



Irrigation in the Murray-Darling Basin:

Farms trading temporary water in 2006-07

Mark Oliver, Brenda Dyack and Dale Ashton

ABARE research report 09.8

May 2009

abare.gov.au

© Commonwealth of Australia 2009

This work is copyright. The *Copyright Act 1968* permits fair dealing for study, research, news reporting, criticism or review. Selected passages, tables or diagrams may be reproduced for such purposes provided acknowledgment of the source is included. Major extracts or the entire document may not be reproduced by any process without the written permission of the Executive Director, ABARE.

ISSN 1447-8358

ISBN 978-1-921448-40-9

Oliver, M, Dyack, B and Ashton, D 2009, *Irrigation in the Murray-Darling Basin: Farms trading temporary water in 2006-07*, ABARE research report 09.8, Canberra, May.

Australian Bureau of Agricultural and Resource Economics

Postal address GPO Box 1563 Canberra ACT 2601 Australia

Location 7B London Circuit Canberra ACT 2601

Switchboard +61 2 6272 2000

Facsimile +61 2 6272 2001

ABARE is a professionally independent government economic research agency.

ABARE project 3324

Acknowledgements

This report uses data collected in an ABARE survey of irrigation farms in the Murray-Darling Basin. This survey was voluntary and depended on the cooperation of farmers in providing information on farm operations. The survey would not have been possible without their full cooperation and assistance. The authors also wish to acknowledge comments provided on a draft of this report by ABARE colleagues Caroline Levantis, Sarah Crooks and Simon Hone, and Jane Jervis and Peta Derham of the Australian Government Department of Agriculture, Fisheries and Forestry.

The survey was funded by the Australian Government Department of the Environment, Water, Heritage and the Arts and the Australian Government Department of Agriculture, Fisheries and Forestry.

Foreword

The prolonged drought affecting much of the Murray-Darling Basin has resulted in significant reductions in water allocations to irrigation farms situated within the Basin. Irrigators have responded to reduced water availability in a number of ways, including buying and selling water on both the permanent and temporary water markets.

ABARE was commissioned by the Australian Government Department of Agriculture, Fisheries and Forestry to undertake a detailed analysis of irrigation farms involved in temporary water trading in 2006-07.

The purpose of this study was to examine the characteristics of temporary water traders in order to provide insights into drivers of participation in water trading.

Results from the study provide comparisons among water traders by region and industry as well as differences between traders and those irrigation farms that did not trade water in 2006-07.



Phillip Glyde
Executive Director
May 2009

Contents

Summary	1
1 Introduction	3
2 Water trading in the Murray-Darling Basin	4
Water trading	4
Water purchases and sales	4
Benefits of water trade	5
Water trading in 2006-07	6
3 Overview of regional water trade	8
Methodology	8
Regional overview	10
4 Intra-regional results	14
Murrumbidgee region	14
Murray region	18
Goulburn–Broken	22
Loddon–Avoca	26
Eastern Mount Lofty Ranges	28
References	30
Figures	
a Temporary water trade within states, Murray-Darling Basin, 2004-05 and 2007-08	5
b Proportion of water trading farms that bought or sold water, by region, 2006-07	11
Tables	
1 Water trading by irrigation farms, Murray-Darling Basin, 2006-07	6
2 Reporting regions and industries	10
3 Selected physical estimates, temporary water traders, by region, 2006-07	12
4 Selected financial estimates, temporary water traders, by region, 2006-07	13
5 Selected estimates, Murrumbidgee region, 2006-07	15

6	Selected estimates, irrigated broadacre farms, Murrumbidgee region, 2006-0716	16
7	Selected estimates, irrigated horticulture farms, Murrumbidgee region, 2006-07	17
8	Selected estimates, Murray region, 2006-07	18
9	Selected estimates, irrigated dairy farms, Murray region, 2006-07	20
10	Selected estimates, irrigated broadacre farms, Murray region, 2006-07	21
11	Selected estimates, irrigated horticulture farms, Murray region, 2006-07	22
12	Selected estimates, Goulburn-Broken region, 2006-07	23
13	Selected estimates, irrigated dairy farms, Goulburn-Broken region, 2006-07	24
14	Selected estimates, irrigated horticulture farms, Goulburn-Broken region, 2006-07	25
15	Selected estimates, Loddon-Avoca region, 2006-07	27
16	Selected estimates, irrigated broadacre farms, Loddon-Avoca region, 2006-07	28
17	Selected estimates, Eastern Mount Lofty Ranges region, 2006-07	29

