COOPERATIVE RESEARCH CENTRE FOR **CATCHMENT HYDROLOGY**

IRRIGATOR AND COMMUNITY ATTITUDES TO WATER ALLOCATION AND TRADING IN THE FITZROY CATCHMENT

TECHNICAL REPORT
Report 01/2
June 2001

John Tisdell / John Ward / Tony Grudzinski

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John Tisdell[1], John Ward[1] and Tony Grudzinski[1]

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[1]Griffith University

Preface

A water allocation management plan has been completed for the Fitzroy Basin and resource operations plans are being developed as part of an overall strategy to reform water management. 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.

The report provides important background information on irrigator and community attitudes to water reform and water trading in particular. The findings of the study provide critical input to resource operations plans as well as long term strategic planning for water trading in the catchment.

John Tisdell
Program Leader
Sustainable Water Allocation Program

Summary

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 member opinions on water reform, allocation and trading in the Fitzroy catchment. The questionnaire 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 survey is developed as part of a multiple catchment project exploring socio-economic issues in water trading and in conjunction with staff from Natural Resources and Mines, Rockhampton.

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 following the reform process. On the reliability of supply, however, irrigators are divided.

There is a strong feeling among irrigators that on-farm runoff should not be licensed. There is division between the community and irrigators on the rights to hold sleeper licences, with the community supporting their extinguishment and irrigators maintaining them. Irrigators and the community support setting aside water for the environment prior to allocating it to farmers, and that sleeper licences be maintained.

Meeting natural flow requirements and ensuring water is distributed in a fair and just manner is seen as more important than maximising farm income or taking account of town and community impacts. 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, however, is still to be achieved, and there is a general consensus that, to date, the community is poorly informed about the reform process. 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 active and inactive irrigators within a region and to those wishing to start an irrigation enterprise, local towns and communities and local industries who use water. Trade by individuals and companies who do not use water is not supported and the respondents were indifferent to irrigators in adjoining regions and environmental groups and agencies trading. 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, but traders are divided on disclosing price and traders' entitlement and crop mix information.

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. Temporary markets are seen as 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; 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 consider transactions costs satisfactory and the time taken to complete a trade as reasonable. Those irrigators who trade did not see these as inhibitors to trade. However, perceived administrative and time costs are blockages to non-traders 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 drivers of trade in both the temporary and permanent water markets are the availability of surplus water and shortfalls in water allocations.

The role of the permanent water market is 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 respondents to the survey expect that trade in the permanent market for the foreseeable future will mainly be in surplus water, and thus not significantly change farm practices of existing irrigators. Given these findings it seems unlikely that the market will provide adequate or comprehensive signals for change in existing uses of water until the surplus water is redistributed.

The main blockages to trade, both perceived and actual, include the view that water is an integral part of a farm and not for sale, a lack of understanding of how the market operates and perceived administrative costs associated with conducting a trade by new non-traders. Creating a change in attitudes toward the nature of water entitlements will not be a simple task.

Finally, the respondents see water markets in the future being limited within their region, yet playing a significant role in irrigated agriculture, increasing overall farm income and being dominated by a few large players. The respondents do not see water markets creating significant externalities in terms of security of supply to other farmers, impacting on the environmental health of river systems, or increasing salinity.

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1. Introduction

This document reports on the findings of a survey conducted in the Fitzroy catchment. The first part of the report outlines the basic structure of the survey instrument and method of sampling. The second section outlines the survey findings on COAG reform and the structure, conduct and performance of water markets in the Fitzroy catchment. The Fitzroy catchment is bounded by the Carnarvon Gorge National Park in the West, Burton Gorge Dam in the North and Injune in the south, covering an area of approximately 15,000km^2 (see Figure 1).

(Source: Department of Natural Resources (1999) Water Allocation and Management Plan)

Figure 1 Fitzroy Basin map

2. Survey Design

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

A total population survey of regulated irrigators in the Fitzroy Basin was conducted. Natural Resources and Mines, Rockhampton supplied names and addresses of the 388 regulated irrigators in the catchment. A stratified random sample of 1,000 community members was drawn from the 1996 electoral roles. In designing the sampling-frame sub-catchments were used as stratums and towns as sub-stratums. Table 1 gives a breakdown of the community members sampled from each sub-catchment major town in the basin.

Table 1 Community sample: Fitzroy catchment

Town name	Pop'n	Sub-catchment	Sample (n)	Town name	Pop'n	Sub-catchment	Sample (n)
Bouldercombe	587	0	5	Injune	405	7	4
Gracemere	4501	0	40	Dysart	3444	9	31
Mount Larcom	213	0	2	Moranbah	6508	9	58
Rockhampton	57770	0	519	Blackwater	5931	10	53
Bluff	431	1	4	Middlemount	2132	10	19
Duaringa	276	1	2	Tieri	1591	10	14
Baralaba	238	2	2	Emerald	9345	11	84
Moura	1980	2	18	Springsure	666	12	6
Woorabinda	1119	2	10	Capella	741	14	7
Biloela	5161	3	46	Clermont	2388	14	21
Mount Morgan	2487	3	22	Rubyvale	602	14	5
Thangool	349	3	3	Sapphire	614	14	6
Theodore	508	4	5	Willows Gemfields	270	15	2
Taroom	662	6	6				
Wandoan	432	6	4				
				Total	**111,351**	**Total**	**1,000**

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[a**]	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[b*]	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 the 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 (a=0.05). The single asterisk on the MW-U value corresponding to the statement signifies this.

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.

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
	Total	**100**	**100**
	Mean Rank	**3**	**3**

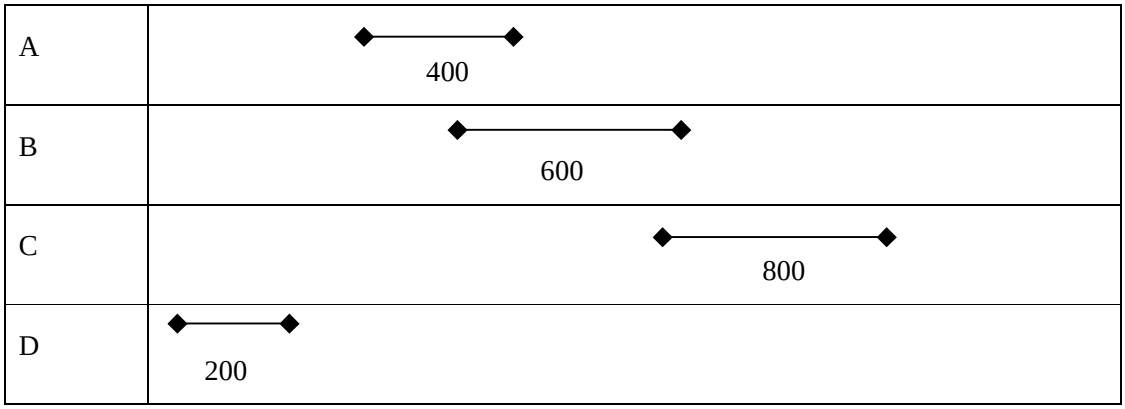
Example 3 Interpreting significant differences

Region	Average water allocation (ML)
A	400[a]
B	600[ab]
C	800[b]
D	200

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

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

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 Fitzroy 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 2 reports the overall opinion to water reform. 83.3% and 80.0% of irrigators and community members respectively agree that water reform was needed.

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 3 presents the irrigator and community support for full-cost pricing of water. Among irrigators, attitudes are against full cost pricing with 69% rejecting or completely rejecting the notion, compared to 17.6% (3.5% and 14.1%) accepting or strongly supporting the notion. The community is more supportive of full cost pricing with 47.3% (18.4% and 28.9%) strongly supporting or accepting the notion of full cost pricing and 35.5% (23.7% and 11.8%) rejecting or completely rejecting such a pricing policy.

Table 2 Overall agreement with the need for water reform

	Irrigators		**Community**	
	Frequency	**Percentage**	**Frequency**	**Percentage**
Yes	115	83.3	120	80.0
No	23	16.7	30	20.0
Total	**138**	**100.0**	**150**	**100.0**

Table 3 Full cost pricing of water

	Irrigators		**Community**	
	Frequency	**Percentage**	**Frequency**	**Percentage**
Strongly support	5	3.5	28	18.4
Accept	20	14.1	44	28.9
Indifferent	19	13.4	26	17.1
Reject	54	38.0	36	23.7
Completely reject	44	31.0	18	11.8
Total	**142**	**100.0**	**152**	**100.0**
Mean Rank	**3.79**		**2.82**	

MW–U=6343.0, p<0.000; KS–Z=2.869, p<0.001
(Mann Whitney U test (MW-U), Kolmogorov-Smirnov Z test (KS-Z) - 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 4 and 5 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 an independent and distinct chattel. Overall, there is agreement that the nexus between land and water should be broken and water rights be traded as chattels separate to land. This view is stronger among irrigators than the wider community and among irrigators who have traded compared to those who have not.

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, with irrigators strongly rejecting the notion and the community indifferent. Irrigators and the general community supported setting aside water for the environment prior to allocating it to farmers. Finally, while there is overall indifference towards the notion of extinguishing sleeper and dozer licences, the community and irrigators attitudes are divided. Irrigators strongly reject the notion while the community agrees with the notion.

Within the irrigation community the opinions of irrigators who have traded water differ from those who have not on the issue of the separation of water entitlements from land. As expected, those who trade are more supportive of breaking the nexus between land and water than those who do not trade.

Table 6 presents opinions on the security and reliability of rights following reform. The results suggest that there is general agreement among irrigators that water entitlements will be more secure following the reform process. Traders and non-traders hold this view alike. There is uncertainty overall as to whether the reliability of water entitlements will improve following the water reform process.

