did you incur establishing your last transaction?**

Cost	Mean (\$)	S.E
Exchange fees	17.93	7.23
Legal fees	21.45	4.49
Consultants	0.00	0.00
Water Authority fees	89.41	29.36
Other	4.35	4.35

- **Do you consider the costs associated with the transaction:-**

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid satisfactory	109	40.5	80.7	80.7
excessive	26	9.7	19.3	100.0
Total	135	50.2	100.0	
Missing System	134	49.8		
Total	269	100.0		

- **How long is it from the start of negotiating a trade to the final approval for the supply of water?**

6.92 days

- **The time taken to complete a trade was:-**

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid excellent	45	16.7	33.6	33.6
reasonable	84	31.2	62.7	96.3
unacceptable	5	1.9	3.7	100.0
Total	134	49.8	100.0	
Missing System	135	50.2		
Total	269	100.0		

<b>Your Views on Permanent Water Trading</b>
--

**1. What is the most important reason why other farmers buy water entitlements?**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	does not meet water requirements	159	59.1	64.1	64.1
	want to develop more land	43	16.0	17.3	81.5
	greater security of supply	46	17.1	18.5	100.0
	Total	248	92.2	100.0	
Missing	System	21	7.8		
Total		269	100.0		

**2. What is the most important reason why other farmers sell water entitlements?**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	surplus to needs	162	60.2	63.3	63.3
	more by sell than crops	63	23.4	24.6	87.9
	dryland farm alternative	10	3.7	3.9	91.8
	retiring	12	4.5	4.7	96.5
	other	9	3.3	3.5	100.0
	Total	256	95.2	100.0	
Missing	System	13	4.8		
Total		269	100.0		

### Your Views on the Impact and Future of Water Trading

To plan for the future it is important to look forward and best guess the future. Your expectations are an important input into policy development for the next decade.

- **Water trading will become like buying fertilizer in that a farmer will buy and sell it in on a need basis**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	strongly agree	34	12.6	13.0	13.0
	agree	96	35.7	36.8	49.8
	uncertain	46	17.1	17.6	67.4
	disagree	55	20.4	21.1	88.5
	strongly disagree	30	11.2	11.5	100.0
	Total	261	97.0	100.0	
Missing	System	8	3.0		
Total		269	100.0		

- **Water entitlements will no longer be an inherent asset in farming**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	strongly agree	4	1.5	1.5	1.5
	agree	12	4.5	4.6	6.2
	uncertain	36	13.4	13.9	20.1
	disagree	102	37.9	39.4	59.5
	strongly disagree	105	39.0	40.5	100.0
	Total	259	96.3	100.0	
Missing	System	10	3.7		
Total		269	100.0		

- **Farmers will be reluctant to trade and rely on their entitlement to meet their water requirements**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	strongly agree	24	8.9	9.3	9.3
	agree	98	36.4	38.0	47.3
	uncertain	74	27.5	28.7	76.0
	disagree	55	20.4	21.3	97.3
	strongly disagree	7	2.6	2.7	100.0
	Total	258	95.9	100.0	
Missing	System	11	4.1		
Total		269	100.0		

- **Farmers will follow water prices as they do crop and input prices**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	strongly agree	28	10.4	10.9	10.9
	agree	168	62.5	65.1	76.0
	uncertain	35	13.0	13.6	89.5
	disagree	23	8.6	8.9	98.4
	strongly disagree	4	1.5	1.6	100.0
	Total	258	95.9	100.0	
Missing	System	11	4.1		
Total		269	100.0		

- **There will be no temporary trading as all trades will be permanent**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	strongly agree	4	1.5	1.6	1.6
	agree	10	3.7	3.9	5.5
	uncertain	38	14.1	14.8	20.3
	disagree	123	45.7	48.0	68.4
	strongly disagree	81	30.1	31.6	100.0
	Total	256	95.2	100.0	
Missing	System	13	4.8		
Total		269	100.0		

- **Markets will consist of only a few traders, farmers will anticipate what others may offer and buy**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	strongly agree	4	1.5	1.6	1.6
	agree	44	16.4	17.3	18.9
	uncertain	102	37.9	40.2	59.1
	disagree	77	28.6	30.3	89.4
	strongly disagree	27	10.0	10.6	100.0
	Total	254	94.4	100.0	
Missing	System	15	5.6		
Total		269	100.0		

