E. Financial Incentive Scheme

Overall details about the Financial Incentive Scheme were contained in a response by the Minister for Natural resources and Mines (Mr Robertson) to a question on notice by Mr Copeland asked on 27th February 2003. This was prior to the end of the FIS program but provides detailed statistics to that point. Information about the specific Industry Financial Incentive Scheme figures later in this report may vary a little to these figures based on the date from when the figures were collated in each case.

Applications and approvals/rejections by industry

Cotton and Grains Industry	Approved Applications	Rejected Applications
Regions:		
Atherton Tablelands	8	2
Border Rivers (Stanthorpe/Goondiwindi)	30	0
Bundaberg	1	0
Burdekin/Bowen/Charters Towers	4	4
Darling Downs	245	4
Emerald (Incl. Mackenzie)	112	0
Lockyer/Fassifern Valley	21	0
Others	1	
Mackay/Proserpine	8	2
Rockhampton/Callide & Dawson	89	0
SEQ-Nambour to NSW Border	5	0
St George/Dirranbandi	44	0
Tully/Innisfail		
Widebay/Burnett	20	0
Total	**588**	**12**

Dairy, Lucerne and Pasture Industry	Approved Applications	Rejected Applications
Regions:		
Atherton Tablelands	34	1
Border Rivers (Stanthorpe/Goondiwindi)	48	1
Bundaberg	9	0
Burdekin/Bowen/Charters Towers	6	1
Darling Downs	122	5
Emerald (Incl. Mackenzie)	3	0
Isis/Maryborough	5	4
Lockyer/Fassifern Valley	74	0
Mackay/Proserpine	5	0
Rockhampton/Callide & Dawson	47	2
SEQ-Nambour to NSW Border	245	17
St George/Dirranbandi	3	0
Tully/Innisfail		
Widebay/Burnett	98	2
Total	**699**	**33**

Fruit and Vegetable Industry	Approved Applications	Rejected Applications
Regions:		
Atherton Tablelands	134	1
Border Rivers (Stanthorpe/Goondiwindi)	124	3
Bundaberg	159	2
Burdekin/Bowen/Charters Towers	124	1
Darling Downs	85	4
Emerald (Incl. Mackenzie)	11	0
Isis/Maryborough	36	3
Lockyer/Fassifern Valley	163	0
Mackay/Proserpine	36	0
Rockhampton/Callide & Dawson	75	1
SEQ-Nambour To NSW Border	213	6
St George/Dirranbandi	9	0
Tully/Innisfail	122	2
Widebay/Burnett	147	1
Total	**1,438**	**24**

Sugar Industry	Approved Applications	*Rejected Applications
Regions:		
Atherton Tablelands	90	
Border Rivers (Stanthorpe/Goondiwindi)		
Bundaberg	375	
Burdekin/Bowen/Charters Towers	433	
Darling Downs		
Emerald (Incl. Mackenzie)		
Isis/Maryborough	219	
Lockyer/Fassifern Valley		
Mackay/Proserpine	776	
Rockhampton/Callide & Dawson		
SEQ-Nambour To NSW Border		
St George/Dirranbandi		
Tully/Innisfail		
Widebay/Burnett		
Total	**1,893**	**10**

**The Regional breakdown of rejected applications for sugar was unavailable.*

The reply noted that…*the Government to date has contributed $10.5 million, to the FIS element of the RWUEI, with matching investment from landholders being $31.42 million. For every one dollar Government has invested, the return* [or rather the level of additional industry funding attracted] *has been three dollars from landholders. This figure is as at 3rd March 2003, and the figure is subject to increase by 30 June 2003, as all approved applications have not been paid as at 3rd March 2003.*

The financial incentives spent by approved and paid growers to the 3rd March 2003 were also provided as below.

	Financial investment spent by approved and paid growers in each industry area by approved and paid growers (excluding government contribution)			
Regions:	Cotton ($)	Dairy, Lucerne And Pasture Industry ($)	Fruit And Vegetable Industry ($)	Sugar Industry ($)
Atherton Tablelands	98,872.00	295,140.91	636,837.62	3,970,306
Border Rivers (Stanthorpe/ Goondiwindi)	379,377.44	357,927.99	716,690.06	
Bundaberg	2,158.45	28,185.78	966,183.92	2,107,518
Burdekin/Bowen/ Charters Towers	8,650.74	133,107.46	344,511.34	1,787,425
Darling Downs	1,922,045.99	1,043,060.33	377,052.61	
Emerald (Incl. Mackenzie)	698,869.19	90,617.82	41,256.18	
Isis/Maryborough		29,401.93	91,707.80	1,958,912
Lockyer/ Fassifern Valley	79,504.16	518,436.46	1,440,119.48	
Others	1,463.64			
Mackay/ Proserpine	202,151.00	7,624.06	65,825.06	4,732,341
Rockhampton/ Callide & Dawson	438,560.99	452,748.73	251,543.78	
SEQ-Nambour To NSW Border	88,893.37	1,389,876.58	858,681.66	
St George/ Dirranbandi	370,888.27	6,084.00	28,951.34	
Tully/Innisfail			507,047.34	
Widebay/Burnett	63,430.75	1,197,721.70	630,478.14	
Total	**$4,354,865.99**	**$5,549,933.75**	**$6,956,886.33**	**$14,556,502**

It was noted that there were 318 applications in total on the waiting list for all four industries and that…*arrangements have been made for the industry partners to retain funds for the adoption's program to help support the phase 4 of the Financial Incentive Scheme post June 2003*

F. Summary and Analysis of RWUEI Grower Survey 2003

Kerry Bell, August 2003

This survey was part of the final evaluation process of the RWUEI Adoption Program. The survey was mailed to approximately 625 growers over the four major industries (Cotton/ Grains, Dairy/Lucerne, Horticulture and Sugar). The survey was administered by CMT Pty Ltd, whose role was to mail out surveys, follow up with phone calls and enter the mail or telephone results in an electronic form.

The selection of growers to complete the survey was done either by the industry contacts sending grower lists for selection taken at random (Cotton/Grains, Lucerne), or random numbers were generated for the industry to select the growers from their lists (Horticulture, Dairy), or the industry contact randomly selecting the growers from their list (Sugar).

The industries were sampled at different rates, related to the total number of growers in each industry. The Sugar and Horticulture industries had the largest numbers of growers (about 3000 each) and were sampled at 6.7% and 5.7% respectively, to achieve approximately 200 growers per industry. The Cotton/Grains industry had approximately 450 growers and was sampled at 16.7% to achieve approximately 75 growers in the sample. The Dairy/Lucerne industry had approximately 1010 growers and was sampled at 14.9% to achieve approximately 150 growers in the sample.