Map

1	Murray-Darling Basin regions	8
---	------------------------------	---

Box

1	Target populations	9
---	--------------------	---

Summary

- Prolonged drought throughout much of the Murray-Darling Basin, particularly across the southern portion, has severely reduced inflows to major water storages, resulting in irrigators receiving water allocations significantly lower than licensed entitlements. Water trading is one of the ways irrigators have responded to increased water scarcity.
- To better understand the economic characteristics of irrigation industries at a farm level, ABARE undertook a survey of irrigators throughout the Murray-Darling Basin to provide data for the 2006-07 financial year. The objective of the survey was to collect a range of physical and financial data from irrigation farms in selected regions and industries within the Basin.
- Results from the survey suggest water trading was effective in reallocating water among users in 2006-07. The ability to trade water appears to have assisted some irrigators in avoiding substantial financial losses in 2006-07, either by obtaining income from water sales or by purchasing water to maintain production.
- The water market has grown considerably in the past decade as a consequence of institutional reforms to facilitate trade and changes in relative marginal returns as a result of increasing scarcity of water and strong competing demands. The large majority of trades are for temporary water.
- Results from ABARE's survey of irrigation farms in the Murray-Darling Basin show an estimated 2 per cent of irrigation farms were involved in trading permanent water entitlements, while around one-quarter of irrigation farms traded water on a temporary basis in 2006-07.
- An estimated 31 per cent of dairy farms, 20 per cent of broadacre farms and 23 per cent of horticulture farms participated in temporary water trading in 2006-07. By region, the proportion of farms participating in trading was between 40 and 50 per cent in the Murrumbidgee, Murray, Goulburn-Broken and Loddon-Avoca regions. In the Eastern Mount Lofty Ranges region, an estimated 17 per cent of farms participated in temporary water trading in 2006-07. There was a relatively small number of farms participating in water trading in each of the remaining regions of the Murray-Darling Basin.
- The most common reasons given for not buying temporary irrigation water across the Murray-Darling Basin were that extra water was not required (primarily horticulture farms) and/or the price was too high. For irrigated broadacre and dairy farms, the most common reason given for not buying temporary water was prices were too high. The most common reason given for not selling temporary water was because farmers had used all the water they had available.
- The main buyers and sellers varied by industry. Overall, dairy farmers were prominent buyers of temporary water in 2006-07, as they sought to offset relatively low seasonal allocations. Conversely, horticulture farms, with generally more reliable irrigation water entitlements, tended to be prominent sellers in most regions. In 2007-08 in the southern Basin, perennial horticulture farmers were the most common buyers, with irrigated broadacre farms the most common sellers (Mallawaarachchi and Foster 2009).
- A regional comparison of farm performance estimates for net buyers and net sellers shows that net buyers of irrigation water operated larger farms on average, with higher overall

irrigation water use than net sellers. The survey results also show that, on average rate of return and equity position, net sellers of water performed slightly better than net buyers of water.

- Water traders in the Murrumbidgee region purchased the largest net volume of water and irrigated the largest area in 2006-07. The proportion of water used by net buyers which was obtained from purchases ranged from 33 per cent in the Eastern Mount Lofty Ranges region to slightly less than 50 per cent in the Murray region.
- There was little difference in the net volume of water sold per farm among the regions, with around one-third of the water available to net sellers being sold in 2006-07.
- The average cost of temporary water purchases for net buyers ranged from around \$44 000 a farm in the Goulburn-Broken region (9 per cent of total cash costs) to about \$72 000 a farm in the Eastern Mount Lofty Ranges region (6 per cent of total cash costs). Temporary water purchases as a proportion of total cash costs was highest in the Loddon-Avoca region (14 per cent).
- In all regions, revenue from water sales provided a substantial boost to farm incomes for many net sellers. The average receipts from temporary water sales for net sellers ranged from \$22 400 a farm in the Murray region (8 per cent of total cash receipts) to \$90 800 a farm in the Loddon-Avoca region (19 per cent of total cash receipts).