- **Farmers will pay more for high security water entitlements than for general security**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	strongly agree	38	14.1	14.9	14.9
	agree	139	51.7	54.5	69.4
	uncertain	40	14.9	15.7	85.1
	disagree	29	10.8	11.4	96.5
	strongly disagree	9	3.3	3.5	100.0
	Total	255	94.8	100.0	
Missing	System	14	5.2		
Total		269	100.0		

- **There will be a lot of traders and the actions of individuals will not greatly influence the market price**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	strongly agree	11	4.1	4.4	4.4
	agree	57	21.2	22.6	27.0
	uncertain	107	39.8	42.5	69.4
	disagree	63	23.4	25.0	94.4
	strongly disagree	14	5.2	5.6	100.0
	Total	252	93.7	100.0	
Missing	System	17	6.3		
Total		269	100.0		

<b>Trade in Water in your Region in Ten Years Time will:</b>
--

- **Be limited and within a region**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	strongly agree	30	11.2	12.0	12.0
	agree	100	37.2	40.0	52.0
	uncertain	56	20.8	22.4	74.4
	disagree	56	20.8	22.4	96.8
	strongly disagree	8	3.0	3.2	100.0
	Total	250	92.9	100.0	
Missing	System	19	7.1		
Total		269	100.0		

- **Become a significant market and influence on irrigated agriculture**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	strongly agree	37	13.8	14.6	14.6
	agree	146	54.3	57.5	72.0
	uncertain	47	17.5	18.5	90.6
	disagree	20	7.4	7.9	98.4
	strongly disagree	4	1.5	1.6	100.0
	Total	254	94.4	100.0	
Missing	System	15	5.6		
Total		269	100.0		



- **Impact on the water supply of farmers in other regions**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	strongly agree	15	5.6	5.9	5.9
	agree	77	28.6	30.4	36.4
	uncertain	85	31.6	33.6	70.0
	disagree	66	24.5	26.1	96.0
	strongly disagree	10	3.7	4.0	100.0
	Total	253	94.1	100.0	
Missing	System	16	5.9		
Total		269	100.0		

- **Reduce the announced sales to all irrigators**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	strongly agree	27	10.0	11.1	11.1
	agree	74	27.5	30.5	41.6
	uncertain	85	31.6	35.0	76.5
	disagree	49	18.2	20.2	96.7
	strongly disagree	8	3.0	3.3	100.0
	Total	243	90.3	100.0	
Missing	System	26	9.7		
Total		269	100.0		

- **Improve overall farm income in the region**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	strongly agree	20	7.4	7.9	7.9
	agree	103	38.3	40.6	48.4
	uncertain	82	30.5	32.3	80.7
	disagree	41	15.2	16.1	96.9
	strongly disagree	8	3.0	3.1	100.0
	Total	254	94.4	100.0	
Missing	System	15	5.6		
Total		269	100.0		

- **Move water out of my reach of the river or channel system**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	strongly agree	11	4.1	4.4	4.4
	agree	29	10.8	11.6	16.0
	uncertain	95	35.3	38.0	54.0
	disagree	96	35.7	38.4	92.4
	strongly disagree	19	7.1	7.6	100.0
	Total	250	92.9	100.0	
Missing	System	19	7.1		
Total		269	100.0		

- **Significantly impact on the environmental health of river systems**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	strongly agree	17	6.3	6.8	6.8
	agree	53	19.7	21.1	27.9
	uncertain	83	30.9	33.1	61.0
	disagree	90	33.5	35.9	96.8
	strongly disagree	8	3.0	3.2	100.0
	Total	251	93.3	100.0	
Missing	System	18	6.7		
Total		269	100.0		

- **Significantly reduce the wellbeing of local towns and businesses in my area**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	strongly agree	15	5.6	5.9	5.9
	agree	44	16.4	17.4	23.3
	uncertain	73	27.1	28.9	52.2
	disagree	106	39.4	41.9	94.1
	strongly disagree	15	5.6	5.9	100.0
	Total	253	94.1	100.0	
Missing	System	16	5.9		
Total		269	100.0		

- **Be dominated by a few large players**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	strongly agree	25	9.3	9.8	9.8
	agree	48	17.8	18.9	28.7
	uncertain	72	26.8	28.3	57.1
	disagree	83	30.9	32.7	89.8
	strongly disagree	26	9.7	10.2	100.0
	Total	254	94.4	100.0	
Missing	System	15	5.6		
Total		269	100.0		