The growers were randomly selected proportionately across the respective regions for each industry.

Summary of responses

There were 238 recorded contacts with growers across the four industries, resulting in 204 completed or partially completed surveys. Thirty of the growers reported that they didn't irrigate and four of the growers who irrigate did not complete the survey. There were 76 (72 telephoned + 4 mailed/faxed) growers who declined to complete the survey.

Table: Number of responses across industry grower lists.

	Grower irrigates		Grower doesn't irrigate	Total
Industry grower list	**Answered Survey**	**Didn't answer survey**		
Sugar	66	2	4	72
Cotton / Grains	32	2	3	37
Lucerne	19		3	22
Dairy	28		1	29
Horticulture	59		19	78
Total	**204**	**4**	**30**	**238**

{Need

- initial numbers actually used
- determine response rates}

The industry grower lists did not necessarily reflect the main income of each grower. The table below shows the number of growers across the industry lists and the reported main income.

Table: The number of growers who answered the survey across industry grower lists and the main industry income reported by grower.

	Main income						
Industry Group	Sugar	Cotton/ Grains	Lucerne	Dairy	Horticulture	Other	Total
Sugar	**59**		2		3	3	67
Cotton / Grains		**28**	1		1	2	32
Lucerne Growers		1	**13**		1	4	19
Dairy			1	**27**			28
Horticulture	9	1	1	3	**42**	2	58
Total	68	30	18	30	47	11	204
% Growers in appropriate industry group list	87%	93%	72%	90%	89%		

Statistics

The statistical analyses used in this report are:

- A chi-square analysis for testing for independence, based on a contingency table. This was applied to count data to assess whether the distribution of results varies across different levels (for example, main income groups).
- One-way or two-way analyses of variance on continuous measures and rating scales from one to ten. This rating scale was considered broad enough to satisfy the assumptions of normality necessary for an analysis of variance. If the F-test in the analysis of variance was significant, then the least significant difference (lsd) test was used for pair-wise comparisons of that term.

The level of significance was set at 5% for all tests.

Summary of survey questions

Q1. Could you please confirm that you use irrigation on your farm?

Only those who confirmed they used irrigation on their farm and answered the survey were used in the following summary, giving a total of 204 responses.

Q2. What region are you in?

	Main Income						
Region	**Sugar**	**Cotton / Grains**	**Lucerne**	**Dairy**	**Horticulture**	**Other**	**Total**
Atherton Tablelands	5		1	3	4	1	14
Border Rivers		3	3			1	7
Bundaberg	4	1			7	1	13
Burdekin/Bowen/Charters Towers	10			1	1		12
Central Queensland		1					1
Darling Downs		9	1	4		1	15
Emerald (including Mackenzie)		4			1		5
Isis/Maryborough	14				2	1	17
Lockyer/Fassifern Valley		1	3	2	1	1	8
Mackay/Proserpine	33		1			2	36
Rockhampton, Callide and Dawson		4	2	3	5	1	14
South East Queensland (Nambour to NSW border)			2	6	12		20
St George/Dirranbandi		7			1	1	9
Tully/Innisfail	2				5		7
Wide Bay/Burnett			4	11	7	1	23
Not provided			1		1	1	3
Total	**68**	**30**	**18**	**30**	**47**	**11**	**204**

Q3. What is the total area of irrigated land in hectares which you farm in an "average" year?

Irrigation area was provided by all but three growers who irrigate. The cotton growers had the largest average irrigated area.

Assuming that the sample of respondents received is representative of the larger industry populations, then the total irrigated area is estimated to be 458200 ha (158*2900) for sugar, ?? ha (585*) for cotton/grains, 36900 ha (82*450) for lucerne, 39200 ha (70*560) for dairy and 334115 ha (95*3517) horticulture. *This is based on the industry group's grower lists* rather than main income. {multiply the average area by # irrigators}

Industry Group List	Sum of irrigation area (ha)	Number of respondents	Average area of irrigation per grower (ha/ grower)
Sugar	10448	66	158
Cotton / Grains	18125	31	585
Lucerne	1557	19	82
Dairy	1893	27	70
Horticulture	3801	58	66
Total	**35824**	**201**	**178**

The following table shows the area of irrigated land across the main income groups (nominated by the growers themselves as their major irrigation crop).

Main Income	Sum of irrigation area (ha)	Number of respondents	Average area of irrigation per grower (ha/grower)
Sugar	12189	68	179
Cotton / Grains	16853	30	562
Lucerne	1308	18	73
Dairy	2021	29	70
Horticulture	1987	47	42
Other	1466	9	163
Grand Total	**35824**	**201**	**178**

Q4. Can you please indicate the total amount of irrigated water in Megalitres that you would use over a 12 month period in an "average" year?

The respondents were given a choice of stating whether their estimate was based on having a water meter or on a best estimate. Most of the responses were reported in one of these categories, but nine respondents were reported in both of these categories and two in neither of these categories.

	Basis of estimate unknown		Based on water meter		Based on best estimate		Based on maximum estimate	
Main Income	Sum of Ml	# respondents	Sum of Ml	# respond-ents	Sum of Ml	# respond-ents	Sum of Ml	# respondents
Sugar	625	2	33909	30	21991	35	69715	62
Cotton / Grains			67340	10	83170	20	149280	27
Lucerne			2813	8	1189	8	3854	15
Dairy			3650	12	3180	13	6830	25
Horticulture			5510	12	1356	24	6761	34
Other			520	3	6093	6	7613	10
Total	**625**	**2**	**113742**	**75**	**116978**	**106**	244053	**173**
Average per grower	313		1694		1104		1411	

It was unclear when more than one estimate was given what was meant in terms of an estimation of the amount of irrigation water used in a 12 month period. It was assumed the maximum estimate was the best estimate, and these results were reported in the last columns in the above table. The average amounts of irrigation water used per irrigator (based on the maximum amount) for the grower lists were 649 ML for Sugar, 5587 ML for Cotton, 285 ML for Lucerne, 273 ML for Dairy, 839 ML for Horticulture and 1411 ML across all the stated industries.

The average irrigation water used over 12 months in an "average" year per area of irrigated land was calculated two ways. Firstly, by calculating the ML/ha for each respondent and then averaging these values, and secondly by taking the total ML and dividing by the total irrigation area. The first method gives an equal weighting to respondents regardless of the size of their irrigation area. The second method reflects water usage of industries as a whole, and is more influenced by respondents with larger irrigation areas.