1 Introduction

The Murray-Darling Basin is an important agricultural region in Australia, accounting for about 40 per cent of Australia's total gross value of agricultural production (ABS 2008). Irrigated agriculture within the Basin makes an important contribution to the total gross value of agricultural production, contributing around \$4.6 billion in 2005-06 (ABS 2008).

Since around 2002, prolonged and severe drought throughout much of the Basin has reduced inflows into river systems to record lows and, subsequently, the volume of water held in many major water storages has also fallen to record lows. As a consequence, allocations of irrigation water were significantly lower than licensed entitlements in most regulated river valleys in 2006-07 (Ashton and Oliver 2008). The timing of inflows and water allocations is critical for irrigated crops and pasture, and greatly influences the business decisions made by farmers.

Irrigators can respond to reduced water availability in a number of ways. For example, they may increase the efficiency of their water use by adopting new management practices or water saving technologies. A further adaptation strategy is to trade water.

To better understand the economic characteristics of irrigation industries at a farm level, ABARE undertook a survey of irrigators throughout the Murray-Darling Basin to provide data for the 2006-07 financial year. The objective of the survey was to collect a range of financial and physical data, including participation in water trading, from irrigation farms in selected regions and industries within the Basin. As well as providing a point in time reference, the survey results will provide a baseline for monitoring future trends in industry performance.

The Australian Government Department of Agriculture, Fisheries and Forestry commissioned ABARE to undertake an analysis of the characteristics of irrigation farms involved in temporary water trading in 2006-07. The purpose of this study was to provide insights into drivers of participation in temporary water trading by examining differences among water traders by region and industry, and differences between traders and non-traders.

2 Water trading in the Murray-Darling Basin

Water trading

Water trading is the transfer of water access entitlements (permanent trade) or seasonal water allocations (temporary trade) between willing buyers and sellers. Water trading is important because it allows scarce water resources to be transferred to their most productive uses. Water trading allows access to water resources to be reallocated over time and space in response to changes in:

- commodity prices
- environmental conditions (for example salinity levels or river health)
- competing demands for water (for example increased urban demand)
- the availability of water.

In response to reforms under the National Water Initiative (NWI), the National Water Commission (NWC) found that good progress had been made by the states in introducing institutional, legislative and administrative arrangements which enable water trade both within and between states. The NWC also found that water trading within and between states has been effective in managing water in difficult circumstances to the benefit of buyers and sellers (NWC 2007).

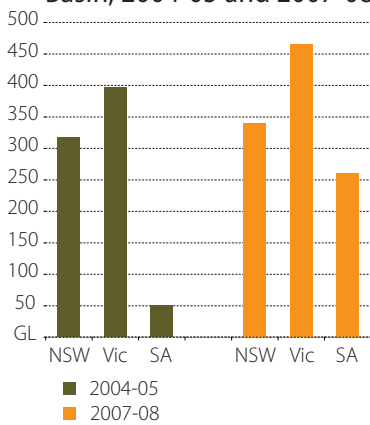
Water purchases and sales

All surface water available for use in the Murray-Darling Basin is allocated. Therefore, if a farmer wishes to acquire additional water, they must purchase from an existing entitlement holder. Generally, water purchases will be driven by those irrigators able to produce agricultural outputs for which the benefits of using additional water outweigh the market costs of acquiring that water. Conversely, water will be made available for sale by those irrigators for which the benefits of using additional water are less than the water market price. These latter irrigators will find it more profitable to sell water and reduce production in dry times.

The water market has grown considerably in the past decade, partly because of the institutional reforms under the NWI that are intended to facilitate trade. In addition, increasing scarcity of water and strong competing demands have increased the relative marginal return to water as an input, which has increased the price of water on the market. Trade has taken place for both annual allocations and entitlements. Temporary water trade refers to trade in annual allocations set by states according to the proportion of the total water under entitlement available for diversion to irrigation. Trade in permanent water refers to sales and purchases of entitlements. The large majority of trade has been for temporary water. For

example, 5.2 gigalitres of permanent water was traded in 2004-05 while 81.7 gigalitres of temporary water was traded interstate in the same year (ABS 2006). In 2004-05 permanent interstate trades were all out of Victoria and mostly into South Australia, with some into New South Wales. In 2007-08 there were no recorded trades of permanent water interstate. The pattern of trade in any one year is a function of a number of variables related to water markets and institutional structure, including relative water scarcity and resultant annual allocations, the timing of announced allocations and expectations about future announcements. The

a Temporary water trade within states, southern Murray-Darling Basin, 2004-05 and 2007-08