- **Significantly increase salinity in your region**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	strongly agree	21	7.8	8.4	8.4
	agree	27	10.0	10.8	19.1
	uncertain	74	27.5	29.5	48.6
	disagree	105	39.0	41.8	90.4
	strongly disagree	24	8.9	9.6	100.0
	Total	251	93.3	100.0	
Missing	System	18	6.7		
Total		269	100.0		

**2. There is concern that if permanent trade results in water moving out of an irrigation area it may not be financially viable to supply water to the remaining irrigators. If this happens, the water authority should:**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	continue to supply	46	17.1	18.7	18.7
	exit fees	43	16.0	17.5	36.2
	compensate and close	25	9.3	10.2	46.3
	restrict trade	118	43.9	48.0	94.3
	other	14	5.2	5.7	100.0
	Total	246	91.4	100.0	
Missing	System	23	8.6		
Total		269	100.0		

<b>Your Views on the Role of the Water Authority in Water Markets</b>
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**1. Under what circumstances should be water authority be able to reject an application for trade?**

- **Only when the system is not capable of supplying the water to the buyer**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	strongly agree	97	36.1	38.5	38.5
	agree	123	45.7	48.8	87.3
	uncertain	11	4.1	4.4	91.7
	disagree	16	5.9	6.3	98.0
	strongly disagree	5	1.9	2.0	100.0
	Total	252	93.7	100.0	
Missing	System	17	6.3		
Total		269	100.0		

- **If there is a possible impact on other water entitlements**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	strongly agree	69	25.7	27.6	27.6
	agree	148	55.0	59.2	86.8
	uncertain	22	8.2	8.8	95.6
	disagree	9	3.3	3.6	99.2
	strongly disagree	2	.7	.8	100.0
	Total	250	92.9	100.0	
Missing	System	19	7.1		
Total		269	100.0		

- **If the trade impacts on the economic viability of local towns and communities**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	strongly agree	38	14.1	15.1	15.1
	agree	123	45.7	49.0	64.1
	uncertain	63	23.4	25.1	89.2
	disagree	22	8.2	8.8	98.0
	strongly disagree	5	1.9	2.0	100.0
	Total	251	93.3	100.0	
Missing	System	18	6.7		
Total		269	100.0		

- **If the trade impacts on the environmental river flow objectives**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	strongly agree	44	16.4	17.5	17.5
	agree	136	50.6	54.2	71.7
	uncertain	49	18.2	19.5	91.2
	disagree	20	7.4	8.0	99.2
	strongly disagree	2	.7	.8	100.0
	Total	251	93.3	100.0	
Missing	System	18	6.7		
Total		269	100.0		

- **If the resulting distribution of water in the catchment is not considered fair and just**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	strongly agree	46	17.1	18.6	18.6
	agree	141	52.4	57.1	75.7
	uncertain	44	16.4	17.8	93.5
	disagree	14	5.2	5.7	99.2
	strongly disagree	2	.7	.8	100.0
	Total	247	91.8	100.0	
Missing	System	22	8.2		
Total		269	100.0		

- **If the conditions and price negotiated are not considered fair and just**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	strongly agree	34	12.6	13.7	13.7
	agree	109	40.5	44.0	57.7
	uncertain	47	17.5	19.0	76.6
	disagree	51	19.0	20.6	97.2
	strongly disagree	7	2.6	2.8	100.0
	Total	248	92.2	100.0	
Missing	System	21	7.8		
Total		269	100.0		

- **Other**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	strongly support	2	.7	14.3	14.3
	accept	6	2.2	42.9	57.1
	indifferent	3	1.1	21.4	78.6
	reject	1	.4	7.1	85.7
	completely reject	2	.7	14.3	100.0
	Total	14	5.2	100.0	
Missing	System	255	94.8		
Total		269	100.0		

**2. To provide aggregate information to the market through a public register, traders should have to disclose to the water authority:-**

- **The volume of water traded**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	strongly agree	125	46.5	49.0	49.0
	agree	119	44.2	46.7	95.7
	uncertain	5	1.9	2.0	97.6
	disagree	5	1.9	2.0	99.6
	strongly disagree	1	.4	.4	100.0
	Total	255	94.8	100.0	
Missing	System	14	5.2		
Total		269	100.0		