Main Income	Average of irrigation water used divided by irrigation area per respondent (ML/ha)	# respondents	Total irrigation water used for an 'average'12 months divided by total irrigation area (ML/ha)
Sugar	4.1	61	4.7
Cotton / Grains	8.6	28	9.3
Lucerne	3.5	15	3.4
Dairy	5.3	25	3.7
Horticulture	3.6	34	3.8
Other	4.0	9	4.5
Grand Total	**4.8**	**172**	**6.8**

Q5. From which one of the following agricultural industry areas would you obtain most of your income?

Please see earlier information.

Q5a. From what other agricultural industry areas do you derive income?

There were 83 respondents (41%) who specified another income across the industries. The individual percentages of respondents who specified another income across industries were: 32% for Sugar, 34% for Cotton/Grains, 72% for Lucerne, 37% for Dairy and 43% for Horticulture.

Main Income	Sugar	Cotton	Grains	Lucerne	Dairy	Horticulture	Other
Sugar			2			13	9
Cotton / Grains				1		1	10
Lucerne			10			4	6
Dairy			3	3			7
Horticulture	5	1	2	3	1		8
Other	2	1	2	2		2	1
Total	**7**	**2**	**19**	**9**	**1**	**19**	**42**

Q6. Please tell us whether you are aware of any of the following programs prior to receiving information in this survey.

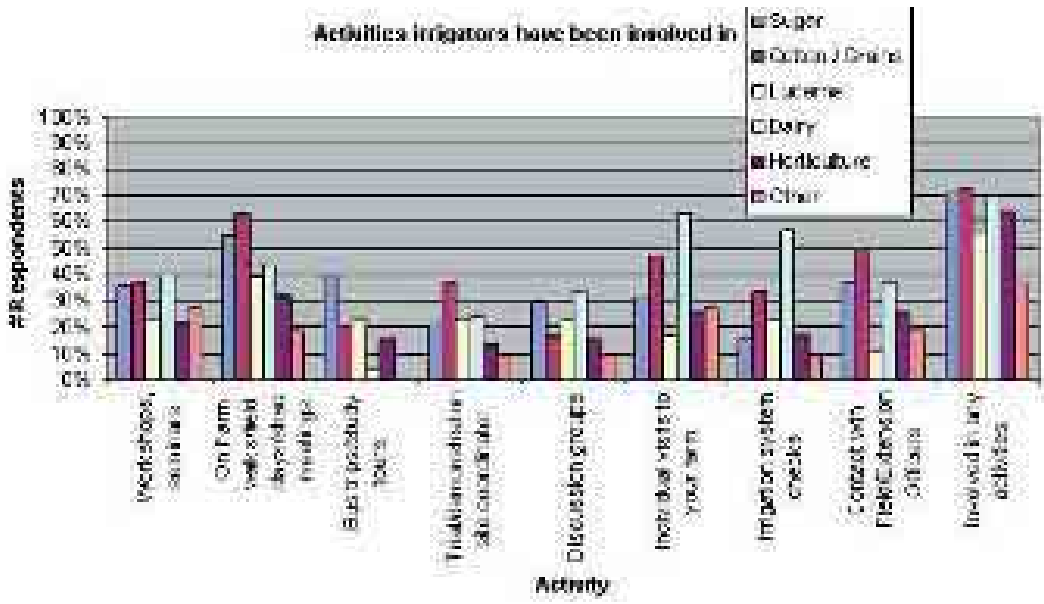
The table below reports the percentage of respondents who answered 'Yes' to being aware of the programs. The total number of respondents who answered the question (yes, no or unsure) is shown in brackets.

Main Income	Water for Profit	Irrigation for Profit	RWUEI	Any of the programs
Sugar	47.9% (N=48)	35.6% (N=45)	92.3% (N=65)	93.9% (N=66)
Cotton / Grains	31.6% (N=19)	42.9% (N=21)	90% (N=30)	93.3% (N=30)
Lucerne	62.5% (N=16)	50% (N=16)	55.6% (N=18)	72.2% (N=18)
Dairy	45.8% (N=24)	52.2% (N=23)	86.7% (N=30)	96.7% (N=30)
Horticulture	75.6% (N=41)	30.8% (N=39)	60% (N=45)	82.6% (N=46)
Other	50% (N=6)	50% (N=6)	87.5% (N=8)	100% (N=8)
Total	**54.5% (N=154)**	**40% (N=150)**	**80.1% (N=196)**	**89.9% (N=198)**

The Horticulture RWUEI project used 'Water for Profit' and the Dairy/Lucerne RWUEI project used 'Irrigation for Profit' as names for their programs. Note that the growers in these industries had the highest awareness of the respective program names. The 'RWUEI' name had the highest overall awareness out of the three choices. Overall, 90% of the respondents who answered the question were aware of at least one of the program names.

Q7. Over the past four years, have you been involved in any activities related to these water use efficiency programs?

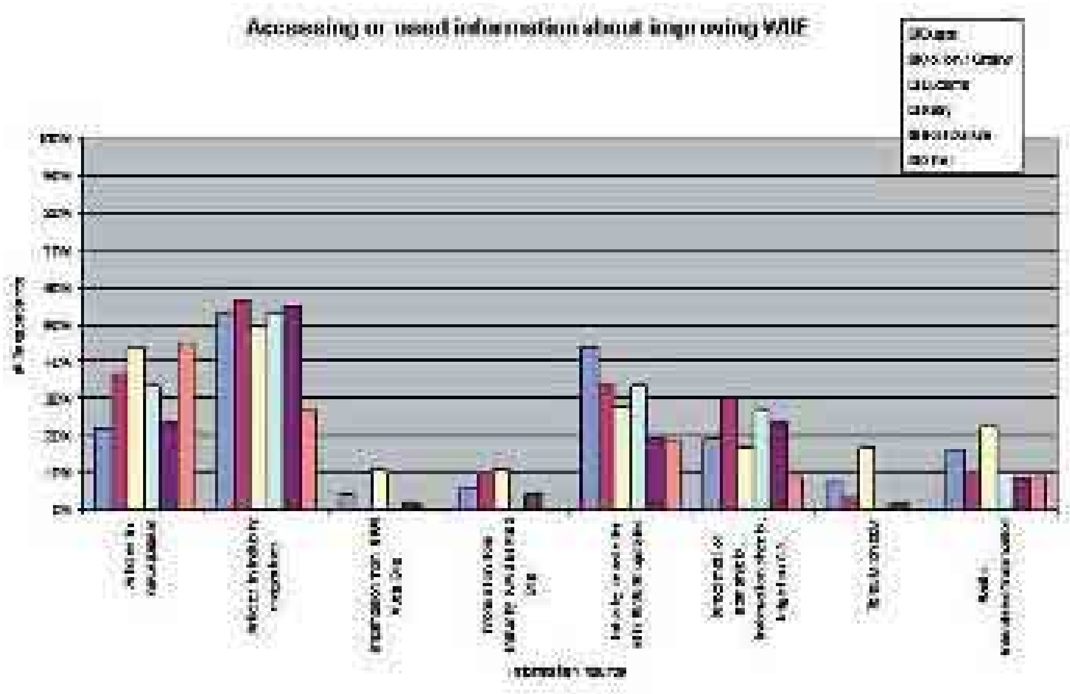
Main Income	%Yes
Sugar	75.0% (N=64)
Cotton / Grains	75.9% (N=29)
Lucerne	62.5% (N=16)
Dairy	70% (N=30)
Horticulture	69.8% (N=43)
Other	50% (N=8)
Total	**71.1% (N=190)**