Table 4 Definition of rights: irrigator and community opinions

	Overall	**Mean Rank Response†**		**MW-U ‡**	**KS-Z ‡**
	Mean Rank†	**Irrigator**	**Community**		
Water entitlements should be allowed to be separated from land and be traded	2.76[a**]	2.43	3.09	8229.0**	2.215**
On-farm runoff should be licensed	3.80[b**]	4.33	3.28	6237.0**	2.995**
Water for the environment should be set aside prior to allocating water to farmers	2.44[a**]	2.53	2.34	10226.0	0.880
Licences that have not been used for five years should be extinguished	2.92	3.36	2.49	7309.5**	2.616**

† 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 5 Definition of rights: trader and non-trader opinions

	Mean Rank †	**Mean Rank Response** †		**MW-U** ‡	**KS-Z** ‡
	Irrigators	**Trader**	**Non-trader**		
Water entitlements should be allowed to be separated from land and be traded	2.43[a**]	1.93	2.75	1742.0**	1.565*
On-farm runoff should be licensed	4.33[b**]	4.33	4.31	2330.0	0.282
Water for the environment should be set aside prior to allocating water to farmers	2.53 [a**]	2.41	2.65	2149.0	0.822
Licences that have not been used for five years should be extinguished	3.36 [b**]	3.22	3.46	2148.5	0.762

† 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 6 Security and reliability of rights following COAG reforms: trader and non-trader opinions

	Mean Rank †	**Mean Rank Response** †		**MW-U** ‡	**KS-Z** ‡
		Trader	**Non-trader**		
Water entitlements will be more secure following the reforms	2.80[a*]	2.82	2.81	2155.0	0.601
Water entitlements will have higher reliability of supply following the water reforms	2.99	3.16	2.91	1897.0	0.638

† 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

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 7 summarises respondents' attitudes to the community's involvement and acceptance of COAG reforms. 30.9% of irrigators responding to the survey feel that the community has been involved but largely ignored and a further 54.7% (30.2% and 24.5%) feel the community has been poorly informed. 3.6% and 10.8% respectively felt that the community had been actively informed and embraced it, or well informed and accepting. This provides opportunities for the water authority as it promotes awareness of COAG reform policies, and adoption of water trading in particular.

6.4 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 8 presents irrigator and community attitudes to key COAG reform objectives. Overall, the respondents to the surveys ranked meeting natural flow requirements and distributing water in a fair and just manner higher than maximising farm income or taking account of local town and community impacts. Irrigators consider ensuring a fair and just distribution of water as most important, followed by maximising farm income and meeting natural flow objectives. The community considers meeting natural flow objective the most important, followed by ensuring a just and fair distribution of water, taking account of local town and community impacts, and finally maximising farm income.

Table 7 Community involvement in the water reform process

	Irrigator		Community	
	Frequency	**Percentage**	**Frequency**	**Percentage**
Actively involved and embraced it	5	3.6	0	0.0
Well informed and accepting	15	10.8	10	6.6
Involved but largely ignored	43	30.9	18	11.9
Poorly informed but accepting	42	30.2	88	58.3
Poorly informed and unhappy	34	24.5	35	23.2
Total	**139**	**100.0**	**151**	**100.0**

MW-U=8455.0, p<0.000; KS-Z=2.278, p <0.00 (See Section 4 for explanation of MW-U and KS-Z)

Table 8 Analysis of key COAG reform objectives

Issue in Water Reform	Mean Percentage		
	Overall	**Irrigator**	**Community**
Maximise farm income	22.29[a]	25.93[c]	19.02
Distribute water in fair and just manner	33.11[b]	36.08	30.51
Meet natural flow requirements	32.93[b]	27.30[c]	37.58
Impact on local towns and communities	22.84[a]	22.70[c]	22.95

Note: Acrsin 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 Environmental Water Requirements

Addressing environmental flow requirements is likely to require a trade-off between extractive and environmental use of water. Four *hypothetical* scenarios are presented to the respondents. The scenarios are based in part on the WAMPS in 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 are asked to rank their preference from highest (1) to lowest (4). 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 responses suggest that they are accepting of 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 no habitat degradation or at least possible reversibility of habitat degradation. No reduction in entitlement was lowest ranked. The community ranked reversible habitat and no habitat degradation, with 30% and 40% reductions in water allocations, equally above unknown degradation with reversibility unknown and irreversible habitat degradation. The community supported the notion that that the government enters the market and purchases water for environmental use while irrigators are indifferent.

Table 9 Trade-offs between extractive and environmental uses of water

Hypothetical Reduction in Water Entitlement	**Hypothetical Impact on the Riverine Environment**	**Mean Rank†**		
		Overall	**Irrigators**	**Community**
0%	Irreversible habitat degradation	3.23	3.13	3.30
20%	Habitat degradation, reversibility unknown	2.48^{a}	2.31^{yz}	2.61
30%	Reversible habitat degradation	2.04^{b}	1.95^{y}	2.10^{x}
40%	No habitat degradation	2.24^{ab}	2.50^{z}	2.05^{x}

† 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.

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

6.6 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 statement developed from a variety of philosophical schools of thought. In this study, statements concerning outcomes and procedures for water trading are 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 utilitarianism is ranked highest. Concern for the worst-off (Rawlsian) and consideration of trades on a case-by-case basis (Kant) are equally ranked, and ranked above ensuring potential compensation to third parties who may be affected by trade. 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. At a secondary level, development of the rules and procedures should allow for case-by-case considerations and should focus on the welfare of those worst off.

Table 10 Social justice and equity objectives for water trading

Philosophical Standpoint	**Philosophical Statement**	**Mean Rank†**		
		Overall	**Irrigator**	**Community**
Utilitarianism	Water trading should benefit the greatest number of people possible	2.03	2.22[a]	1.85[a]
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	2.36[a]	2.69[bc]	2.07[ab]
Kaldor/Hicks	The beneficiaries from water trade should be able to compensate those who feel they have lost because of the transaction	2.71	3.03[b]	2.43[c]
Kant	There should be no general rules of trade as each situation is different and should be considered on a case-by-case basis	2.44[a]	2.56[ac]	2.32[bc]

† 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.

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 the key variable in constructing rational public policy toward water trading. To effectively achieve the efficiency objectives of COAG reforms in water, 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.

Table 11 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	1.97[a**]	1.58	2.34	5525.5**	3.458**
Active irrigators who hold water entitlements in adjoining regions	3.07	3.15	2.99	9395.5	1.250
Farmers who wish to start an irrigation enterprise in your region	2.43[a**]	2.45	2.41	9634.0	1.100
Farmers who have not used their entitlement in the last five years	2.84[a*]	2.42	3.23	6364.0**	3.115**
Local towns and communities for domestic use	2.28[a**]	2.42	2.16	9513.0	0.731
Local shires to use water for recreation use, such as parks and golf courses	2.63[a**]	2.72	2.56	9934.0	0.946
Local industries who use water	2.35[a**]	2.35	2.36	10020.0	0.554
Environmental groups and agencies	2.85[a*]	3.08	2.64	8103.0**	1.424*
Individuals and companies who do not intend to use water	3.94[b**]	4.10	3.80	8479.5**	1.630**

† 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

The number of buyers and sellers in the market will depend *inter alia* on who is allowed to trade. Constraints on such rights may be spatial, sectoral or use related. Overall, there is support for trade between irrigators, local towns and communities and local shires and environmental groups and agencies, 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 environmental groups and agencies to trade and indifferent to trade in sleeper licences.

Spatially, there is strong support by irrigators for active irrigators within their region to trade, but indifference towards trade with active irrigators in adjoining regions. Irrigators who trade are more supportive of trade with active irrigators in adjoining regions than those who do not trade. Irrigators who trade are supportive of trade with local towns and communities; irrespective of whether those sectors for domestic and local industrial use or for recreation use, such as parks and golf courses. Traders are also more supportive of trade with environmental groups and agencies and farmers who wish to start an irrigation enterprise than non-traders. 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 12 Rights to trade: trader and non-trader opinions

	Mean Rank†	**Mean Response** †		**MW-U** ‡	**KS-Z** ‡
		Irrigators	**Community**		
Active irrigators who hold water entitlements within your region	1.97[a**]	1.58	2.34	5525.5**	3.458**
Active irrigators who hold water entitlements in adjoining regions	3.07	3.15	2.99	9395.5	1.250
Farmers who wish to start an irrigation enterprise in your region	2.43[a**]	2.45	2.41	9634.0	1.100
Farmers who have not used their entitlement in the last five years	2.84[a*]	2.42	3.23	6364.0**	3.115**
Local towns and communities for domestic use	2.28[a**]	2.42	2.16	9513.0	0.731
Local shires to use water for recreation use, such as parks and golf courses	2.63[a**]	2.72	2.56	9934.0	0.946
Local industries who use water	2.35[a**]	2.35	2.36	10020.0	0.554
Environmental groups and agencies	2.85[a*]	3.08	2.64	8103.0**	1.424*
Individuals and companies who do not intend to use water	3.94[b**]	4.10	3.80	8479.5**	1.630**

† 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

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 13 summarises irrigator attitudes on this issue. Irrigators are unsure whether water would become a chattel and traded, and reject the notion that a farm's water entitlement would no longer be an inherent asset in farming. This suggests that the current emphasis on the temporary, rather than the permanent water market, will continue. Finally, the security of a right is important in determining its value as irrigators feel that farmers 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 trader 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. Irrigators are unsure whether the market will consist of a few players who may act strategically, but reject the notion that the actions of individuals will not influence the market price. When asked later in the survey about the future of water markets they agree that it will consist of only a few players. In aggregate, these results suggest a high level of uncertainty and produce conflicting views among irrigators on this matter.