Sources: ABS, 2006 Water Access Entitlements, Allocations and Trading 2004-05, Catalogue: 4610.0.

pattern of water trade is also related to changes in commodity markets. A rising relative price for a particular irrigated commodity will encourage movement of water purchases toward this now more profitable commodity. Over the past decade, for example, this has been the case with water moving to wine grape production in response to strong export demand.

Temporary water trade both within and between states has increased over the past five years. For example, figure a shows that between 2004-05 and 2007-08, trade within each southern Murray-Darling Basin state increased, with a relatively larger increase in South Australia. However, care is required in interpreting the volumes of water traded because volumes of water can be traded multiple times in a year both within states and between states. Figure A shows the aggregate of all volumes recorded as traded.

Benefits of water trade

Water trading has been a centrepiece of water reform in Australia because of the benefits to individuals, communities, and the economy in general which can be generated when irrigators are able to buy and sell water. Water trade facilitates the movement of water to relatively more valuable uses.

The benefits of water trade can be described as the difference between the net value of the production enabled by applying traded water and the net value of production forgone as a result of water being made available for trade. Goesch et al. (2007) explain that the benefits from water trade arise from differences in the marginal value of water use between irrigators. The marginal value of water use is the net return irrigators earn from the use of an additional megalitre of water. These marginal values vary according to differences in the irrigated activities undertaken, regional biophysical attributes and water availability. Trade will facilitate the transfer of water to its highest value use. For example, irrigators with a marginal value of water use lower than the market price may sell water, in which case the income from selling water will be greater than the loss from not irrigating. Conversely, for irrigators with a marginal

value of water use higher than the market price, the cost of purchasing water will be less than the loss from not irrigating. Thus, the overall loss is reduced in a mutually beneficial way when allocations are reduced.

In 2007-08, South Australia was the main water importing state and New South Wales was the largest exporter. South Australia imported a total volume of 148 gigalitres in that year. Based on this volume of trade, Mallawaarachchi and Foster (2009) estimated that there was a gain of \$31 million to South Australian irrigators generated by the ability to purchase water. Upstream irrigators were estimated to have gained around \$4 million from this trade. Hence, the net gains from the water traded into South Australia are estimated to have been around \$35 million in 2007-08. Overall gains to the southern Murray-Darling Basin would have been greater as gains from other inter-state trades and trades within the state are not accounted for in the estimate.

Water trading in 2006-07

Results from ABARE's survey of irrigation farms in the Murray-Darling Basin show that, across the Basin, an estimated 2 per cent of irrigation farms were involved in trading permanent water entitlements (either buying or selling), while around one-quarter of irrigation farms traded water (either buying or selling) on a temporary basis in 2006-07 (table 1). An estimated 31 per cent of dairy farms, 20 per cent of broadacre farms and 23 per cent of horticulture farms participated in temporary water trading in 2006-07.

1 Water trading by irrigation farms, Murray-Darling Basin, 2006-07

percentage of farms

		dairy	broadacre	horticulture	Murray-Darling Basin
Percentage of farms trading					
Permanent entitlements	%	3	1	4	2
Temporary irrigation water	%	31	20	23	23
Reasons for not buying water					
Trade of water restricted	%	10	20	8	13
Price too high	%	42	40	10	25
No irrigation water available	%	12	17	8	13
Not interested	%	5	11	14	11
Extra water not required	%	17	19	46	31
Other	%	5	3	6	5
Reasons for not selling water					
No or low allocation	%	8	20	7	12
Trade of water restricted	%	9	14	9	11
Used all water available	%	56	36	37	40
Prefer to carry over water	%	7	16	18	14
Not interested	%	8	5	18	12
Uncertainty of allocations	%	13	11	18	14
May have needed it	%	28	20	28	26

Source: ABARE survey of irrigation farms in the Murray-Darling Basin.