Activities listed in ‘other’ are:

- diviner and enviroscan trials in our smallcrops;
- recycle;
- judging water awards;
- North Johnstone and Lake Eacham Landcare Group ran this project;
- ground moisture monitoring;
- subsidy; and
- purchase of tensiometers.

Q7a. Have you accessed or used information about improving water use efficiency from other sources? If yes, please identify your sources.



Sources of information listed in other are:

- Bundaburg cane production and test board;
- Cultivation;
- Local irrigation retail outlet;
- BSES contact;
- Billboards;
- Fitzroy development association;
- Suppliers;
- Agricultural college;
- Licensed driller, Drillfest;
- We ran project;
- Farmer meeting;
- Irrigation equipment dealers;
- visited irrigation projects in USA and spoken to suppliers locally; and
- consultant.

Q8. To what extent has your thinking and understanding about water use efficiency on your farm changed over the last 3-4 years?

A chi-square test for independence was used to assess whether the distribution of responses was different across income groups (not including 'Other'). This showed no significant difference in the distribution of responses (p>0.1), indicating that there was no significant difference across main income groups in their responses. The similar average scores also support this finding across income groups.

On average, each of the income groups reported a value between 'a little' and 'a moderate amount'.

Main Income	Not at all	A little	A moderate amount	A lot	Total Respondents	Average Score*	% moderate + a lot
Sugar	18%	26%	33%	23%	66	2.6	56%
Cotton / Grains	10%	17%	45%	28%	29	2.9	73%
Lucerne	39%	17%	17%	28%	18	2.3	45%
Dairy	10%	33%	40%	17%	30	2.6	57%
Horticulture	23%	23%	28%	26%	47	2.6	54%
Other	33%		67%		9	2.3	67%
Total	**39**	**46**	**69**	**45**	**199**	**2.6**	**57%**

* The levels were set as 1=not at all, 2=a little, 3=a moderate amount, 4=a lot, and the average of these numbers were reported.

Q8a. Please briefly describe the main change in your understanding or thinking about water use efficiency on your farm?

Comments not included in this summary.

Q8b. To what extent would you attribute your involvement in RWUEI program activities to these changes in your understanding or thinking?

A one-way analysis of variance was performed on the ratings (1 to 10), showing no significant difference in the average ratings across the main income groups (excluding 'Other').

The table below groups the ratings into four categories, not at all (1), a little (2, 3 & 4), a moderate amount (5, 6 & 7) and a lot (8, 9 & 10). Overall there were 57% of respondents who attributed their involvement in RWUEI activities to changes in thinking by a moderate to a lot.

Main Income	Not at all	A little	A moderate amount	A lot	Total Respond-ents	Average Score	% mod + a lot
Sugar	9%	33%	40%	18%	55	5.11	58%
Cotton / Grains	17%	24%	45%	14%	29	4.90	59%
Lucerne	27%	9%	55%	9%	11	4.82	63%
Dairy	13%	22%	43%	22%	23	5.57	65%
Horticulture	27%	30%	24%	18%	33	4.33	42%
Other	25%	13%	38%	25%	8	5.25	63%
Total	**17%**	**26%**	**39%**	**18%**	**159**	**4.96**	**56%**

Q8c. What other factors have influenced your understanding and thinking about water use efficiency on your farm?

Comments not included in this summary.

Q9. What changes, if any, have you made to your irrigation system or management during the last four years that you did not do previously? Also please indicate what changes you intend to make (if any) over the next 2 years.

The table below shows the percentage of respondents who have made any changes to their irrigation system or management over the last 3-4 years, who intend to make changes over the next 2 years, and those who both have made changes and intend to make future changes.

Main Income	Any changes in last 3-4 years	Any changes intended over next 2 years	Made changes & intend to make changes	Total Respondents
Sugar	88%	65%	59%	68
Cotton / Grains	100%	90%	90%	30
Lucerne	78%	56%	50%	18
Dairy	90%	60%	60%	30
Horticulture	89%	53%	49%	47
Other	45%	27%	27%	11
Total	**87%**	**62%**	**59%**	**204**

A large proportion of respondents (90% to 100%) who said they intended to make changes had also made changes over the last 3-4 years, indicating a possible trend that these irrigators are seeing the benefit of improving their irrigation systems or management through prior experience. There were only 7 respondents who intended to make changes over the next 2 years but had not made any other the last 3-4 years.

Q9a. How much influence did activities or information related to the water use efficiency program have on your decision and ability to make these changes?

A one-way analysis of variance was performed on the ratings (1 to 10), showing no significant difference in the average ratings across the main income groups (excluding 'Other').

The table below groups the ratings into four categories, not at all (1), a little (2, 3 & 4), a moderate amount (5, 6 & 7) and a lot (8, 9 & 10). Overall, 55% of respondents attribute the influence of RWUEI program activities or information on their decision and ability to make changes by a moderate amount to a lot.

Main Income	Not at all	A little	A moderate amount	A lot	Total Respondents	Average Score	% mod + a lot
Sugar	15%	31%	31%	23%	52	4.8	54%
Cotton / Grains	21%	34%	34%	10%	29	4.3	44%
Lucerne	25%	8%	50%	17%	12	4.8	67%
Dairy	12%	16%	40%	32%	25	5.9	72%
Horticulture	29%	26%	20%	26%	35	4.4	46%
Other	29%	0%	29%	43%	7	5.4	72%
Total	**20%**	**25%**	**32%**	**23%**	**160**	**4.8**	**55%**

The average scores were mostly below 5 even though the majority of the respondents gave ratings over 5 ('a moderate amount' plus 'a lot'). This was due to a large proportion of respondents giving a rating of 1 ('not at all') that heavily weights the average downwards.

Q10. Based on the changes you have listed, what, in your best estimate, would the combined benefits be in an "average" year to your farm operation.