Table 13 The nature of water entitlements in water markets: trader and non-trader opinions

		Mean Response†			
	Mean Rank†	**Trader**	**Non-trader**	**MW-U‡**	**KS-Z‡**
Water trading will become like buying fertilizer in that a farmer will buy and sell it in on a need basis	2.90	2.90	2.91	2326.0	0.385
Farmers will pay more for high security water than for general security	2.10a**	1.96	2.20	1941.0	0.840
Water entitlements will no longer be an inherent asset in farming	4.23b**	4.22	4.24	2259.5	0.403

† 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 14 Perceptions of market concentration: trader and non-trader opinions

		Mean Response†			
	Mean Rank†	**Trader**	**Non-trader**	**MW-U‡**	**KS-Z‡**
Markets will consist of only a few traders, farmers will anticipate what others may offer and buy	2.97	2.98	2.96	2274.0	0.557
There will be a lot of traders and the actions of individuals will not greatly influence the market price	3.38b**	3.50	3.30	2038.5	0.862

† 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

The water authority plays a key role in formulating the structure of a market. Historically, the role of the water authority has been largely one of managing the system given its hydrological characteristics. The commonly held standpoint on water trading is to minimise water authority and state intervention and allow the market to redistribute water entitlements. Irrigator and community attitudes to the role of the water authority are presented in Tables 15 and 16.

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, traders are less supportive of water authority market intervention on the grounds of fairness or justice than non-traders, and indifferent to intervention when the negotiated price and quantity traded may be deemed unjust or unfair. 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. 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 17 presents a breakdown of irrigator support for each option. 63.5% of irrigators support restricting trade to within the system, compared to at most 15.1% for any other option.

Table 15 The role of the water authority in regulating water markets: irrigator and community opinions

	Overall	**Mean Rank Response** †		**MW-U** ‡	**KS-Z** ‡
	Mean †	**Irrigators**	**Community**		
If the trade impacts on the economic viability of local towns and communities	1.83[a**]	2.04	1.64	7758.0**	2.134**
If the trade impacts on the environmental river flow objectives	1.89[a**]	2.22	1.60	6923.0**	2.496**
If the resulting distribution of water in the catchment is not considered fair and just	1.77[a**]	2.01	1.56	7300.0**	2.238**

† 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 16 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	2.04[a**]	2.00	2.01	2270.5	0.344
If there is a possible impact on other water entitlements	1.87 [a**]	1.81	1.91	2236.0	0.515
If the trade impacts on the economic viability of local towns and communities	2.04 [a**]	2.12	1.97	2021.0	0.447
If the trade impacts on the environmental river flow objectives	2.22 [a**]	2.40	2.10	1913.0	0.755
If the resulting distribution of water in the catchment is not considered fair and just	2.01 [a**]	2.23	1.86	1726.0**	0.960
If the conditions and price negotiated are not considered fair and just	2.70 [a**]	3.21	2.35	1301.0**	1.976**

† 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 17 Remedies to infrastructure isolation resulting of trade

	Frequency	**Percentage**	**Cumulative Percentage**
Continue to supply	17	13.5	13.5
Impose exit fees	19	15.1	28.6
Compensate and close system	10	7.9	36.5
Restrict trade to within system	80	63.5	100.0
Total	**126**		

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 18 presents a summary of irrigators' opinions on the disclosure of market information. While irrigators overall are supportive of disclosure of the volume and price of water traded and traders' entitlements and crop mixes being on a public register, traders are indifferent to disclosure of price and traders' entitlements and crop mix, and less supportive than non-traders to disclose the volume traded.

In terms of acquiring market information there is division among irrigators as to the availability of market information with exactly 50% of irrigators agreeing that information is readily available and 50% stating that it is not. Breaking this result down by sub-catchment 73% of irrigator respondents in Emerald and 63.8% of irrigator respondents in Theodore stated that they have been able to gain good information on how temporary water markets operate. 65.3% and 56.3% of Rockhampton and Moura irrigator respondents did not consider they have been able to gain good information.

Sources of information are listed in Figure 2 below. The main sources include the Department of Natural Resources and Mines, State Water, agents and brokers, and other farmers.

Table 18 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	1.92 [a**]	2.12	1.74	1775.0*	1.179
The price at which the water traded	2.56 [a**]	3.12	2.16	1393.0**	1.532*
The traders entitlements and crop mix	2.88 [a**]	3.22	2.64	1744.0*	0.937

† 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

Information obtained from:

- DNR (29) of which specified sold (3), bought (6) and traded (6);
- SWP (4) of which specified temporary transfer (2) and trade (1);
- State Water (7) of which specified bought (2), sold (2);
- Water Resources (2) of which specified bought (1), sold (1);
- DPI (5) of which specified trade (1);
- Local government office (1) which specified sold;
- Fitzroy Advisory Commission (1);
- Irrigators committee (2);
- Emerald Office (1);
- Local paper (1);
- Newsletters (2);
- Auctions (1) which specified the use of that information to set selling price for the year;
- Agents/brokers (7) of which specified obtaining the going price (1);
- Own research (1) which specified sale;
- Irrigators/Farmers (4) of which specified sell (1), trade (1); to price water (1);
- Local trader (1);
- Locals/neighbour (5) of which specified bought (2), sold (3);

Figure 2 Sources of water market information

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 the actions of other traders, both perceived and actual.

Table 19 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. 93.75% of water sold is surplus to needs, while 6.25% of sellers considered the opportunity cost of selling as opposed to using their water on their farm. 81.01% bought water because their existing entitlement did not meet their needs and 11.11% bought water to meet their end of season watering needs. 32.0% considered the actions of other traders influenced how they traded.[1]

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. Similarly, selling water that is surplus to needs or because more can be earned by selling than using the water on-farm is correctly perceived by traders, but not non-traders. In essence, the traders' perceptions of why other farmers buy or sell water are accurate, while those who do not trade have a poor realisation of actual market drivers.

100%, 89.2%, and 77.6% of irrigators in the Moura, Emerald and Rockhampton sub-catchments, respectively, gave the opportunity cost of water as the main reason why others temporarily sell water on the temporary market. 22.7% and 22.4% of irrigator respondents in the Rockhampton and Theodore sub-catchments thought that other farmers sold water on the basis of its opportunity cost. It was rated by less than 10% of irrigator respondents in all other sub-catchments.

In buying water, 75.0% of irrigator respondents from the Moura sub-catchment considered the fact that an allocation would not meet crop requirements as the main reason why other farmers buy water, while 24.0% and 31.8% of Rockhampton and Theodore irrigator respondents considered the end-of-season water needs as the main driver for other farmers buying water.

Table 19 Perceptions of temporary trading: trader and non-trader opinions

Perception		Overall	Traders	Non-traders	Actual
Buy	Water allocation does not meet requirement	0.6250^{ab}	0.6393^{acd}	0.6097^{bc}	0.8148^{d}
	End of season waterings	0.2847^{abd}	0.2623^{abce}	0.3049^{cd}	0.1111^{e}
Sell	Surplus water	0.8500^{abc}	0.8983^{ade}	0.8101^{bd}	0.9375^{ce}
	Earn more by selling than using	0.1429^{abc}	0.0847^{ade}	0.1899^{bd}	0.0625^{ce}

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

[1]See Appendix A, Question 8

Traders see security and acquiring water to finish a crop as the main reasons for buying water in the future. When asked about selling water, 78.1% of traders said that they would sell their surplus water. There is little support for any strategic planning for buying or selling water prior to planting or during the growing season.

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 is seen to be an indication that there is a continued place for temporary markets to meet within season distribution issues.

Table 20 Reasons for trading water in the future

Buy/Sell	Reason	Count	Percentage of Responses
Buy	Prior to making a cropping decision	60	27.6
	To finish a crop should water become short	64	29.5
	To acquire more secure water supply	51	23.5
	Prior to next irrigation	10	4.6
	Purchase regularly according to watering regime	32	14.7
	Total	**217**	**100.0**
Sell	Only sell water surplus to requirements	118	78.1
	Change crop to use less water	5	3.3
	Run all or some of the crop dryland	7	4.6
	Reduce the area planted	5	3.3
	Not crop that year	7	4.6
	Other	9	6.0
	Total	**151**	**100.0**

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

Table 21 Expected conduct of farmers in water trading: trader and non-trader opinions

	Mean Rank†	Mean Response†		MW-U ‡	KS-Z ‡
		Trader	Non-trader		
Farmers will be reluctant to trade and rely on their entitlement to meet their water requirements	2.55[a**]	2.93	2.28	1517.0**	1.562*
Farmers will follow water prices as they do crop and input prices	2.37[a**]	2.20	2.50	1974.5	0.952
There will be no temporary trading, as all trades will be permanent	4.01[b**]	4.14	3.92	1924.5	0.643

† 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

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 3 below. The main use is in trade: determining volumes to buy or sell and when to trade.

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. Traders see neither of these issues as an inhibitor to trade, with 82.7% of traders considering the level of transaction costs to be satisfactory and 90.7% of traders considering the time taken to complete a trade as reasonable or better.

While overall completion time is considered reasonable or better, 31.6% of irrigators in the Fitzroy considered the costs excessive.

Used information to:
- Buy water (11)
- Sell water (12)
- Trade (9)
- Temporary transfer (1)
- Set price (1)
- Gain information on the going price (2)

Figure 3 Use of market information

Table 22 Level of transaction costs

Mean Transaction Cost $145.69	**Frequency**	**Percentage**	**Cumulative Percentage**
Satisfactory	43	82.7	82.7
Excessive	9	17.3	100.0
Total	**52**	**100.0**	

Table 23 Time to complete trade

Mean Time 11.64 days	**Frequency**	**Percentage**	**Cumulative Percentage**
Excellent	12	22.2	22.2
Reasonable	37	68.5	90.7
Unacceptable	5	9.3	100.0
Inhibited the final use of the water	0	0	
Total	**54**	**100.0**	

7.3 Permanent Trading

Respondent views on permanent water trading are that most traders purchased water because their existing water entitlement does not meet current needs. Irrigators see a surplus of water, as opposed to the opportunity value of water, as the main reason why others sell water in the permanent market. This result questions whether, beyond redistributing surplus water, the permanent market is yet to result in real structural change in the crop mix of individual farmers.

7.4 Blockages and Impediments to Trade

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.

Table 25 outlines the perceived reasons why others do not trade water. 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 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. The second blockage lies in perceptions of administrative costs and delays. While traders do not see these as significant blockages to trade, non-traders do.