- **The price at which the water traded**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	strongly agree	81	30.1	32.0	32.0
	agree	116	43.1	45.8	77.9
	uncertain	18	6.7	7.1	85.0
	disagree	32	11.9	12.6	97.6
	strongly disagree	6	2.2	2.4	100.0
	Total	253	94.1	100.0	
Missing	System	16	5.9		
Total		269	100.0		

- **The traders entitlements and crop mix**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	strongly agree	65	24.2	26.1	26.1
	agree	97	36.1	39.0	65.1
	uncertain	46	17.1	18.5	83.5
	disagree	36	13.4	14.5	98.0
	strongly disagree	5	1.9	2.0	100.0
	Total	249	92.6	100.0	
Missing	System	20	7.4		
Total		269	100.0		

- **Other**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	strongly support	7	2.6	43.8	43.8
	accept	2	.7	12.5	56.3
	indifferent	5	1.9	31.3	87.5
	reject	1	.4	6.3	93.8
	completely reject	1	.4	6.3	100.0
Total		16	5.9	100.0	
Missing	System	253	94.1		
Total		269	100.0		

### Environmental Concerns

1. A number of options have been raised to make water available for environmental flows. Please consider the following *hypothetical* policy options and associated consequences for restoring environmental flows. Rank them from highest (1) to lowest (4) in order of your preference.

Hypothetical reduction in water entitlement	Hypothetical impact on the riverine environment	Mean Rank
0%	Irreversible habitat degradation	2.98
20%	Habitat degradation, reversibility unknown	2.30
30%	Reversible habitat degradation	2.12
40%	No habitat degradation	2.68



**2. A government agency should enter the market and use taxpayers money to buy water for the environment.**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	strongly disagree	80	29.7	31.4	31.4
	disagree	43	16.0	16.9	48.2
	do not know	31	11.5	12.2	60.4
	agree	69	25.7	27.1	87.5
	strongly agree	32	11.9	12.5	100.0
	Total	255	94.8	100.0	
Missing	System	14	5.2		
Total		269	100.0		

**Information about Yourself**

**1. Do you have on-farm water storage?**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	yes	103	38.3	42.0	42.0
	no	142	52.8	58.0	100.0
	Total	245	91.1	100.0	
Missing	System	24	8.9		
Total		269	100.0		

- **If yes, what is the size of your ring tank?**

Mean 6.92 ML. s.e. 1.15

- **Do you generate most of your income from irrigated crops?**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	yes	139	51.7	55.2	55.2
	no	113	42.0	44.8	100.0
	Total	252	93.7	100.0	
Missing	System	17	6.3		
Total		269	100.0		

- **What proportion of your income is derived from dryland farming?**

34.02%

- **What proportion of your income is derived from off-farm sources?**

45.19%

## 2. What age group does the farm manager belong to?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	25-34	12	4.5	4.6	4.6
	35-44	50	18.6	19.2	23.8
	45-54	108	40.1	41.4	65.1
	55-64	49	18.2	18.8	83.9
	65-74	32	11.9	12.3	96.2
	75 and over	10	3.7	3.8	100.0
	Total	261	97.0	100.0	
Missing	System	8	3.0		
Total		269	100.0		



**APPENDIX B.**

**Frequency tables arising from the survey  
of community members of the Goulburn  
Broken catchment**

**The Impact of Water Reform in Australia**

The planning process for water policy reform for the next decade is underway. This survey provides a great opportunity for you to be part of that process. All answers are confidential and will only be used to gain an overview of opinions in the catchments. Researchers at Griffith University are conducting this survey. The University will not release information from individual surveys. The role of Universities is to provide informed and independent comment on government policy. A report on the findings of this study will be given to the water authority governing your region for consideration and released as a public document for comment.

**Your Views on Water Reform**

The Council of Australian Governments (COAG) is promoting water reform in Australia. State governments are currently reviewing water laws and policies. The reforms involve the definition of rights to water, water pricing and the introduction of trade in water entitlements. We are interested in how these reforms impact on you, as a member of a rural catchment community, your family and friends.