In the table below the ratings are grouped into four categories, not at all (1), a little (2, 3 & 4), a moderate amount (5, 6 & 7) and a lot (8, 9 & 10), then percentage of respondents indicating moderate and a lot is reported. The average of the ratings is also given.

A series of one-way analyses of variance was performed on the ratings (1 to 10) for each sub question, showing no significant difference in the average ratings across the main income groups (excluding 'Other').

		Main Income						
		Sugar	Cotton / Grains	Lucerne	Dairy	Horticulture	Other	Overall
Reduced water use per hectare	% Moderate/ A lot difference	50%	54%	64%	61%	64%	33%	56%
	Average	4.5	4.7	4.5	5.3	5.2	4.0	4.8
	Total respondents	50	28	11	23	33	6	151
Increase yield	% Moderate/ A lot difference	58%	55%	64%	64%	50%	20%	56%
	Average	4.9	4.8	4.8	5.0	4.6	3.8	4.8
	Total respondents	48	29	11	22	36	5	151
Improved quality	% Moderate/ A lot difference	49%	48%	60%	60%	53%	50%	52%
	Average	4.4	4.2	4.6	4.5	4.4	4.0	4.4
	Total respondents	39	25	10	20	38	4	136
Improved irrigation management	% Moderate/ A lot difference	62%	62%	64%	72%	61%	80%	64%
	Average	5.3	5.0	5.4	5.9	5.4	6.8	5.4
	Total respondents	52	29	11	25	36	5	158
Improved irrigation efficiency	% Moderate/ A lot difference	57%	62%	75%	76%	72%	80%	66%
	Average	5.1	4.9	5.6	6.1	5.8	6.2	5.4
	Total respondents	49	29	12	21	32	5	148
Improved profit	% Moderate/ A lot difference	42%	44%	55%	75%	46%	25%	48%
	Average	4.0	4.3	4.5	5.2	4.6	3.8	4.4
	Total respondents	48	27	11	20	35	4	145
Improved life style	% Moderate/ A lot difference	29%	32%	45%	56%	32%	80%	37%
	Average	2.9	3.0	4.5	4.9	3.3	5.8	3.5
	Total respondents	48	25	11	18	31	5	138

The ratings (1-10) were combined into an analysis of variance across questions (except for responses in 'other' main income), that showed a significant main effect for main income ($p=0.012$) and question ($p<0.001$), but no significant interaction. A possible reason why income groups are significantly different when combined across questions and not for individual questions, is because the testing becomes more sensitive with larger amount of numbers.

Using the least significant difference procedure to do pair-wise comparisons, it showed that Cotton/Grains (4.4) and Sugar (4.5) had received significantly lower average ratings (across questions), than the highest rating group - Dairy (5.3). Horticulture (4.8) and Lucerne (4.9) were not significantly different from the other main income groups.

The question 'improved life style' had a significantly lower average than all other questions. The highest average rated questions were 'improved irrigation management' and 'improved irrigation efficiency', and these were significantly higher that 'improved quality', 'improved profit' and 'improved life style'.

It was interesting to note that 'improved lifestyle' was the lowest rated change, and six respondents had noted that it made things worse (allocated a rating of zero).

Q10a. Overall, if you nominated a change, can you please give your best estimate of the % gains you have made to your water use efficiency as a result of the changes?

The table below shows the number of respondents who indicated the % gains, with the average of the % gains given in the last column. An analysis of variance shows a significant difference between main incomes ($p=0.002$), with 'Other' excluded from the analysis. In the table below, if two means have the same letter beside the average, then those means are not significantly different. Cotton/grains have significantly lower % gains than dairy and horticulture, according to the respondents' estimates. Note that these average % gains do not represent all the respondents, only those who indicated they made a change and provided an estimate.

Main Income	-5%	0%	1-10%	11-20%	21-30%	31-40%	50-100%	Total Respondents	Average of % gain
Sugar	1	4	17	10	2		4	38	16.5 ab
Cotton / Grains		2	14	7	1		1	25	12.3 a
Lucerne		1	3	4	2			10	15.3 ab
Dairy			8	4	1	2	5	20	26.9 bc
Horticulture		1	8	6	5	5	7	32	31.5 c
Other			2	2				4	12.0
Total	**1**	**8**	**52**	**33**	**11**	**7**	**17**	**129**	**20.8**

Q10b. Comments.

Comments not included in this summary.

Q11. Have you applied for a subsidy from the Financial Incentive Scheme (FIS)?

A chi-square test on the number of respondents who did and didn't apply for the Financial Incentive Scheme showed no significant difference across the main income groups (excluding 'Other'). This means that the proportion who had applied did not significantly change across the main income groups. Overall, approximately half the respondents had applied.

Main Income	% applied for FIS
Sugar	54% (N=65)
Cotton / Grains	47% (N=30)
Lucerne	39% (N=18)
Dairy	62% (N=29)
Horticulture	51% (N=45)
Other	57% (N=7)
Total	**52% (N=194)**

Q11a. If yes, how important was the subsidy to you in making changes to your irrigation system?

The table below groups the ratings into four categories, not at all (1), a little (2, 3 & 4), a moderate amount (5, 6 & 7) and a lot (8, 9 & 10). This uses information only from respondents who answered 'yes' in having applied for a subsidy from the Financial Incentive Scheme (FIS).

An analysis of variance performed on the ratings showed a significant difference (p=0.044) between the average score across main income groups (excluding 'Other').

Main Income	Not at all	A little	A moderate amount	A lot	Total	Average Score
Sugar	3%	23%	30%	43%	30	6.5 a
Cotton / Grains	7%	7%	29%	57%	14	6.5 ab
Lucerne	14%	14%	57%	14%	7	5.7 a
Dairy	0%	6%	31%	63%	16	7.7 ab
Horticulture	0%	0%	32%	68%	22	8.0 b
Other	0%	0%	0%	100%	4	9.3
Total	**3%**	**11%**	**31%**	**55%**	**93**	**7.1**

The least significant difference procedure showed that average rating for Lucerne and Sugar was significantly lower than horticulture. Averages with the same letter in the above table are not significantly different from each other.

Q11b. If no, could you please explain why you did not apply for the subsidy?

The following table contains responses only from respondents who said they had not applied for a subsidy from the Financial Incentive Scheme.