Table 24 Perceptions of permanent trading

		Frequency	Percentage	Cumulative Percentage
Buy	Entitlement does not meet existing water requirements	76	63.9	63.9
	Land development	22	18.5	82.4
	Increased security of supply	21	17.6	100.0
	Total	**119**	**100.0**	
Sell	Surplus to needs	95	82.6	82.6
	More by selling than crops	3	2.6	85.2
	Dryland alternative	1	0.9	86.1
	Retiring	8	7.0	93.0
	Other	8	7.0	100.0
	Total	**115**	**100.0**	

Table 25 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	86	38.7	43	56.6	42	29.8
They do not know enough about the market	33	14.9	9	11.8	23	16.3
They view water as an integral part of their farm and not for sale	54	24.3	16	21.1	37	26.2
They do not wish to barter with other farmers	12	5.4	3	3.9	8	5.7
They are philosophically opposed to trading	10	4.5	1	1.3	8	5.7
They find the administration costs and delays associated with trade too great	27	12.2	4	5.3	23	16.3
Total	**222**	**100.0**	**76**	**100.0**	**141**	**100.0**

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

Blockages, as outlined in Figure 4 below, can be classified as attitudinal, knowledge, administrative, cost, legal, anti-market and pricing. The main blockages to trade seem to be administrative requirements (19) and costs associated with trading (13), and in understanding of how water markets operate (13). 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. These are issues that the water authority may wish to address in order to promote water trading.

Blockages involving:

ATTITUDES

A. Unwillingness to part with water (4) of which specified fearing loss of allocation (2) jealousy (1)
B. Lack of water (16) of which specified allocations being too low (1)
C. Seasonal uncertainty (1)
D. Everyone in the same boat at the same time (1)
E. Transfers affecting other allocations (1)

Proposed solutions:

A. Education (2); Reassurance (2); policing temporary contracts (1);
B. Improve communication (1); increase allocations (1); build dam (3); more rain (2); improve storage (6)

KNOWLEDGE BLOCKAGES

A. Ignorance (13) of which specified ignorance of size of allocations and who has them (3); ignorance of the exact area allowed to trade in (1); ignorance of appropriate selling price (1)

Proposed Solutions:

A. Register (3) of names of allocation holders, sizes of allocations in local area, and usage per year (1); set standard selling price (1); create register/map of trading areas (1); education (2); publicity/marketing (1); workshops (3)

ADMINISTRATION PROCESS BLOCKAGES

TOTAL 19

A. DNR (6)
B. Organisation (1)
C. Time (3)
D. Red tape (8)
E. Transfer has to be done before its used (1)

Proposed Solutions:

A. Improve employee knowledge and communication skills (6); get a catchment manager (1)
B. Body to handle market information transfer (1)
C. Improve trading speed by marketing on the net (1)
D. Streamline approval process (2); have less government involvement (1)
E. Allow for a transfer to make up the shortfall (1)

COST BLOCKAGES

A. Costs (13) of which specified: administration costs (4); charges (6)
B. Proposed high part A and low part b cost structure decreases incentive to transfer surplus in a given year (1);

Proposed Solutions:

A. Remove brokers (1); introduce caps on selling prices (1) government control (1); less involvement of DNR (1); lower admin fees (2)
B. Keep part a low with part b absorbing much of the cost, set aside resources for promoting water use efficiency (1)

LEGISLATION BLOCKAGES

A. No policing of temporary licences (1)
B. Current legislation restrictions (3)
C. Artificial barriers within the catchment/limits to trading areas (3)

Proposed Solutions:

A. Government control (1)
B. Those unable to use allocation should be able to negotiate excess with other users (1)

ANTI-MARKET BEHAVIOUR BLOCKAGES

A. Larger farmers dominate markets (1)
B. Barter (1)

Proposed Solutions:

A. Cap and evenly distribute (1)
B. Create a central trading body (1)

PRICING BLOCKAGES

A. Water is not traded at cost (1)
B. There is no fixed price (1)

Figure 4 Perceived blockages to trade

8. Social Impacts of Water Trading

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 26. Small businesses and banking facilities are seen as being in decline while there has been no significant change in hospital facilities, 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 26 Social capital impacts of water trading

Measure of Social Capital	Mean Response by the Community †
School and education opportunities	2.92
Crime and disorderly behaviour	2.99
Closures of small businesses	3.18[b*]
Hospital facilities and services	3.00
Town real estate values	2.89
Banking facilities	2.78[a**]
Expectations for the future of your community	3.03

† 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. The results are summarised in Tables 27 and 28. Irrigators perceive that in the future trade will be limited to within a region, be significant and impact on irrigated agriculture, improve overall farm income, and be dominated by a few players. Irrigators do not see water trading having significant third party impacts, increasing salinity or significantly impacting on the environmental health of river systems, or reducing the well-being of local towns or communities.

Table 27 Opinions on the future performance of water markets: trader and non-trader opinions

	Mean Rank†	Mean Response†		MW-U‡	KS-Z‡
		Trader	Non-trader		
Be limited and within a region	2.18[a**]	2.08	2.21	1864.5	0.438
Become a significant market and influence on irrigated agriculture	2.46[a**]	2.33	2.56	1954.0	0.445
Impact on the water supply of farmers in other regions	3.48[b**]	3.57	3.43	1928.5	0.972
Reduce the announced sales to all irrigators	3.21[b*]	3.29	3.15	1939.5	0.697
Improve overall farm income in the region	2.78[a*]	2.60	2.93	1811.0	1.070
Move water out of my reach of the river or channel system	3.23[b*]	3.25	3.21	2141.5	0.201
Significantly impact on the environmental health of river systems	3.48[b**]	3.69	3.36	1756.5	0.799
Significantly reduce the well-being of local towns and businesses in my area	3.79[b**]	3.87	3.72	2022.0	0.646
Be dominated by a few large players	2.80[a*]	2.95	2.71	1986.0	0.648
Significantly increase salinity in your region	3.68[b**]	3.77	3.60	2050.5	0.725

† 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 28 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	2.25[a**]	2.18	2.31	8994.0	0.782
Become a significant market and influence on irrigated agriculture	2.36[a**]	2.46	2.27	9439.5	0.631
Impact on the water supply of farmers in other regions	3.01	3.48	2.58	5364.0**	3.203**
Improve overall farm income in the region	2.66[a**]	2.78	2.54	9416.5	1.227
Move water out of my reach of the river or channel system	3.18[b**]	3.23	3.13	9561.5	0.891
Significantly impact on the environmental health of river systems	2.85[a*]	3.48	2.29	4972.0**	3.612**
Significantly reduce the well-being of local towns and businesses in my area	3.34[b**]	3.79	2.93	5878.5**	3.606**
Be dominated by a few large players	2.64[a**]	2.80	2.50	8873.5*	1.083
Significantly increase salinity in your region	3.18[b**]	3.68	2.74	5525.0**	3.735**

† 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

10. Sub-Catchment Breakdown

In order to explore attitudes and opinions within the catchment survey responses were grouped and analysed by sub-catchment. Table 29 gives a break down of key question responses by sub-catchment. Irrigators in the Emerald and Theodore sub-catchments are more supportive of extinguishing sleeper licences than those in Rockhampton. Similarly, they are more supportive of trade between active irrigators who hold water allocations within their region. Emerald irrigators, compared to Moura irrigators are less supportive of allowing interregional trade, while Theodore irrigators are more supportive. Emerald irrigators are more supportive of allowing environmental groups and agencies to trade than irrigators in Rockhampton. Emerald and Moura irrigators are more supportive of the water authority intervening in trades where the price or conditions of trade may be deemed unjust than irrigators in Rockhampton. Finally, irrigators in Rockhampton, compared to irrigators in Emerald are more supportive of the notion that in the future trade will be limited and within a region.

Table 29 Differences in attitudes across sub-catchments of the Fitzroy Basin

		Rockhampton†	**Moura†**	**Theodore†**	**Emerald†**	**χ^2**	**p**
Rights to water	Licences that have not been used for five years should be extinguished	3.61^{t,e}	3.94	3.43^{r}	2.89^{r}	7.831	0.050
Rights to trade	Active irrigators who hold water allocations within your region	1.88^{t,e}	1.47	1.38^{r}	1.37^{r}	12.054	0.007
	Active irrigators who hold water allocations in adjoining regions	3.04	3.57^{t,e}	2.55^{m}	3.61^{m}	10.325	0.016
	Environmental groups and agencies	3.36^{e}	3.00	3.10	2.55^{r}	7.652	0.054
Role of the water authority	If the conditions and price negotiated are not considered fair and just	2.49^{m,e}	2.00^{r}	2.00	1.94^{r}	7.729	0.052
Future of water trading	Be limited and within a region	2.27^{e}	3.20	2.84	3.11^{r}	13.262	0.004

† 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. Scale 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 30 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 30 Age distribution of respondents

Age	Irrigators %	Cumulated Frequency	Community %	Cumulated Frequency
15-24	0	0	3.1	3.1
25-34	8.5	8.5	17.9	21.0
35-44	23.2	31.7	29.6	50.6
45-54	33.8	65.5	17.9	68.5
55-64	26.8	92.3	12.3	80.8
65-74	7.0	99.3	11.7	92.5
74 and over	0.7	100.0	7.4	100.0

12. Conclusion

The survey of the Fitzroy 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. However, irrigators see the notion that water allocations are an integral part of a farm and not tradeable as a major inhibitor to trade in the future.

There is general agreement among irrigators that water entitlements will be more secure following the reform process, but there is uncertainty surrounding the reliability of supply. 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, however, is still to be achieved, and there is a general consensus, that to date, the community is poorly informed about the reform process. In terms of meeting environmental flow objectives, reductions in water entitlements to ensure no habitat degradation or at least reversibility of habitat degradation are possible.

Appendix A.

Frequency tables arising from the survey of irrigators in the Fitzroy 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 an irrigator and member of a rural catchment community, and your family, friends and the community at large.