The survey included a set of questions on reasons farmers did not buy or sell water in 2006-07. The most common reasons given for not buying temporary irrigation water across the Murray-Darling Basin were that extra water was not required (primarily horticulture farms) and/or the price was too high. The most common reason given for not selling temporary water was because farmers had used all the water they had available.

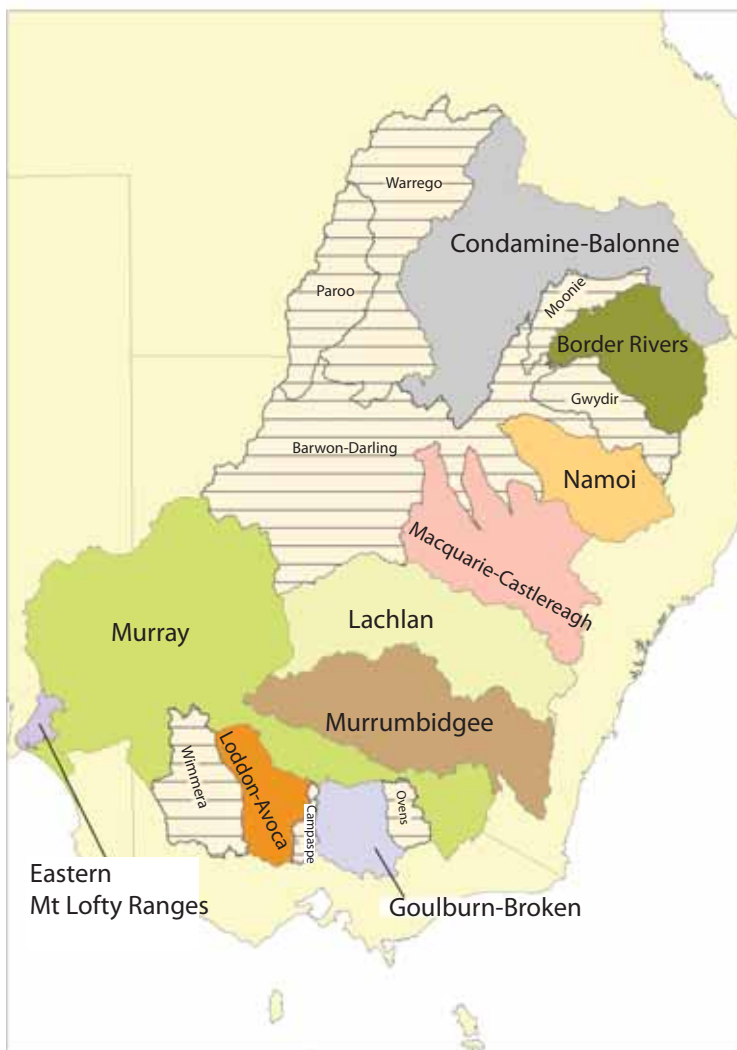
3 Overview of regional water trade

Methodology

In this study, data from ABARE's survey of irrigation farms in the Murray-Darling Basin were used to examine the characteristics of farms participating in temporary water trading in 2006-07. The survey covered irrigated broadacre (including rice and cotton growers), dairy and horticulture farms in 10 regions across the Murray-Darling Basin (map 1).

The 10 survey regions were chosen to cover the major irrigation regions in the Basin and were based on those defined by CSIRO in its 'Sustainable Yields Project' (CSIRO 2007) namely:

map 1 Reporting regions



Condamine-Balonne, Border Rivers, Namoi, Macquarie-Castlereagh, Lachlan, Murrumbidgee, Murray, Goulburn-Broken, Loddon-Avooca, and Eastern Mount Lofty Ranges. The Murray region includes parts of New South Wales, Victoria and South Australia. Some of the CSIRO regions were not covered by ABARE's survey because of relatively small numbers of irrigation farms in those regions. Detailed information on the survey methodology is provided in Ashton and Oliver (2008).

The irrigation survey was conducted using face-to-face interviews to collect detailed farm financial and physical information, including land area and value; crop and livestock production and sales; irrigation water use by crop type and pasture; farm receipts and costs; debts and assets; and market values of farm capital. The irrigation survey also included a set of supplementary questions to collect information on types of water licences held, water trading, types of irrigation infrastructure, basis for irrigation scheduling decisions and future intentions.

box 1 Target populations

ABARE surveys are designed and samples selected on the basis of a framework drawn by the Australian Business Register – maintained by the Australian Bureau of Statistics. This framework includes agricultural establishments (that is, farms) classified by size and industry in each statistical local area.