**1. Do you believe the system of water management needed to be reformed?**

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid    yes	173	81.2	88.3	88.3
no	23	10.8	11.7	100.0
Total	196	92.0	100.0	
Missing   System	17	8.0		
Total	213	100.0		

Note: "Missing System" signifies non-response to question

**2. Overall, during the water reform process the community at large has been:**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	actively involved and embraced it	4	1.9	2.2	2.2
	well informed and accepting	10	4.7	5.4	7.5
	involved but largely ignored	31	14.6	16.7	24.2
	poorly informed but accepting	107	50.2	57.5	81.7
	poorly informed and unhappy	34	16.0	18.3	100.0
	Total	186	87.3	100.0	
Missing	System	27	12.7		
Total		213	100.0		

**3. This question lists a number of statements concerning water reform. Please tick the box that best describes your opinion on the following statements.**

- **Water entitlements should be allowed to be separated from land and be traded**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	strongly support	36	16.9	18.8	18.8
	accept	61	28.6	31.9	50.8
	indifferent	29	13.6	15.2	66.0
	reject	39	18.3	20.4	86.4
	completely reject	26	12.2	13.6	100.0
	Total	191	89.7	100.0	
Missing	System	22	10.3		
Total		213	100.0		

- **On-farm runoff should be licensed**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	strongly support	13	6.1	6.8	6.8
	accept	27	12.7	14.2	21.1
	indifferent	28	13.1	14.7	35.8
	reject	56	26.3	29.5	65.3
	completely reject	66	31.0	34.7	100.0
	Total	190	89.2	100.0	
Missing	System	23	10.8		
Total		213	100.0		

- **Water for the environment should be set aside prior to allocating water to farmers**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	strongly support	58	27.2	30.2	30.2
	accept	59	27.7	30.7	60.9
	indifferent	20	9.4	10.4	71.4
	reject	31	14.6	16.1	87.5
	completely reject	24	11.3	12.5	100.0
	Total	192	90.1	100.0	
Missing	System	21	9.9		
Total		213	100.0		

- **Water users should be charged the full cost of water supply**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	strongly support	36	16.9	18.9	18.9
	accept	58	27.2	30.5	49.5
	indifferent	31	14.6	16.3	65.8
	reject	45	21.1	23.7	89.5
	completely reject	20	9.4	10.5	100.0
	Total	190	89.2	100.0	
Missing	System	23	10.8		
Total		213	100.0		

- **Licences which have not been used for five years should be extinguished**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	strongly support	48	22.5	24.2	24.2
	accept	54	25.4	27.3	51.5
	indifferent	36	16.9	18.2	69.7
	reject	44	20.7	22.2	91.9
	completely reject	16	7.5	8.1	100.0
	Total	198	93.0	100.0	
Missing	System	15	7.0		
Total		213	100.0		

- **Water trading should benefit the greatest number of people possible**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	strongly support	77	36.2	38.9	38.9
	accept	86	40.4	43.4	82.3
	indifferent	23	10.8	11.6	93.9
	reject	9	4.2	4.5	98.5
	completely reject	3	1.4	1.5	100.0
	Total	198	93.0	100.0	
Missing	System	15	7.0		
Total		213	100.0		

- **If trading rules and procedures cannot provide equal opportunity to access water for all in your region they should protect the rights of those worst off**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	strongly support	53	24.9	26.8	26.8
	accept	89	41.8	44.9	71.7
	indifferent	30	14.1	15.2	86.9
	reject	21	9.9	10.6	97.5
	completely reject	5	2.3	2.5	100.0
	Total	198	93.0	100.0	
Missing	System	15	7.0		
Total		213	100.0		



- **The beneficiaries from water trade should be able to compensate those who feel they have lost because of the transaction**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	strongly support	28	13.1	14.8	14.8
	accept	78	36.6	41.3	56.1
	indifferent	50	23.5	26.5	82.5
	reject	29	13.6	15.3	97.9
	completely reject	4	1.9	2.1	100.0
	Total	189	88.7	100.0	
Missing	System	24	11.3		
Total		213	100.0		

- **There should be no general rules of trade as each situation is different and should be considered on a case-by-case basis**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	strongly support	49	23.0	24.9	24.9
	accept	75	35.2	38.1	62.9
	indifferent	25	11.7	12.7	75.6
	reject	38	17.8	19.3	94.9
	completely reject	10	4.7	5.1	100.0
	Total	197	92.5	100.0	
Missing	System	16	7.5		
Total		213	100.0		

4. **Below are four aspects of water reform. Please allocate 100 points among these aspects to reflect the relative importance you attach to each of them. The more points a statement receives, the more important that statement is to you. If you think the statement is not at all important give it zero points. If one statement is twice as important as some other statement, it should receive twice as many points. The reforms should:**

Aspect of Water Reform	Mean
Maximise farm income only, given available water supplies	15.8
Distribute water entitlements in a fair and just manner	28.5
Meet the requirements of natural river flow	32.5
Account for the impact of trading on local towns and communities	20.14