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

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	yes	115	75.7	83.3	83.3
	no	23	15.1	16.7	100.0
	Total	138	90.8	100.0	
Missing	System	14	9.2		
Total		152	100.0		

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

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

Statement

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

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	strongly support	56	36.8	37.3	37.3
	accept	43	28.3	28.7	66.0
	indifferent	10	6.6	6.7	72.7
	reject	13	8.6	8.7	81.3
	completely reject	28	18.4	18.7	100.0
	Total	150	98.7	100.0	
Missing	System	2	1.3		
Total		152	100.0		

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

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	strongly support	4	2.6	2.7	2.7
	accept	10	6.6	6.8	9.5
	indifferent	8	5.3	5.4	15.0
	reject	37	24.3	25.2	40.1
	completely reject	88	57.9	59.9	100.0
	Total	147	96.7	100.0	
Missing	System	5	3.3		
Total		152	100.0		

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

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	strongly support	29	19.1	19.7	19.7
	accept	64	42.1	43.5	63.3
	indifferent	16	10.5	10.9	74.1
	reject	23	15.1	15.6	89.8
	completely reject	15	9.9	10.2	100.0
	Total	147	96.7	100.0	
Missing	System	5	3.3		
Total		152	100.0		

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

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	strongly support	5	3.3	3.5	3.5
	accept	20	13.2	14.1	17.6
	indifferent	19	12.5	13.4	31.0
	reject	54	35.5	38.0	69.0
	completely reject	44	28.9	31.0	100.0
	Total	142	93.4	100.0	
Missing	System	10	6.6		
Total		152	100.0		

- **Licences that have not been used for 5 years should be extinguished**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	strongly support	16	10.5	10.9	10.9
	accept	35	23.0	23.8	34.7
	indifferent	17	11.2	11.6	46.3
	reject	38	25.0	25.9	72.1
	completely reject	41	27.0	27.9	100.0
	Total	147	96.7	100.0	
Missing	System	5	3.3		
Total		152	100.0		

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

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	strongly support	21	13.8	15.1	15.1
	accept	37	24.3	26.6	41.7
	indifferent	42	27.6	30.2	71.9
	reject	27	17.8	19.4	91.4
	completely reject	12	7.9	8.6	100.0
	Total	139	91.4	100.0	
Missing	System	13	8.6		
Total		152	100.0		

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

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	strongly support	16	10.5	11.5	11.5
	accept	31	20.4	22.3	33.8
	indifferent	45	29.6	32.4	66.2
	reject	32	21.1	23.0	89.2
	completely reject	15	9.9	10.8	100.0
	Total	139	91.4	100.0	
Missing	System	13	8.6		
Total		152	100.0		

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

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	strongly support	41	27.0	27.7	27.7
	accept	62	40.8	41.9	69.6
	indifferent	25	16.4	16.9	86.5
	reject	12	7.9	8.1	94.6
	completely reject	8	5.3	5.4	100.0
	Total	148	97.4	100.0	
Missing	System	4	2.6		
Total		152	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	21	13.8	15.0	15.0
	accept	49	32.2	35.0	50.0
	indifferent	36	23.7	25.7	75.7
	reject	21	13.8	15.0	90.7
	completely reject	13	8.6	9.3	100.0
	Total	140	92.1	100.0	
Missing	System	12	7.9		
Total		152	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	18	11.8	13.3	13.3
	accept	31	20.4	23.0	36.3
	indifferent	35	23.0	25.9	62.2
	reject	31	20.4	23.0	85.2
	completely reject	20	13.2	14.8	100.0
	Total	135	88.8	100.0	
Missing	System	17	11.2		
Total		152	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	39	25.7	26.5	26.5
	accept	49	32.2	33.3	59.9
	indifferent	15	9.9	10.2	70.1
	reject	26	17.1	17.7	87.8
	completely reject	18	11.8	12.2	100.0
	Total	147	96.7	100.0	
Missing	System	5	3.3		
Total		152	100.0		

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

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	actively involed and embraced it	5	3.3	3.6	3.6
	well informed and accepting	15	9.9	10.8	14.4
	involved but largely ignored	43	28.3	30.9	45.3
	poorly informed but accepting	42	27.6	30.2	75.5
	poorly informed and unhappy	34	22.4	24.5	100.0
	Total	139	91.4	100.0	
Missing	System	13	8.6		
Total		152	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.	25.93
Distribute water allocations in a fair and just manner.	36.08
Meet the requirements of natural river flow.	27.30
Account for the impact of trading on local towns and communities.	22.70

Your Views on Temporary Water Trading

1. What is the most important reason why <u>other farmers</u> temporarily buy water?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Not meet crop requirements	90	59.2	62.5	62.5
	They need water to meet end of season	41	27.0	28.5	91.0
	other	13	8.6	9.0	100.0
	Total	144	94.7	100.0	
Missing	System	8	5.3		
Total		152	100.0		

2. What is the most important reason why <u>other farmers</u> temporarily sell water?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	They have surplus water	119	78.3	85.0	85.0
	Sell because they could make more by selling	20	13.2	14.3	99.3
	other	1	.7	.7	100.0
	Total	140	92.1	100.0	
Missing	System	12	7.9		
Total		152	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	86	56.6	61.9	61.9
	no	53	34.9	38.1	100.0
	Total	139	91.4	100.0	
Missing	System	13	8.6		
Total		152	100.0		

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

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	yes	33	21.7	23.7	23.7
	no	106	69.7	76.3	100.0
	Total	139	91.4	100.0	
Missing	System	13	8.6		
Total		152	100.0		

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

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	yes	54	35.5	38.8	38.8
	no	85	55.9	61.2	100.0
	Total	139	91.4	100.0	
Missing	System	13	8.6		
Total		152	100.0		

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

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	yes	12	7.9	8.6	8.6
	no	127	83.6	91.4	100.0
	Total	139	91.4	100.0	
Missing	System	13	8.6		
Total		152	100.0		

- **They are philosophically opposed to trading**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	yes	10	6.6	7.2	7.2
	no	129	84.9	92.8	100.0
	Total	139	91.4	100.0	
Missing	System	13	8.6		
Total		152	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	27	17.8	19.4	19.4
	no	112	73.7	80.6	100.0
	Total	139	91.4	100.0	
Missing	System	13	8.6		
Total		152	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	70	46.1	50.0	50.0
	no	70	46.1	50.0	100.0
	Total	140	92.1	100.0	
Missing	System	12	7.9		
Total		152	100.0		

5. If <u>you</u> were 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	60	39.5	44.8	44.8
	no	74	48.7	55.2	100.0
	Total	134	88.2	100.0	
Missing	System	18	11.8		
Total		152	100.0		

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

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	yes	64	42.1	47.8	47.8
	no	70	46.1	52.2	100.0
	Total	134	88.2	100.0	
Missing	System	18	11.8		
Total		152	100.0		

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

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	yes	51	33.6	38.1	38.1
	no	83	54.6	61.9	100.0
	Total	134	88.2	100.0	
Missing	System	18	11.8		
Total		152	100.0		

- **Prior to the next irrigation**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	yes	10	6.6	7.5	7.5
	no	124	81.6	92.5	100.0
	Total	134	88.2	100.0	
Missing	System	18	11.8		
Total		152	100.0		

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

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	yes	32	21.1	23.9	23.9
	no	102	67.1	76.1	100.0
	Total	134	88.2	100.0	
Missing	System	18	11.8		
Total		152	100.0		

6. If <u>you</u> planned to sell water temporarily prior to planting would you:

- **Only sell water surplus to requirements**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	yes	118	77.6	88.1	88.1
	no	16	10.5	11.9	100.0
	Total	134	88.2	100.0	
Missing	System	18	11.8		
Total		152	100.0		

- **Change crops to use less water**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	yes	5	3.3	3.7	3.7
	no	129	84.9	96.3	100.0
	Total	134	88.2	100.0	
Missing	System	18	11.8		
Total		152	100.0		

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

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	yes	7	4.6	5.2	5.2
	no	127	83.6	94.8	100.0
	Total	134	88.2	100.0	
Missing	System	18	11.8		
Total		152	100.0		

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

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	yes	5	3.3	3.7	3.7
	no	129	84.9	96.3	100.0
	Total	134	88.2	100.0	
Missing	System	18	11.8		
Total		152	100.0		

- **Not crop that year**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	yes	7	4.6	5.2	5.2
	no	127	83.6	94.8	100.0
	Total	134	88.2	100.0	
Missing	System	18	11.8		
Total		152	100.0		

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

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

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	strongly agree	76	50.0	53.5	53.5
	agree	59	38.8	41.5	95.1
	uncertain	1	.7	.7	95.8
	disagree	2	1.3	1.4	97.2
	strongly disagree	4	2.6	2.8	100.0
	Total	142	93.4	100.0	
Missing	System	10	6.6		
Total		152	100.0		

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

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	strongly agree	18	11.8	13.3	13.3
	agree	31	20.4	23.0	36.3
	uncertain	24	15.8	17.8	54.1
	disagree	37	24.3	27.4	81.5
	strongly disagree	25	16.4	18.5	100.0
	Total	135	88.8	100.0	
Missing	System	17	11.2		
Total		152	100.0		

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

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	strongly agree	30	19.7	22.9	22.9
	agree	54	35.5	41.2	64.1
	uncertain	18	11.8	13.7	77.9
	disagree	16	10.5	12.2	90.1
	strongly disagree	13	8.6	9.9	100.0
	Total	131	86.2	100.0	
Missing	System	21	13.8		
Total		152	100.0		

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

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	strongly agree	36	23.7	26.3	26.3
	agree	57	37.5	41.6	67.9
	uncertain	10	6.6	7.3	75.2
	disagree	18	11.8	13.1	88.3
	strongly disagree	16	10.5	11.7	100.0
	Total	137	90.1	100.0	
Missing	System	15	9.9		
Total		152	100.0		

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

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	strongly agree	27	17.8	19.7	19.7
	agree	67	44.1	48.9	68.6
	uncertain	17	11.2	12.4	81.0
	disagree	11	7.2	8.0	89.1
	strongly disagree	15	9.9	10.9	100.0
	Total	137	90.1	100.0	
Missing	System	15	9.9		
Total		152	100.0		