To be eligible for this survey, farms had to have engaged in irrigated agricultural activities during 2005-06, had an estimated value of agricultural operations of \$40 000 or more and be defined as broadacre, dairy or horticulture industry farms.

The industry definitions used in this study are based on the Australian and New Zealand Standard Industrial Classification (ANZSIC). This classification is consistent with international standards and permits comparisons between industries, both within Australia and internationally. Farms assigned to a particular ANZSIC class means that they have a high proportion of their total output characterised by that class.

The ANZSIC industry classes and codes associated with the broadacre, dairy and horticulture categories used for this study were as follows:

Broadacre	Grain growing	ANZSIC code 0121
	Grain–sheep and grain–beef cattle farming	ANZSIC code 0145
	Rice growing	ANZSIC code 0146
	Other grain growing	ANZSIC code 0149
	Cotton growing	ANZSIC code 0152
	Beef cattle farming	ANZSIC code 0142
	Sheep–beef cattle farming	ANZSIC code 0144
	Sheep farming	ANZSIC code 0141
Dairy	Dairy cattle farming	ANZSIC code 0160
Horticulture	Grape growing	ANZSIC code 0131
	Apple and pear growing	ANZSIC code 0134
	Stone fruit growing	ANZSIC code 0135
	Citrus fruit growing	ANZSIC code 0136
	Other fruit and tree nut growing	ANZSIC code 0139
	Vegegrowing (under cover)	ANZSIC code 0122
Vegegrowing (outdoors)	ANZSIC code 0123	

In this report, results are reported for those regions where the number of sample farms participating in temporary water trading was sufficient to produce reliable estimates. Sufficient farm numbers were available for five regions: the Murrumbidgee, Murray, Goulburn-Broken, Loddon-Avoca and Eastern Mount Lofty Ranges (table 2). Collectively, these regions account for most of the water trading which occurs in the Murray-Darling Basin. Results were also able to be reported for some individual industry groups within most of the five regions (table 2).

2 Reporting regions and industries

region		dairy farms	broadacre farms	horticulture farms	all farms
Goulburn-Broken	buyer - net	√	•	√	√
	seller - net	•	•	•	√
Loddon-Avoca	buyer - net	•	•	•	√
	seller - net	•	√	•	√
Murrumbidgee	buyer - net	•	√	•	√
	seller - net	•	•	√	√
Murray	buyer - net	√	√	√	√
	seller - net	•	•	√	√
Eastern Mt Lofty Ranges	buyer - net	•	•	•	√

√ Sufficient farm numbers were available to produce reliable estimates.

Results are provided for net buyers and net sellers of water on the temporary markets. Net buyers are defined as farms which either only bought water or bought more water than they sold, while net sellers are defined as farms which either only sold water or sold more water than they bought. Non-traders are those farms which did not engage in temporary water trading in 2006-07.

Care should be taken when drawing inferences from the reported results because the Murray-Darling Basin irrigation survey was not designed to provide representative estimates of water traders as a group. Consequently, the average volume of water purchased per farm is not equal to the average volume of water sold per farm, nor can these average volumes be aggregated to represent the total volume of water traded in each region. Nevertheless, the survey results do allow comparisons of the characteristics of water traders and non-traders.

Regional overview

The extent to which dairy, broadacre and horticulture farms participated in temporary water trading varied considerably between the five regions. Relative participation rates are provided in more detail in chapter 4. However, some broad participation rates can be provided for groups of farms aggregated across all five regions according to industry type and water trading involvement.

Of the net buyers group (aggregated across all five regions), around 50 per cent were horticulture farms, 30 per cent were dairy farms and 20 per cent were broadacre farms. For the

net sellers group, more than 60 per cent were horticulture farms, 20 per cent were dairy farms and around 20 per cent were broadacre farms.