**5. Part of the COAG reform is the CAP on water entitlements in 1993/94. Has the CAP impacted on your business or job?**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	yes	11	5.2	5.9	5.9
	no	175	82.2	94.1	100.0
	Total	186	87.3	100.0	
Missing	System	27	12.7		
Total		213	100.0		

**6. Who should be allowed to trade in water?**

- **Active irrigators who hold water entitlements within your region**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	strongly agree	60	28.2	30.5	30.5
	agree	92	43.2	46.7	77.2
	uncertain	21	9.9	10.7	87.8
	disagree	13	6.1	6.6	94.4
	strongly disagree	11	5.2	5.6	100.0
	Total	197	92.5	100.0	
Missing	System	16	7.5		
Total		213	100.0		

- **Active irrigators who hold water entitlements in adjoining regions**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	strongly agree	30	14.1	15.5	15.5
	agree	74	34.7	38.3	53.9
	uncertain	43	20.2	22.3	76.2
	disagree	28	13.1	14.5	90.7
	strongly disagree	18	8.5	9.3	100.0
	Total	193	90.6	100.0	
Missing	System	20	9.4		
Total		213	100.0		

- **Farmers who wish to start an irrigation enterprise in your region**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	strongly agree	41	19.2	20.7	20.7
	agree	86	40.4	43.4	64.1
	uncertain	38	17.8	19.2	83.3
	disagree	19	8.9	9.6	92.9
	strongly disagree	14	6.6	7.1	100.0
	Total	198	93.0	100.0	
Missing	System	15	7.0		
Total		213	100.0		

- **Farmers who have not used their entitlement in the last five years**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	strongly agree	26	12.2	13.5	13.5
	agree	60	28.2	31.1	44.6
	uncertain	35	16.4	18.1	62.7
	disagree	40	18.8	20.7	83.4
	strongly disagree	32	15.0	16.6	100.0
	Total	193	90.6	100.0	
Missing	System	20	9.4		
Total		213	100.0		

- **Local towns and communities for domestic use**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	strongly agree	53	24.9	26.9	26.9
	agree	93	43.7	47.2	74.1
	uncertain	24	11.3	12.2	86.3
	disagree	19	8.9	9.6	95.9
	strongly disagree	8	3.8	4.1	100.0
	Total	197	92.5	100.0	
Missing	System	16	7.5		
Total		213	100.0		

- **Local shires to use water for recreation use, such as parks and golf courses**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	strongly agree	22	10.3	11.5	11.5
	agree	77	36.2	40.1	51.6
	uncertain	41	19.2	21.4	72.9
	disagree	35	16.4	18.2	91.1
	strongly disagree	17	8.0	8.9	100.0
	Total	192	90.1	100.0	
Missing	System	21	9.9		
Total		213	100.0		

- **Local industries who use water**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	strongly agree	37	17.4	18.8	18.8
	agree	108	50.7	54.8	73.6
	uncertain	25	11.7	12.7	86.3
	disagree	17	8.0	8.6	94.9
	strongly disagree	10	4.7	5.1	100.0
	Total	197	92.5	100.0	
Missing	System	16	7.5		
Total		213	100.0		

- **Environmental groups and agencies**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	strongly agree	29	13.6	15.1	15.1
	agree	70	32.9	36.5	51.6
	uncertain	39	18.3	20.3	71.9
	disagree	34	16.0	17.7	89.6
	strongly disagree	20	9.4	10.4	100.0
	Total	192	90.1	100.0	
Missing	System	21	9.9		
Total		213	100.0		

- **Individuals and companies who do not intend to use water**

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid strongly agree	13	6.1	6.7	6.7
agree	25	11.7	13.0	19.7
uncertain	30	14.1	15.5	35.2
disagree	41	19.2	21.2	56.5
strongly disagree	84	39.4	43.5	100.0
Total	193	90.6	100.0	
Missing System	20	9.4		
Total	213	100.0		

**Your Views on the Impact and Future of Water Trading**

1. **To plan for the future it is important to look forward and best guess the future. Your expectations are an important input into policy development for the next decade. For each of the following place a tick in the relevant box**