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

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	strongly agree	21	13.8	15.3	15.3
	agree	56	36.8	40.9	56.2
	uncertain	17	11.2	12.4	68.6
	disagree	27	17.8	19.7	88.3
	strongly disagree	16	10.5	11.7	100.0
	Total	137	90.1	100.0	
Missing	System	15	9.9		
Total		152	100.0		

- **Local industries who use water**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	strongly agree	25	16.4	18.4	18.4
	agree	71	46.7	52.2	70.6
	uncertain	16	10.5	11.8	82.4
	disagree	15	9.9	11.0	93.4
	strongly disagree	9	5.9	6.6	100.0
	Total	136	89.5	100.0	
Missing	System	16	10.5		
Total		152	100.0		

- **Environmental groups and agencies**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	strongly agree	14	9.2	10.6	10.6
	agree	37	24.3	28.0	38.6
	uncertain	30	19.7	22.7	61.4
	disagree	26	17.1	19.7	81.1
	strongly disagree	25	16.4	18.9	100.0
	Total	132	86.8	100.0	
Missing	System	20	13.2		
Total		152	100.0		

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

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	strongly agree	9	5.9	6.6	6.6
	agree	10	6.6	7.4	14.0
	uncertain	12	7.9	8.8	22.8
	disagree	33	21.7	24.3	47.1
	strongly disagree	72	47.4	52.9	100.0
	Total	136	89.5	100.0	
Missing	System	16	10.5		
Total		152	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	61	40.1	41.8	41.8
	no	85	55.9	58.2	100.0
	Total	146	96.1	100.0	
Missing	System	6	3.9		
Total		152	100.0		

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

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Not meet crop requirements	22	14.5	37.3	37.3
	water to finish crop	3	2.0	5.1	42.4
	water surplus to needs	30	19.7	50.8	93.2
	more by selling	2	1.3	3.4	96.6
	overused entitlement	2	1.3	3.4	100.0
	Total	59	38.8	100.0	
Missing	System	93	61.2		
Total		152	100.0		

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

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	yes	14	9.2	24.1	24.1
	no	44	28.9	75.9	100.0
	Total	58	38.2	100.0	
Missing	System	94	61.8		
Total		152	100.0		

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

Cost	$
Broker fees	150.00
Exchange fees	100.00
Legal fees	0.00
Consultants	0.00
Water Authority fees	139.75
Other	3001.00

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

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	satisfactory	43	28.3	82.7	82.7
	excessive	9	5.9	17.3	100.0
	Total	52	34.2	100.0	
Missing	System	100	65.8		
Total		152	100.0		

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

  11.40 days

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

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	excellent	12	7.9	22.2	22.2
	reasonable	37	24.3	68.5	90.7
	unacceptable	5	3.3	9.3	100.0
	Total	54	35.5	100.0	
Missing	System	98	64.5		
Total		152	100.0		

Your Views on Permanent Water Trading

1. What is the most important reason why <u>other farmers</u> buy water allocations?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	does not meet water requirements	76	50.0	63.9	63.9
	want to develop more land	22	14.5	18.5	82.4
	greater security of supply	21	13.8	17.6	100.0
	Total	119	78.3	100.0	
Missing	System	33	21.7		
Total		152	100.0		

2. What is the most important reason why <u>other farmers</u> sell water allocations?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	surplus to needs	95	62.5	82.6	82.6
	more by sell than crops	3	2.0	2.6	85.2
	dryland farm alternative	1	.7	.9	86.1
	retiring	8	5.3	7.0	93.0
	other	8	5.3	7.0	100.0
	Total	115	75.7	100.0	
Missing	System	37	24.3		
Total		152	100.0		

Your Views on the Impact and Future of Water Trading Authority

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.

Issue

The nature of trade and attitudes of farmers

- **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	22	14.5	15.4	15.4
	agree	48	31.6	33.6	49.0
	uncertain	18	11.8	12.6	61.5
	disagree	32	21.1	22.4	83.9
	strongly disagree	23	15.1	16.1	100.0
	Total	143	94.1	100.0	
Missing	System	9	5.9		
Total		152	100.0		

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

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	strongly agree	4	2.6	2.8	2.8
	agree	5	3.3	3.5	6.4
	uncertain	18	11.8	12.8	19.1
	disagree	42	27.6	29.8	48.9
	strongly disagree	72	47.4	51.1	100.0
	Total	141	92.8	100.0	
Missing	System	11	7.2		
Total		152	100.0		

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

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	strongly agree	23	15.1	16.8	16.8
	agree	54	35.5	39.4	56.2
	uncertain	27	17.8	19.7	75.9
	disagree	27	17.8	19.7	95.6
	strongly disagree	6	3.9	4.4	100.0
	Total	137	90.1	100.0	
Missing	System	15	9.9		
Total		152	100.0		

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

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	strongly agree	21	13.8	15.1	15.1
	agree	75	49.3	54.0	69.1
	uncertain	20	13.2	14.4	83.5
	disagree	17	11.2	12.2	95.7
	strongly disagree	6	3.9	4.3	100.0
	Total	139	91.4	100.0	
Missing	System	13	8.6		
Total		152	100.0		

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

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	strongly agree	1	.7	.7	.7
	agree	6	3.9	4.4	5.1
	uncertain	24	15.8	17.5	22.6
	disagree	65	42.8	47.4	70.1
	strongly disagree	41	27.0	29.9	100.0
	Total	137	90.1	100.0	
Missing	System	15	9.9		
Total		152	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	7	4.6	5.0	5.0
	agree	42	27.6	30.2	35.3
	uncertain	48	31.6	34.5	69.8
	disagree	32	21.1	23.0	92.8
	strongly disagree	10	6.6	7.2	100.0
	Total	139	91.4	100.0	
Missing	System	13	8.6		
Total		152	100.0		

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

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	strongly agree	30	19.7	21.7	21.7
	agree	74	48.7	53.6	75.4
	uncertain	25	16.4	18.1	93.5
	disagree	8	5.3	5.8	99.3
	strongly disagree	1	.7	.7	100.0
	Total	138	90.8	100.0	
Missing	System	14	9.2		
Total		152	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	4	2.6	2.9	2.9
	agree	28	18.4	20.0	22.9
	uncertain	39	25.7	27.9	50.7
	disagree	49	32.2	35.0	85.7
	strongly disagree	20	13.2	14.3	100.0
	Total	140	92.1	100.0	
Missing	System	12	7.9		
Total		152	100.0		

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	31	20.4	23.1	23.1
	agree	69	45.4	51.5	74.6
	uncertain	18	11.8	13.4	88.1
	disagree	11	7.2	8.2	96.3
	strongly disagree	5	3.3	3.7	100.0
	Total	134	88.2	100.0	
Missing	System	18	11.8		
Total		152	100.0		

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

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	strongly agree	20	13.2	14.6	14.6
	agree	66	43.4	48.2	62.8
	uncertain	28	18.4	20.4	83.2
	disagree	14	9.2	10.2	93.4
	strongly disagree	9	5.9	6.6	100.0
	Total	137	90.1	100.0	
Missing	System	15	9.9		
Total		152	100.0		

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

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	strongly agree	5	3.3	3.7	3.7
	agree	18	11.8	13.3	17.0
	uncertain	35	23.0	25.9	43.0
	disagree	61	40.1	45.2	88.1
	strongly disagree	16	10.5	11.9	100.0
	Total	135	88.8	100.0	
Missing	System	17	11.2		
Total		152	100.0		

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

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	strongly agree	5	3.3	3.8	3.8
	agree	20	13.2	15.3	19.1
	uncertain	63	41.4	48.1	67.2
	disagree	29	19.1	22.1	89.3
	strongly disagree	14	9.2	10.7	100.0
	Total	131	86.2	100.0	
Missing	System	21	13.8		
Total		152	100.0		

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

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	strongly agree	11	7.2	8.0	8.0
	agree	57	37.5	41.6	49.6
	uncertain	33	21.7	24.1	73.7
	disagree	23	15.1	16.8	90.5
	strongly disagree	13	8.6	9.5	100.0
	Total	137	90.1	100.0	
Missing	System	15	9.9		
Total		152	100.0		

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

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	strongly agree	14	9.2	10.2	10.2
	agree	20	13.2	14.6	24.8
	uncertain	42	27.6	30.7	55.5
	disagree	43	28.3	31.4	86.9
	strongly disagree	18	11.8	13.1	100.0
	Total	137	90.1	100.0	
Missing	System	15	9.9		
Total		152	100.0		

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

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	strongly agree	11	7.2	8.1	8.1
	agree	15	9.9	11.0	19.1
	uncertain	29	19.1	21.3	40.4
	disagree	60	39.5	44.1	84.6
	strongly disagree	21	13.8	15.4	100.0
	Total	136	89.5	100.0	
Missing	System	16	10.5		
Total		152	100.0		

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

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	strongly agree	3	2.0	2.2	2.2
	agree	13	8.6	9.4	11.6
	uncertain	19	12.5	13.8	25.4
	disagree	78	51.3	56.5	81.9
	strongly disagree	25	16.4	18.1	100.0
	Total	138	90.8	100.0	
Missing	System	14	9.2		
Total		152	100.0		

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

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	strongly agree	22	14.5	15.9	15.9
	agree	39	25.7	28.3	44.2
	uncertain	32	21.1	23.2	67.4
	disagree	35	23.0	25.4	92.8
	strongly disagree	10	6.6	7.2	100.0
	Total	138	90.8	100.0	
Missing	System	14	9.2		
Total		152	100.0		

- **Significantly increase salinity in your region**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	strongly agree	6	3.9	4.3	4.3
	agree	9	5.9	6.5	10.8
	uncertain	35	23.0	25.2	36.0
	disagree	63	41.4	45.3	81.3
	strongly disagree	26	17.1	18.7	100.0
	Total	139	91.4	100.0	
Missing	System	13	8.6		
Total		152	100.0		

3. 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	17	11.2	13.5	13.5
	compensate low channel	4	2.6	3.2	16.7
	exit fees	19	12.5	15.1	31.7
	compensate and close	6	3.9	4.8	36.5
	restrict trade	80	52.6	63.5	100.0
	Total	126	82.9	100.0	
Missing	System	26	17.1		
Total		152	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?