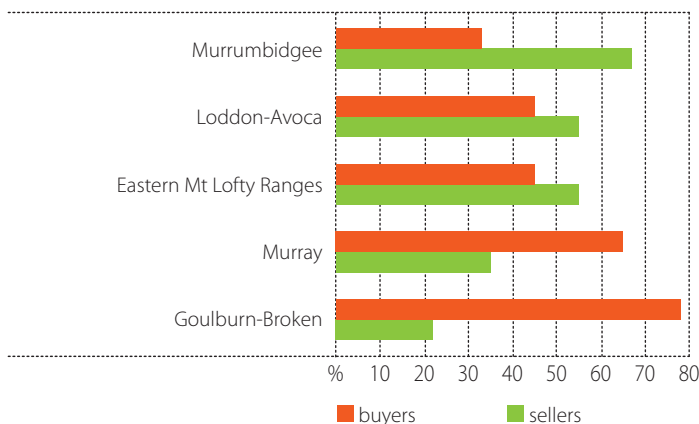
Aggregating net buyers and net sellers (but excluding non-traders) on an industry basis across all five regions showed that a greater proportion of dairy farms were net buyers than broadacre or horticulture farms.

Around 70 per cent of water trading dairy farms were net buyers, while 30 per cent were net sellers. For broadacre farms the relative split between buyers and sellers was around 60 per cent and 40 per cent respectively, while for horticulture farms the split was more even at around 55 per cent (net buyers) and 45 per cent (net sellers).

At a regional level, the proportion of farms engaged in temporary water trading was between 40 and 50 per cent in the Murrumbidgee, Murray, Goulburn-Broken and Loddon-Avoca regions. In the Eastern Mount Lofty Ranges region, the participation rate was much lower with around 17 per cent of farms participating in temporary water trading in 2006-07.

In the Goulburn-Broken and Murray regions a majority of the farms engaged in water trading were net buyers, while in the Murrumbidgee a majority of water trading farms were net sellers. In both the Loddon-Avoca and Eastern Mount Lofty Ranges regions a small majority of water trading farms were net sellers (figure b).

b Proportion of water trading farms that bought or sold water, by region, 2006-07



Source: ABARE survey of irrigation farms in the Murray-Darling Basin.

Regional comparisons

Regional comparisons of selected farm physical and financial performance estimates for net buyers, net sellers and non-traders are shown in table 3 and table 4 respectively.

On average, net buyers in the Murrumbidgee region purchased the largest volume of irrigation water (460 megalitres per farm) while net buyers in the Goulburn-Broken purchased the lowest

3 Selected physical estimates, temporary water traders, by region, 2006-07

average per farm

	net volume of water bought or sold a	area irrigated	water applied crops and to pasture	water application rate	area crops irrigated	area pasture irrigated	water entitlements held
	ML	ha	ML	ML/ha	ha	ha	ML
Net water buyers							
Murrumbidgee	460	311	1 163	3.7	294	19	1 970
Murray	240	98	512	5.2	75	22	588
Goulburn-Broken	113	96	244	2.6	59	36	382
Loddon-Avoca	197	102	460	4.5	32	70	410
Mt Lofty Ranges	167	112	512	4.6	93	18	525
Net water sellers							
Murrumbidgee	-92	39	204	5.2	34	6	489
Murray	-82	43	190	4.3	39	4	465
Goulburn-Broken	-71	64	150	2.3	46	18	516
Loddon-Avoca	-96	99	158	1.6	66	32	565
Non-water traders							
Murrumbidgee	na	116	425	3.7	111	5	1 355
Murray	na	75	253	3.4	64	12	413
Goulburn-Broken	na	69	133	1.9	39	29	390
Loddon-Avoca	na	110	360	3.3	76	34	482
Mt Lofty Ranges	na	31	91	2.9	28	4	124

a Negative figures represent net sales.

Source: ABARE survey of irrigation farms in the Murray-Darling Basin.

average volume of water (113 megalitres per farm). The proportion of total irrigation water net buyers obtained via purchases (as opposed to allocations), was between 40 and 47 per cent in all regions except the Eastern Mount Lofty Ranges (where it was lower at 33 per cent).

The average volume of water sold by net sellers ranged from around 70 megalitres in the Goulburn-Broken region to 96 megalitres in the Loddon-Avoca region. The proportion of total available irrigation water sold by net sellers ranged between 30 and 44 per cent across the regions.