2. **Trade in water in your region in ten years time will:**

- **Be limited and within a region**

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid strongly agree	32	15.0	16.5	16.5
agree	78	36.6	40.2	56.7
uncertain	55	25.8	28.4	85.1
disagree	23	10.8	11.9	96.9
strongly disagree	6	2.8	3.1	100.0
Total	194	91.1	100.0	
Missing System	19	8.9		
Total	213	100.0		

- **Become a significant market and influence on irrigated agriculture**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	strongly agree	52	24.4	26.5	26.5
	agree	99	46.5	50.5	77.0
	uncertain	33	15.5	16.8	93.9
	disagree	10	4.7	5.1	99.0
	strongly disagree	2	.9	1.0	100.0
	Total	196	92.0	100.0	
Missing	System	17	8.0		
Total		213	100.0		

- **Impact on the water supply of farmers in other regions**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	strongly agree	29	13.6	15.3	15.3
	agree	88	41.3	46.3	61.6
	uncertain	45	21.1	23.7	85.3
	disagree	25	11.7	13.2	98.4
	strongly disagree	3	1.4	1.6	100.0
	Total	190	89.2	100.0	
Missing	System	23	10.8		
Total		213	100.0		

- **Improve overall farm income in the region**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	strongly agree	30	14.1	15.5	15.5
	agree	75	35.2	38.7	54.1
	uncertain	70	32.9	36.1	90.2
	disagree	13	6.1	6.7	96.9
	strongly disagree	6	2.8	3.1	100.0
	Total	194	91.1	100.0	
Missing	System	19	8.9		
Total		213	100.0		

- **Move water out of my reach of the river or channel system**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	strongly agree	19	8.9	9.9	9.9
	agree	22	10.3	11.5	21.5
	uncertain	88	41.3	46.1	67.5
	disagree	51	23.9	26.7	94.2
	strongly disagree	11	5.2	5.8	100.0
	Total	191	89.7	100.0	
Missing	System	22	10.3		
Total		213	100.0		

- **Significantly impact on the environmental health of river systems**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	strongly agree	61	28.6	31.0	31.0
	agree	80	37.6	40.6	71.6
	uncertain	33	15.5	16.8	88.3
	disagree	15	7.0	7.6	95.9
	strongly disagree	8	3.8	4.1	100.0
	Total	197	92.5	100.0	
Missing	System	16	7.5		
Total		213	100.0		

- **Significantly reduce the wellbeing of local towns and businesses in my area**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	strongly agree	26	12.2	13.3	13.3
	agree	37	17.4	18.9	32.1
	uncertain	60	28.2	30.6	62.8
	disagree	57	26.8	29.1	91.8
	strongly disagree	16	7.5	8.2	100.0
	Total	196	92.0	100.0	
Missing	System	17	8.0		
Total		213	100.0		

- **Be dominated by a few large players**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	strongly agree	45	21.1	23.2	23.2
	agree	48	22.5	24.7	47.9
	uncertain	49	23.0	25.3	73.2
	disagree	31	14.6	16.0	89.2
	strongly disagree	21	9.9	10.8	100.0
	Total	194	91.1	100.0	
Missing	System	19	8.9		
Total		213	100.0		

- **Significantly increase salinity in your region**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	strongly agree	41	19.2	21.4	21.4
	agree	36	16.9	18.8	40.1
	uncertain	59	27.7	30.7	70.8
	disagree	39	18.3	20.3	91.1
	strongly disagree	17	8.0	8.9	100.0
	Total	192	90.1	100.0	
Missing	System	21	9.9		
Total		213	100.0		



**3. Have you been aware of any changes in the following that you believe are a result of trading water into or out of your region?**

- School and education opportunities**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Decline	8	3.8	4.9	4.9
		1	.5	.6	5.5
	No Change	149	70.0	91.4	96.9
		2	.9	1.2	98.2
	Increase	3	1.4	1.8	100.0
	Total	163	76.5	100.0	
Missing	System	50	23.5		
Total		213	100.0		

- Crime and disorderly behaviour**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Decline	5	2.3	3.0	3.0
		1	.5	.6	3.6
	No Change	146	68.5	88.5	92.1
		2	.9	1.2	93.3
	Increase	11	5.2	6.7	100.0
	Total	165	77.5	100.0	
Missing	System	48	22.5		
Total		213	100.0		

- Closures of small businesses**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Decline	15	7.0	9.1	9.1
		3	1.4	1.8	11.0
	No Change	126	59.2	76.8	87.8
	Increase	20	9.4	12.2	100.0
	Total	164	77.0	100.0	
Missing	System	49	23.0		
Total		213	100.0		