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

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	strongly agree	51	33.6	36.4	36.4
	agree	63	41.4	45.0	81.4
	uncertain	4	2.6	2.9	84.3
	disagree	14	9.2	10.0	94.3
	strongly disagree	8	5.3	5.7	100.0
	Total	140	92.1	100.0	
Missing	System	12	7.9		
Total		152	100.0		

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

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	strongly agree	45	29.6	32.1	32.1
	agree	76	50.0	54.3	86.4
	uncertain	12	7.9	8.6	95.0
	disagree	6	3.9	4.3	99.3
	strongly disagree	1	.7	.7	100.0
	Total	140	92.1	100.0	
Missing	System	12	7.9		
Total		152	100.0		

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

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	strongly agree	30	19.7	21.7	21.7
	agree	88	57.9	63.8	85.5
	uncertain	7	4.6	5.1	90.6
	disagree	11	7.2	8.0	98.6
	strongly disagree	2	1.3	1.4	100.0
	Total	138	90.8	100.0	
Missing	System	14	9.2		
Total		152	100.0		

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

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	strongly agree	33	21.7	23.7	23.7
	agree	66	43.4	47.5	71.2
	uncertain	20	13.2	14.4	85.6
	disagree	16	10.5	11.5	97.1
	strongly disagree	4	2.6	2.9	100.0
	Total	139	91.4	100.0	
Missing	System	13	8.6		
Total		152	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	35	23.0	25.4	25.4
	agree	78	51.3	56.5	81.9
	uncertain	15	9.9	10.9	92.8
	disagree	8	5.3	5.8	98.6
	strongly disagree	2	1.3	1.4	100.0
	Total	138	90.8	100.0	
Missing	System	14	9.2		
Total		152	100.0		

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

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	strongly agree	20	13.2	14.7	14.7
	agree	50	32.9	36.8	51.5
	uncertain	26	17.1	19.1	70.6
	disagree	31	20.4	22.8	93.4
	strongly disgree	9	5.9	6.6	100.0
	Total	136	89.5	100.0	
Missing	System	16	10.5		
Total		152	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	50	32.9	35.7	35.7
	agree	70	46.1	50.0	85.7
	uncertain	8	5.3	5.7	91.4
	disagree	5	3.3	3.6	95.0
	stronly disagree	7	4.6	5.0	100.0
	Total	140	92.1	100.0	
Missing	System	12	7.9		
Total		152	100.0		

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

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	strongly agree	34	22.4	24.3	24.3
	agree	51	33.6	36.4	60.7
	uncertain	13	8.6	9.3	70.0
	disagree	27	17.8	19.3	89.3
	strongly disagree	15	9.9	10.7	100.0
	Total	140	92.1	100.0	
Missing	System	12	7.9		
Total		152	100.0		

- **The traders allocations and crop mix**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	strongly agree	23	15.1	16.4	16.4
	agree	39	25.7	27.9	44.3
	uncertain	28	18.4	20.0	64.3
	disagree	32	21.1	22.9	87.1
	strongly disagree	18	11.8	12.9	100.0
	Total	140	92.1	100.0	
Missing	System	12	7.9		
Total		152	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 allocation	Hypothetical impact on the riverine environment	Rank
0%	Irreversible habitat degradation	3.13
20%	Habitat degradation, reversibility unknown	2.31
30%	Reversible habitat degradation	1.95
40%	No habitat degradation	2.50

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	35	23.0	25.4	25.4
	disagree	19	12.5	13.8	39.1
	do not know	10	6.6	7.2	46.4
	agree	37	24.3	26.8	73.2
	strongly agree	37	24.3	26.8	100.0
	Total	138	90.8	100.0	
Missing	System	14	9.2		
Total		152	100.0		

Information About Yourself

1. Do you have on-farm water storage?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	yes	66	43.4	47.1	47.1
	no	74	48.7	52.9	100.0
	Total	140	92.1	100.0	
Missing	System	12	7.9		
Total		152	100.0		

2. Do you generate most of your income from irrigated crops?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	yes	59	38.8	42.4	42.4
	no	80	52.6	57.6	100.0
	Total	139	91.4	100.0	
Missing	System	13	8.6		
Total		152	100.0		

3. What age group does the farm manager belong to?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	25-34	12	7.9	8.5	8.5
	35-44	33	21.7	23.2	31.7
	45-54	48	31.6	33.8	65.5
	55-64	38	25.0	26.8	92.3
	65-74	10	6.6	7.0	99.3
	75 and over	1	.7	.7	100.0
	Total	142	93.4	100.0	
Missing	System	10	6.6		
Total		152	100.0		

THANK YOU VERY MUCH

If you would like a copy of the study results please tick the YES box in the following form. We are also planning to develop alternative sets of trading rules and procedures and ask representative farmers to participate in some market simulations. Conducting simulations of water markets with potential traders and real trading rules will help to gain insights into how well water policies will work on the ground. If you would be prepared to participate in such a study please tick the YES box on the following form.

1. Please forward a summary of the results of the survey on community attitudes on water trading.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	yes	109	71.7	85.2	85.2
	no	19	12.5	14.8	100.0
	Total	128	84.2	100.0	
Missing	System	24	15.8		
Total		152	100.0		

2. I am interested in participating in the simulations and experiments of trading in water markets.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	yes	40	26.3	40.0	40.0
	no	60	39.5	60.0	100.0
	Total	100	65.8	100.0	
Missing	System	52	34.2		
Total		152	100.0		

Appendix B.

Frequency tables arising from the survey of community members of the Fitzroy 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	120	71.9	80.0	80.0
	no	30	18.0	20.0	100.0
	Total	150	89.8	100.0	
Missing	System	17	10.2		
Total		167	100.0		

Note: 'Missing System' signifies non-response to question.

2. Overall, during the water reform process the community at large has been:
Please place a tick in the box next to the answer of your choice.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	well informed and accepting	10	6.0	6.6	6.6
	involved but largely ignored	18	10.8	11.9	18.5
	poorly informed but accepting	88	52.7	58.3	76.8
	poorly informed and unhappy	35	21.0	23.2	100.0
	Total	151	90.4	100.0	
Missing	System	16	9.6		
Total		167	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	18	10.8	11.8	11.8
	accept	47	28.1	30.9	42.8
	indifferent	19	11.4	12.5	55.3
	reject	39	23.4	25.7	80.9
	completely reject	29	17.4	19.1	100.0
	Total	152	91.0	100.0	
Missing	System	15	9.0		
Total		167	100.0		

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

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	strongly support	23	13.8	15.2	15.2
	accept	27	16.2	17.9	33.1
	indifferent	23	13.8	15.2	48.3
	reject	40	24.0	26.5	74.8
	completely reject	38	22.8	25.2	100.0
	Total	151	90.4	100.0	
Missing	System	16	9.6		
Total		167	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	46	27.5	29.9	29.9
	accept	57	34.1	37.0	66.9
	indifferent	13	7.8	8.4	75.3
	reject	28	16.8	18.2	93.5
	completely reject	10	6.0	6.5	100.0
	Total	154	92.2	100.0	
Missing	System	13	7.8		
Total		167	100.0		

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

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	strongly support	28	16.8	18.4	18.4
	accept	44	26.3	28.9	47.4
	indifferent	26	15.6	17.1	64.5
	reject	36	21.6	23.7	88.2
	completely reject	18	10.8	11.8	100.0
	Total	152	91.0	100.0	
Missing	System	15	9.0		
Total		167	100.0		

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

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	strongly support	36	21.6	23.5	23.5
	accept	54	32.3	35.3	58.8
	indifferent	27	16.2	17.6	76.5
	reject	24	14.4	15.7	92.2
	completely reject	12	7.2	7.8	100.0
	Total	153	91.6	100.0	
Missing	System	14	8.4		
Total		167	100.0		

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

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	strongly support	68	40.7	43.6	43.6
	accept	61	36.5	39.1	82.7
	indifferent	15	9.0	9.6	92.3
	reject	7	4.2	4.5	96.8
	completely reject	5	3.0	3.2	100.0
	Total	156	93.4	100.0	
Missing	System	11	6.6		
Total		167	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	45	26.9	29.0	29.0
	accept	76	45.5	49.0	78.1
	indifferent	16	9.6	10.3	88.4
	reject	14	8.4	9.0	97.4
	completely reject	4	2.4	2.6	100.0
	Total	155	92.8	100.0	
Missing	System	12	7.2		
Total		167	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	16.8	18.4	18.4
	accept	63	37.7	41.4	59.9
	indifferent	32	19.2	21.1	80.9
	reject	26	15.6	17.1	98.0
	completely reject	3	1.8	2.0	100.0
	Total	152	91.0	100.0	
Missing	System	15	9.0		
Total		167	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	41	24.6	26.6	26.6
	accept	63	37.7	40.9	67.5
	indifferent	17	10.2	11.0	78.6
	reject	26	15.6	16.9	95.5
	completely reject	7	4.2	4.5	100.0
	Total	154	92.2	100.0	
Missing	System	13	7.8		
Total		167	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	19.02
Distribute water entitlements in a fair and just manner	30.51
Meet the requirements of natural river flow	37.58
Account for the impact of trading on local towns and communities	22.95

5. 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	20	12.0	13.2	13.2
	agree	88	52.7	57.9	71.1
	uncertain	25	15.0	16.4	87.5
	disagree	11	6.6	7.2	94.7
	strongly disagree	8	4.8	5.3	100.0
	Total	152	91.0	100.0	
Missing	System	15	9.0		
Total		167	100.0		