	Main Income						
Reason	Sugar	Cotton / Grains	Lucerne	Dairy	Horticulture	Other	Total
Didn't know about it	20%	19%	45%	18%	32%	67%	27%
Incentive wasn't enough for me to make a change	13%	25%	9%	27%	14%	67%	18%
No subsidy available on irrigation items which I wanted to purchase	13%	6%		18%			8%
I applied but was rejected			9%		5%		2%
No funds left available	10%	6%		18%			6%
No changes to irrigation are required on my farm	10%		27%	18%	23%		14%
Didn't want government money	3%	6%	9%	9%	18%		9%
Applied but did not purchase item and receive funding	3%	6%					2%
Other	37%	25%	18%		14%		22%
Total respondents who didn't apply	30	16	11	11	22	3	93

The other reasons are listed below, with the main income group listed in brackets.

Financial Reasons

- Don't want any more debt. Too much now. (S).
- Amount of money not enough to do major works (S).
- Sugar Industry outlook has been poor for last 5 years and does not look good for the future (S).
- Financial incapacity (S).
- I struggled to find my own financial commitment to drastically change system (S).
- Had to spend the money upfront and then apply for it back - didn't have the money up front (S).
- Was unable to afford cost. (S).
- Insignificant in overall expenditure (C&G).
- have had own funds (C&G).

Other

- Main thing we need is water (S).
- Didn't think about it, or was too late. (S).
- Most changes made just before subsidy started. Also I was too slow/slack applying (C&G).
- Our equipment was purchased prior to the subsidy scheme (H).
- lack of information towards it (C&G).
- We would probably not be considered in need. Do not qualify (L).
- Not relevant because of size of farm (S).
- Not eligible (H).
- No use for it (S).
- felt didn't need it (H).

Q12. Can you please give an estimate on how much money you have spent over the last 3 years in improving irrigation efficiency?

The estimated costs spent on improving irrigation efficiency have been categorised by whether they had applied for the Financial Incentive Scheme as well as the main income groups. This information was subjected to a two-way analysis of variance, (using a log($+500) to satisfy assumptions of normality and homogeneity), excluding main income 'Other' and respondents who did not specify whether they applied for the Financial Incentive Scheme. This analysis showed a significant interaction between main income groups and applying for the Financial Incentive Scheme. The main explanations for this interaction are:

- The average estimated of money spent was higher for those who applied for the Financial Incentive Scheme for each of the main income groups, except for cotton/ grains where the trend was reversed.
- For the remaining income groups, there was over two times the average amount spent by respondents who had applied for the financial incentive scheme, except for sugar, where the average amount spent was more similar.

	Applied for FIS		Hasn't applied for FIS		Didn't specify about FIS		Overall	
Main Income	**Average $ per respondent**	**Number of Responses**	**Average $ per respondent**	**Number of Responses**	**Average $ per respondent**	**Number of Responses**	**Sum of $ spent**	**Number of Responses**
Sugar	59,672 cd	32	49,472 bcd	27	100,000	1	3,345,250	60
Cotton / Grains	131,192 de	13	183,357 e	14			4,272,500	27
Lucerne	65,833 de	6	19,350 ab	10			588,500	16
Dairy	30,647 bcd	17	24,430 abc	10			765,300	27
Horticulture	42,357 bcd	23	13,474 a	19	600	2	1,231,400	44
Other	228,000	4	6,250	2			924,500	6
Average/ Total	**67,549**	**95**	**56,208**	**82**	**33,733**	**3**	**11,127,450**	**180**

The averages with the same letter are not significantly different from each other. The averages without letters were not part of the analysis of variance

Q13. In your opinion, how well does your current irrigation system perform? This is in terms of even distribution of irrigation water, good timing of irrigation, irrigation system well maintained and operating efficiently.

The majority of respondents (63%) thought that some improvements possible for improvement of the performance of their current irrigation system. A chi-square analysis of the first two categories versus the last three categories showed no significant difference in the proportion of responses across the main income groups ('Other' excluded from analysis).

Main Income	No room for any improvement	Some improvements possible	Moderate improvements needed	A lot of room for improvement	Run down and inefficient	Total Respondents
Sugar	8%	60%	23%	8%	2%	65
Cotton / Grains	3%	77%	13%	7%		30
Lucerne	17%	56%	17%	11%		18
Dairy	3%	66%	24%	7%		29
Horticulture	13%	57%	28%	2%		47
Other		71%	29%	0%		7
Overall	**8% (N=16)**	**63% (N=123)**	**22% (N=44)**	**6% (N=12)**	**1% (N=1)**	**100% (N=196)**

Q14. What would motivate you to make further changes to irrigation practices?

Most of the respondents (76%) ticked more than one response to this question, and 7% did not select any of the answers. A series of chi-square tests on each answer showed no significant difference between main income groups ('Other' excluded from analysis) for the percentage of respondents who ticked the option.

Main Income	Improved financial return	Environmental reasons	Lifestyle	Cost saving	Production/ productivity increase	Other	Total respondents
Sugar	79%	40%	41%	66%	60%	6%	68
Cotton / Grains	90%	67%	47%	83%	83%	13%	30
Lucerne	78%	44%	56%	72%	72%	22%	18
Dairy	87%	43%	60%	67%	70%	3%	30
Horticulture	74%	49%	43%	60%	70%	6%	47
Other	55%	9%	9%	36%	36%	9%	11
Overall	**79% (n=162)**	**45% (n=92)**	**45% (n=91)**	**66% (n=135)**	**67% (n=137)**	**8% (n=17)**	**100% (N=204)**

The 'Other' responses were (3 respondents didn't specify):

Water resources

- More water
- More water available
- More water - i.e. build dam
- Spread water further
- Reliable water supply
- Not running out of water

Financial

- High government incentives (Finance subs-grants)
- Government assistance
- A money tree
- Better price for milk
- Labour saving

Other

- Sustainability (2)
- Government feral pig control

Q15. What (if any) are the major reasons that would stop you making further improvements to your irrigation system.

The most frequent reported reasons for stopping respondents making further improvements to their irrigation systems were financial constraints (65%), followed by water availability and security (49%) and the financial situation of the farm/industry (48%).