- **Hospital facilities and services**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Decline	12	5.6	7.4	7.4
		2	.9	1.2	8.6
	No Change	143	67.1	88.3	96.9
	Increase	5	2.3	3.1	100.0
	Total	162	76.1	100.0	
Missing	System	51	23.9		
Total		213	100.0		

- **Town real estate values**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Decline	21	9.9	12.6	12.6
		5	2.3	3.0	15.6
	No Change	124	58.2	74.3	89.8
		1	.5	.6	90.4
	Increase	16	7.5	9.6	100.0
	Total	167	78.4	100.0	
Missing	System	46	21.6		
Total		213	100.0		

- **Banking facilities**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Decline	28	13.1	17.3	17.3
		6	2.8	3.7	21.0
	No Change	122	57.3	75.3	96.3
	Increase	6	2.8	3.7	100.0
	Total	162	76.1	100.0	
Missing	System	51	23.9		
Total		213	100.0		

- **Expectations for the future of your community**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Decline	22	10.3	13.7	13.7
		4	1.9	2.5	16.1
	No Change	109	51.2	67.7	83.9
		3	1.4	1.9	85.7
	Increase	23	10.8	14.3	100.0
	Total	161	75.6	100.0	
Missing	System	52	24.4		
	Total	213	100.0		

**Your Views on the Role of the Water Authority  
in Water Markets**

**1. Under what circumstances should the water authority be able to reject an application for trade?**

- **If the trade impacts on the economic viability of local towns and communities**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	strongly agree	86	40.4	43.7	43.7
	agree	84	39.4	42.6	86.3
	uncertain	19	8.9	9.6	95.9
	disagree	4	1.9	2.0	98.0
	strongly disagree	4	1.9	2.0	100.0
	Total	197	92.5	100.0	
Missing	System	16	7.5		
	Total	213	100.0		

- **If the trade impacts on the environmental river flow objectives**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	strongly agree	102	47.9	51.8	51.8
	agree	63	29.6	32.0	83.8
	uncertain	21	9.9	10.7	94.4
	disagree	8	3.8	4.1	98.5
	strongly disagree	3	1.4	1.5	100.0
	Total	197	92.5	100.0	
Missing	System	16	7.5		
Total		213	100.0		

- **If the resulting distribution of water in the catchment is not considered fair and just**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	strongly agree	92	43.2	46.9	46.9
	agree	78	36.6	39.8	86.7
	uncertain	21	9.9	10.7	97.4
	disagree	2	.9	1.0	98.5
	strongly disagree	3	1.4	1.5	100.0
	Total	196	92.0	100.0	
Missing	System	17	8.0		
Total		213	100.0		

### Environmental Concerns

1. **A number of options have been raised to make water available for environmental flows. Please consider the following *hypothetical* policy options and associated consequences for restoring environmental flows. Rank them from highest (1) to lowest (4) in order of your preference.**

Hypothetical reduction in water entitlement	Hypothetical impact on the riverine environment	Mean Rank
0%	Irreversible habitat degradation	3.24
20%	Habitat degradation, reversibility unknown	2.58
30%	Reversible habitat degradation	2.05
40%	No habitat degradation	2.12

**2. A government agency should enter the market and use taxpayers money to buy water for the environment.**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	strongly disagree	61	28.6	30.3	30.3
	disagree	28	13.1	13.9	44.3
	do not know	27	12.7	13.4	57.7
	agree	60	28.2	29.9	87.6
	strongly agree	25	11.7	12.4	100.0
	Total	201	94.4	100.0	
Missing	System	12	5.6		
Total		213	100.0		

**Information About Yourself**

**1. What age group do you belong to? Please place a cross in the appropriate box.**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	15-24	4	1.9	1.9	1.9
	25-34	34	16.0	16.4	18.4
	35-44	38	17.8	18.4	36.7
	45-54	46	21.6	22.2	58.9
	55-64	33	15.5	15.9	74.9
	65-74	31	14.6	15.0	89.9
	75 and over	21	9.9	10.1	100.0
	Total	207	97.2	100.0	
Missing	System	6	2.8		
Total		213	100.0		

- **If you would like a copy of the study results please tick the YES box in the following form.**

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid				
yes	128	60.1	68.8	68.8
no	58	27.2	31.2	100.0
Total	186	87.3	100.0	
Missing				
System	27	12.7		
Total	213	100.0		