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

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	strongly agree	5	3.0	3.3	3.3
	agree	54	32.3	35.8	39.1
	uncertain	45	26.9	29.8	68.9
	disagree	31	18.6	20.5	89.4
	strongly disagree	16	9.6	10.6	100.0
	Total	151	90.4	100.0	
Missing	System	16	9.6		
Total		167	100.0		

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

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	strongly agree	15	9.0	9.8	9.8
	agree	85	50.9	55.6	65.4
	uncertain	34	20.4	22.2	87.6
	disagree	13	7.8	8.5	96.1
	strongly disagree	6	3.6	3.9	100.0
	Total	153	91.6	100.0	
Missing	System	14	8.4		
Total		167	100.0		

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

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	strongly agree	3	1.8	2.0	2.0
	agree	44	26.3	29.1	31.1
	uncertain	41	24.6	27.2	58.3
	disagree	42	25.1	27.8	86.1
	strongly disagree	21	12.6	13.9	100.0
	Total	151	90.4	100.0	
Missing	System	16	9.6		
Total		167	100.0		

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

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	strongly agree	38	22.8	24.7	24.7
	agree	76	45.5	49.4	74.0
	uncertain	24	14.4	15.6	89.6
	disagree	10	6.0	6.5	96.1
	strongly disagree	6	3.6	3.9	100.0
	Total	154	92.2	100.0	
Missing	System	13	7.8		
Total		167	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	18	10.8	11.8	11.8
	agree	75	44.9	49.0	60.8
	uncertain	29	17.4	19.0	79.7
	disagree	19	11.4	12.4	92.2
	strongly disagree	12	7.2	7.8	100.0
	Total	153	91.6	100.0	
Missing	System	14	8.4		
Total		167	100.0		

- **Local industries who use water**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	strongly agree	18	10.8	11.8	11.8
	agree	90	53.9	59.2	71.1
	uncertain	24	14.4	15.8	86.8
	disagree	12	7.2	7.9	94.7
	strongly disagree	8	4.8	5.3	100.0
	Total	152	91.0	100.0	
Missing	System	15	9.0		
Total		167	100.0		

- **Environmental groups and agencies**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	strongly agree	19	11.4	12.4	12.4
	agree	66	39.5	43.1	55.6
	uncertain	33	19.8	21.6	77.1
	disagree	21	12.6	13.7	90.8
	strongly disagree	14	8.4	9.2	100.0
	Total	153	91.6	100.0	
Missing	System	14	8.4		
Total		167	100.0		

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

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	strongly agree	2	1.2	1.3	1.3
	agree	22	13.2	14.3	15.6
	uncertain	33	19.8	21.4	37.0
	disagree	45	26.9	29.2	66.2
	strongly disagree	52	31.1	33.8	100.0
	Total	154	92.2	100.0	
Missing	System	13	7.8		
Total		167	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	25	15.0	16.7	16.7
	agree	73	43.7	48.7	65.3
	uncertain	34	20.4	22.7	88.0
	disagree	17	10.2	11.3	99.3
	strongly disagree	1	.6	.7	100.0
	Total	150	89.8	100.0	
Missing	System	17	10.2		
Total		167	100.0		

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

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	strongly agree	26	15.6	17.3	17.3
	agree	76	45.5	50.7	68.0
	uncertain	34	20.4	22.7	90.7
	disagree	9	5.4	6.0	96.7
	strongly disagree	5	3.0	3.3	100.0
	Total	150	89.8	100.0	
Missing	System	17	10.2		
Total		167	100.0		

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

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	strongly agree	21	12.6	14.2	14.2
	agree	56	33.5	37.8	52.0
	uncertain	43	25.7	29.1	81.1
	disagree	20	12.0	13.5	94.6
	strongly disagree	8	4.8	5.4	100.0
	Total	148	88.6	100.0	
Missing	System	19	11.4		
Total		167	100.0		

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

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	strongly agree	16	9.6	10.6	10.6
	agree	59	35.3	39.1	49.7
	uncertain	58	34.7	38.4	88.1
	disagree	14	8.4	9.3	97.4
	strongly disagree	4	2.4	2.6	100.0
	Total	151	90.4	100.0	
Missing	System	16	9.6		
Total		167	100.0		

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

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	strongly agree	8	4.8	5.3	5.3
	agree	29	17.4	19.3	24.7
	uncertain	62	37.1	41.3	66.0
	disagree	37	22.2	24.7	90.7
	strongly disagree	14	8.4	9.3	100.0
	Total	150	89.8	100.0	
Missing	System	17	10.2		
Total		167	100.0		

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

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	strongly agree	51	30.5	33.3	33.3
	agree	40	24.0	26.1	59.5
	uncertain	36	21.6	23.5	83.0
	disagree	19	11.4	12.4	95.4
	strongly disagree	7	4.2	4.6	100.0
	Total	153	91.6	100.0	
Missing	System	14	8.4		
Total		167	100.0		

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

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	strongly agree	20	12.0	13.2	13.2
	agree	32	19.2	21.1	34.2
	uncertain	51	30.5	33.6	67.8
	disagree	37	22.2	24.3	92.1
	strongly disagree	12	7.2	7.9	100.0
	Total	152	91.0	100.0	
Missing	System	15	9.0		
Total		167	100.0		

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

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	strongly agree	43	25.7	28.5	28.5
	agree	43	25.7	28.5	57.0
	uncertain	29	17.4	19.2	76.2
	disagree	18	10.8	11.9	88.1
	strongly disagree	18	10.8	11.9	100.0
	Total	151	90.4	100.0	
Missing	System	16	9.6		
Total		167	100.0		

- **Significantly increase salinity in your region**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	strongly agree	24	14.4	15.7	15.7
	agree	34	20.4	22.2	37.9
	uncertain	64	38.3	41.8	79.7
	disagree	20	12.0	13.1	92.8
	strongly disagree	11	6.6	7.2	100.0
	Total	153	91.6	100.0	
Missing	System	14	8.4		
Total		167	100.0		

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

- **School and education opportunities**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Decline	11	6.6	8.1	8.1
		2	1.2	1.5	9.6
	No Change	116	69.5	85.3	94.9
		1	.6	.7	95.6
	Increase	6	3.6	4.4	100.0
	Total	136	81.4	100.0	
Missi	System	31	18.6		
Total		167	100.0		

- **Crime and disorderly behaviour**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Decline	6	3.6	4.5	4.5
		2	1.2	1.5	6.0
	No Change	119	71.3	88.8	94.8
		1	.6	.7	95.5
	Increase	6	3.6	4.5	100.0
	Total	134	80.2	100.0	
Missin	System	33	19.8		
Total		167	100.0		

- **Closures of small businesses**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Decline	9	5.4	6.6	6.6
		2	1.2	1.5	8.1
	No Change	101	60.5	74.3	82.4
		3	1.8	2.2	84.6
	Increase	21	12.6	15.4	100.0
	Total	136	81.4	100.0	
Missing	System	31	18.6		
Total		167	100.0		

- **Hospital facilities and services**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Decline	8	4.8	5.9	5.9
		1	.6	.7	6.6
	No Change	118	70.7	86.8	93.4
		1	.6	.7	94.1
	Increase	8	4.8	5.9	100.0
	Total	136	81.4	100.0	
Missing	System	31	18.6		
Total		167	100.0		

- **Town real estate values**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Decrease	20	12.0	14.7	14.7
		1	.6	.7	15.4
	No Change	100	59.9	73.5	89.0
		4	2.4	2.9	91.9
	Increase	11	6.6	8.1	100.0
	Total	136	81.4	100.0	
Missing	System	31	18.6		
Total		167	100.0		

- **Banking facilities**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Decrease	17	10.2	12.5	12.5
		2	1.2	1.5	14.0
	No Change	114	68.3	83.8	97.8
	Increase	3	1.8	2.2	100.0
	Total	136	81.4	100.0	
Missing	System	31	18.6		
Total		167	100.0		

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

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Decrease	23	13.8	17.0	17.0
		4	2.4	3.0	20.0
	No Change	80	47.9	59.3	79.3
		2	1.2	1.5	80.7
	Increase	26	15.6	19.3	100.0
	Total	135	80.8	100.0	
Missing	System	32	19.2		
Total		167	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	72	43.1	46.8	46.8
	agree	70	41.9	45.5	92.2
	uncertain	9	5.4	5.8	98.1
	disagree	1	.6	.6	98.7
	strongly disagree	2	1.2	1.3	100.0
	Total	154	92.2	100.0	
Missing	System	13	7.8		
Total		167	100.0		

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

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	strongly agree	82	49.1	52.9	52.9
	agree	57	34.1	36.8	89.7
	uncertain	13	7.8	8.4	98.1
	disagree	2	1.2	1.3	99.4
	strongly disagree	1	.6	.6	100.0
	Total	155	92.8	100.0	
Missing	System	12	7.2		
Total		167	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	79	47.3	51.6	51.6
	agree	65	38.9	42.5	94.1
	uncertain	7	4.2	4.6	98.7
	disagree	2	1.2	1.3	100.0
	Total	153	91.6	100.0	
Missing	System	14	8.4		
Total		167	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	3.30
20%	Habitat degradation, reversibility unknown	2.61
30%	Reversible habitat degradation	2.10
40%	No habitat degradation	2.05

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	46	27.5	28.9	28.9
	disagree	24	14.4	15.1	44.0
	do not know	31	18.6	19.5	63.5
	agree	37	22.2	23.3	86.8
	strongly agree	21	12.6	13.2	100.0
	Total	159	95.2	100.0	
Missing	System	8	4.8		
Total		167	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	5	3.0	3.1	3.1
	25-34	29	17.4	17.9	21.0
	35-44	48	28.7	29.6	50.6
	45-54	29	17.4	17.9	68.5
	55-64	20	12.0	12.3	80.9
	65-74	19	11.4	11.7	92.6
	75 and over	12	7.2	7.4	100.0
	Total	162	97.0	100.0	
Missing	System	5	3.0		
Total		167	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	94	56.3	70.1	70.1
	no	40	24.0	29.9	100.0
	Total	134	80.2	100.0	
Missing	System	33	19.8		
Total		167	100.0		