	Main Income						
Reasons	**Sugar**	**Cotton / Grains**	**Lucerne**	**Dairy**	**Horticulture**	**Other**	**Overall**
No constraints	1%	3%	6%	3%			2% (n=4)
Financial constraints	68%	87%	61%	73%	51%	36%	65% (n=133)
Uncertainty about the best changes to make	15%	37%	28%	20%	17%	18%	21% (n=42)
Uncertainty about the financial pay-off of such changes	35%	47%	39%	37%	21%	18%	33% (n=68)
Lack of knowledge about making specific changes	7%	10%	28%	20%	17%	9%	14% (n=28)
Contentment with existing system	10%	23%	28%	27%	49%		25% (n=50)
Don't have enough time	9%	10%	11%	10%	6%	9%	9% (n=18)
Equipment is too technical	4%	3%		7%	6%		4% (n=9)
Equipment is unreliable	4%		11%	10%	6%		5% (n=11)
Other priorities		10%	11%	10%	13%		7% (n=14)
Water is not a major issue	4%			7%	9%	9%	5% (n=10)
Water availability and security	46%	63%	50%	63%	30%	64%	49% (n=99)
Financial situation of farm/industry	59%	53%	44%	50%	28%	45%	48% (n=97)
Other	7%	7%		3%	9%		6% (n=12)
Total respondents	**68**	**30**	**18**	**30**	**47**	**11**	**100% (N=204)**

A chi-squared analysis was only applied to answers with enough responses to satisfy the conditions of a chi-square test for independence, that is no more than 10% of expected values less that 5, and no expected values less than 1. The answers that were satisfactory to analyse were:

- Financial constraints (significant, p=0.022)
- Uncertainty about the best changes to make (not significant)
- Uncertainty about the financial pay-off of such changes (not significant)
- Contentment with existing system (significant, p=0.0002)
- Water availability and security (significant, p=0.017)
- Financial situation of farm/industry (significant, p=0.022)

A significant result indicates that at least one of the main income groups (‘Other’ not included in the analysis) had a significantly different percentage to the others.

The ‘other’ reasons listed were:

Financial

- The sugar prices.
- Price of cane.
- No finance available.
- Dairying is finished.
- If I knew the government were going to take our saving.

Water

- Weather or lack of.
- Bad seasons.
- Regulated water on own property.

Other

- Topography of farm.
- Legislation.
- Hoping to retire soon*.

*This response was reframed to preserve the anonymity of the respondent.

Q16. What would give you incentive to make further improvements?

The most frequently reported incentive to make further improvements was water availability and security (63%), followed by the financial incentives of tax benefits (58%), improved financial situation of farm/industry (55%) and subsidies (52%).

	Main Income						
Incentive	**Sugar**	**Cotton / Grains**	**Lucerne**	**Dairy**	**Horticulture**	**Other**	**Overall**
Subsidies	53%	43%	56%	63%	51%	36%	52% (n=106)
Tax benefits	57%	57%	78%	63%	53%	36%	58% (n=118)
Low interest loans	38%	37%	56%	43%	38%	27%	40% (n=81)
Environmental credits	29%	47%	33%	30%	38%	18%	34% (n=69)
More evidence of possible gains	19%	27%	50%	23%	32%	18%	26% (n=54)
Training and extension support	21%	27%	28%	23%	30%	18%	25% (n=50)
More Research & Development	25%	43%	28%	17%	28%	18%	27% (n=55)
Water availability and security	56%	90%	78%	77%	47%	45%	63% (n=129)
Improved financial situation of farm/industry	68%	50%	44%	63%	45%	36%	55% (n=113)
Lower water prices	59%	50%	39%	37%	19%	18%	41% (n=84)
Practices of other growers	15%	10%	28%	23%	21%	9%	18% (n=36)
Other	3%	3%	6%	3%	4%		3% (n=7)
Total respondents	**68**	**30**	**18**	**30**	**47**	**11**	**100% (n=204)**

A chi-squared analysis was only applied to answers with enough responses to satisfy the conditions of a chi-square test for independence, that is no more than 10% of expected values less that 5, and no expected values less than 1. The answers that were satisfactory to analyse were:

- Subsidies (not significant)
- Tax benefits (not significant)
- Low interest loans (not significant)
- Environmental credits (not significant)
- More evidence of possible gains (not significant)
- Training and extension support (not significant)
- More Research & Development (not significant)
- Water availability and security (significant, p=0.0004)
- Improved financial situation of farm/industry (not significant, p=0.083)
- Lower water prices (significant, p=0.0007)

A significant result indicates that at least one of the main income groups ('Other' not included in the analysis) had a significantly different percentage to the others.

Q17. Given your own situation and what you know of the needs for the industry, what areas do you think that government and industry programs should focus on in the future?

Eighty-one percent of the respondents gave feedback on this question.

Q18. Do you have any other comments about the RWUEI program or about irrigation issues in general?

Fifty-one percent of the respondents made a general comment

G. Goulburn-Murray Table of Economic and Employment Benefits

Estimate of Economic and Employment Benefits from Irrigation						
Type of Enterprise	Gross Margin per 1,000 ML ($)	Farm Value of production per 1,000 ML ($)	Number of Jobs per 1,000 ML			Total Number of Jobs per 1,000 ML
			On Farm	Processing	Support Industries	
Dairy	227,000	413,000	6	2	7	**15**
Horticulture	517,000	1,043,000	9	11	10	**30**
Cropping	97,000	207,000	1.72	-	1.03	**2.75**
Grazing	19,000	40,000	0.38	-	0.24	**0.62**
Tomatoes	337,000	798,000	6	8	9	**23**

The following papers were referenced as sources for these estimates:

The Economic Impact of Irrigated Agriculture in the Shepparton Irrigation region (May 1996), a paper prepared fro Sustainable Regional Development Board by EconSearch Pty Ltd and FarmStats Australia Pty Ltd.

Dairy gross margins and farm value of production figures calculated using production details collected from NRMS project I/6014. Unpublished data: Knee,J. and Armstrong,D. 1998, *Irrigated Dairy Benchmarks,* DNRI, Kyabram, Victoria.

Mason,L. 1997, *Northern Irrigation Cropping Gross Margins 1997/1998*. DNRE

Hall et al, 1993, *ABARE Model of Irrigation Farming in the Southern Murray Darling Basin.* Report prepared fro Murray Darling Basin Commission. ABARE

Source: extract from Goulburn-Murray Water (date unknown) Estimate of Economic and Employment Benefits from Irrigation, submission from Goulburn-Murray Water, provided by Smith K, NR&M.

The figures in this table were taken at face value (with caveats) when used in this evaluation – no attempt was made to directly tease out the basis of the calculations.

H. Methodology

1. Desk-top Review

A desktop review was undertaken using available reports, previous evaluations and other documents directly relating to the RWUEI. Other literature and sources were used to capture trends and issues that may have impacted on the project or that could inform the next stage of addressing RWUEI.

2. Guidance and Support for Industry Milestone Reports

This component recognises that the Industry Coordinators have the best access to information about the activities and impacts of the program and have kept extensive records throughout the life of the program. These have been captured in Milestone Reports and other Initiative reports. The gathering and reporting of information for the Final Milestone Report presented an opportunity to work closely with Coordinators to ensure that suitable information is included and presented in a way that will best serve the needs of the evaluation.

Coordinators were given one-on-one advice on collating, analysing and reporting under the framework. This included approaches to calculating gains in WUE from existing data and changes.

3. Collation and Analysis of Data from Industry Milestone Reports

The headings comprising the framework for the Industry Milestone Reports closely reflect the headings which are used in this final evaluation report. The reports were analysed in terms of their content and the validity of their conclusions and a summary of the information from each report is incorporated into the overall report.

4. Telephone Survey

An overarching independent survey was undertaken of Queensland irrigators stratified by industry and region.

The survey was mailed to approximately 625 growers' over the four major industries (Cotton/Grains, Dairy/Lucerne, Horticulture and Sugar). The survey was administered by CMT Pty Ltd, whose role was to mail out surveys, follow up with phone calls and enter the mail or telephone results in an electronic form.

The selection of growers to complete the survey was done either by the industry contacts sending grower lists for selection taken at random (Cotton/Grains, Lucerne), or random numbers were generated for the industry to select the growers from their lists (Horticulture, Dairy), or the industry contact randomly selecting the growers from their list (Sugar).

The industries were sampled at different rates, related to the total number of growers in each industry. The sugar and horticulture industries had the largest numbers of growers (about 3000 each) and were sampled at 6.7% and 5.7% respectively, to achieve approximately 200 growers per industry. The Cotton/Grains industry had approximately 450 growers and was sampled at 16.7% to achieve approximately 75 growers in the sample. The Dairy/Lucerne industry had approximately 1010 growers and was sampled at 14.9% to achieve approximately 150 growers in the sample.

The growers were randomly selected proportionately across the respective regions for each industry.

The purpose of the survey was to provide an independent quantitative assessment of the impact of the RWUEI Adoption Program on awareness, understanding and changed practice as reported by the irrigators themselves. It also captured some of the surrounding issues, barriers and opportunities to further build on the work that has been undertaken to date in the program. Those irrigators randomly selected for the interview were sent the survey in advance to permit them to more accurately prepare for the survey. A pilot was undertaken across all industries to test and refine the survey.

The survey was undertaken by an independent company contracted for the task by the RWUEI program. Jeff Coutts and Kerry Bell designed the format and content of the survey in conjunction with the Industry Coordinators, RWUEI management with input from wider management within NR&M. Amy Coutts conducted the pilot. Kerry Bell undertook the analysis of the survey.

The survey was undertaken in July 2003.

5. Analysis of Financial Incentive Scheme Data

Information from the Financial Incentive Scheme (FIS) was an excellent source of data about the impact of the program and changes planned and undertaken by recipients. It records the individual irrigators who sought and obtained funds, the regions and industries from where they come and the way in which they use the funds (for example, installing new equipment, seeking advice etc).

Collation and analysis of the figures was undertaken by RWUEI Management and Industry Coordinators. Summaries implications and limitations of the data will be included in the evaluation report.

6. Participation in Workshop with Project Staff and Industry

A workshop was held for RWUE staff across industries and programs in Brisbane in April 2003. The purpose of the workshop was to:

- Identify future needs and best investment in RWUE 2;
- Provide a closure event and celebration of success;
- Facilitate E&A staff and R&D staff to share information and lessons from RWUE1;
- For R&D staff to present their most important result to date and have a reality check on the utility of results and presentation; and
- For E&A staff to demonstrate the success stories and the challenges in their industry and to identify gaps in the E&A and R&D to date in terms of future needs for their industry.

The evaluator participated in the workshop recording discussions, key points in presentations and feedback from participants.

7. Member Checking

Final conclusions and recommendations emerging from the evaluation were circulated to key persons for reflection and comment prior to finalising the report.

The purpose of member checking is to ensure that key information is not misinterpreted or missed in the evaluation and to assist in the understanding and ownership of the final evaluation report.

I. Benefit Cost Rationale

In the argument used in the body of the report, the BCR for the RWUEI has been estimated based on all the RWUEI costs, not the Adoption Program alone as seems to be indicated by the references to Barraclough.

To come up with a figure for the Cost/Benefit Ratio for the RWUEI, there is a need to look at the total cost. This total cost comprises:

a) The amount invested by the Government (Adoption + FIS)
b) The amount invested by the growers under the FIS; and
c) The amount invested by those growers who invested in changes because of RWUEI but did not receive any financial assistance to do the change.

There is a breakdown of costs for (a) the Adoption Program as well as the FIS subsidy. The industry has provided the total dollar value for (b) contributed by the growers under the FIS. But to estimate a dollar value for the investment (c) made by growers who did not receive any subsidy but did so because of the influence of the initiative, the survey results have to be used.

Estimating the dollar value of changes under RWUEI but not funded by FIS, the following information were used:
- Survey --- 87% (page 86) of respondents had made changes;
- Survey ---55% (page 87) of the respondents said they were influenced (Moderate to a Lot) by RWUEI.
- Survey --- 52% of respondents applied for FIS (Page 75);
- a total of 4618 growers applied for FIS assistance and 4559 (or 98%) of them received funds (page 76);
- Total Cost of FIS = $10.5M (Govt) + Participating Growers <u>$33.4M</u> (QFVG + Canegrowers i.e. $17,396,490 + $16,009,555) = <u>$43.9M</u>

Cost Calculations

52% x 98% = (51%) of the survey respondents received FIS

Assuming:
- “moderate to a lot” means they invested dollars, 87% - 55% = 32% invested in changes without the influence of RWUEI; and
- the $43.9M invested through the FIS can be apportioned to the 51% of survey respondents that received FIS;

then an estimate of the 32% who made changes without the influence of RWUEI would be ($43.9M/51%) x 32% = <u>$27.55M</u>

Similarly an estimate of the dollar value invested <u>without</u> the assistance of the FIS <u>but because</u> of RWUEI (55%-51% = 4%) would be ($43.9M/51%) x 4% = <u>$3.44</u>M

Benefit Cost Ratio

Benefit = $197.7M (page 26 and 27)

Cost (Government)	= Adoption Cost + FIS Cost
	= $23M + $10.5M
	= $33.5M

"**Benefit/Cost**" based on Government investment only = ($197.92M/$33.5M) = **5.91:1**

Cost (Government) + Grower Investment Attributable to RWUEI = $33.5M + $33.4 + $3.44M = $70.34M

"**Benefit/Cost**" based on all RWUEI investment = ($197.92M/$70.34M) = **2.81**:**1**

By either measure the Initiative has had a favourable outcome

If the estimated investment in changes "not" under RWUEI extrapolated from the Survey results (i.e. $27.5M) is added, the BCR is obviously reduced but still positive i.e. - ($197.92M/$97.84M) = **2.02**

This logic was developed in conjunction with Russell Cuerel and Jinaraj Rajakaruna, Natural Resources and Mines, 2003.

J. Publications consulted

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