In all regions, except the Loddon-Avoca region, net buyers irrigated larger total areas than both net sellers and non-traders. Net buyers irrigated larger areas of pasture in all regions and, except in the Loddon-Avoca, larger crop areas. Net buyers also irrigated the largest average area of vegetable crops in all regions.

Reflecting their larger irrigation areas, net buyers in all regions applied much larger total volumes of water to crops and pasture than non-traders and net sellers. Apart from the Murrumbidgee region, net buyers also reported higher water application rates per hectare than both net sellers and non-traders.

Table 4 shows that in most regions, net buyers recorded the highest average total cash receipts and cash costs, while net sellers had the lowest total cash receipts and costs. However, for farm business profit – a measure of the returns from farming after allowance has been made for co-

4 Selected financial estimates, temporary water traders, by region, 2006-07

average per farm

	total cash receipts \$	total cash costs \$	temporary water receipts or costs a %	farm business profit \$	rate of return %	equity ratio %
Net water buyers						
Murrumbidgee	897 580	833 350	8	-42 090	3.5	74
Murray	695 540	652 730	11	-46 750	0.8	79
Goulburn-Broken	495 790	475 480	9	-63 100	-1.0	79
Loddon-Avoca	471 210	454 900	14	-47 860	-0.9	73
Mt Lofty Ranges	1 450 940	1 291 660	6	51 860	4.6	61
Net water sellers						
Murrumbidgee	201 170	146 690	12	2 370	1.8	82
Murray	266 120	195 690	8	7 210	1.6	85
Goulburn-Broken	379 190	395 980	8	-96 830	-0.9	78
Loddon-Avoca	488 320	294 250	19	85 560	2.3	86
Non-water traders						
Murrumbidgee	428 250	389 300	na	-50 630	0.1	83
Murray	288 700	238 550	na	-7 100	1.5	83
Goulburn-Broken	471 930	457 540	na	-68 970	-0.6	74
Loddon-Avoca	343 920	259 160	na	-3 200	1.0	92
Mt Lofty Ranges	219 150	166 620	na	1 330	1.4	84

a For net buyers the reported figure is the total cost of water purchased expressed as a percentage of total cash costs; For net sellers the reported figure is total receipts from water sales expressed as a percentage of total cash receipts.

Source: ABARE survey of irrigation farms in the Murray-Darling Basin.

operator and family labour, depreciation and changes in the value of trading stock – the net sellers group recorded the highest values in all regions except in the Goulburn-Broken region.

For rate of return to capital and management – defined as profit at full equity divided by total capital – the results were more mixed among buyers, sellers and non-traders. For example, net buyers in the Murrumbidgee and Eastern Mount Lofty Ranges regions recorded the highest rates of return while net buyers in the other three regions recorded the lowest return figures.

The average cost of temporary water purchases for net buyers ranged from around \$44 000 a farm in the Goulburn-Broken region to about \$72 000 a farm in the Eastern Mount Lofty Ranges and Murray regions. Water purchase costs as a proportion of total cash costs were highest in the Loddon-Avoca region (14 per cent) and lowest in the Eastern Mount Lofty Ranges region (6 per cent).

The average receipts per farm from temporary water sales for net sellers ranged from around \$22 000 a farm in the Murray and Murrumbidgee regions to more than \$90 000 a farm in the Loddon-Avoca region. When expressed as a proportion of total cash receipts, water sale receipts ranged from 8 per cent in the Murray and Goulburn-Broken regions, to 19 per cent in the Loddon-Avoca.

4 Intra-regional results

Murrumbidgee region

- An estimated 48 per cent of irrigators in the Murrumbidgee region participated in temporary water trading in 2006-07, of which 67 per cent were net sellers.
- Net buyers were mostly broadacre with lesser numbers of dairy farms.
- Net sellers were mostly horticulture farms.
- Non-traders were mostly broadacre farms with lesser numbers of horticulture farms.

Reflecting the high proportion of horticulture farms in the group, on average net sellers operated much smaller farms and irrigated much smaller areas than the net buyer and non-trader groups (table 5). Net sellers also applied less water to crops and pasture (averaging 204 megalitres) than net buyers (1163 megalitres) and non-traders (425 megalitres).

On average, net sellers sold 92 megalitres of water, which was around 31 per cent of their total available water. In comparison, net buyers purchased 40 per cent of their total water used in 2006-07.

On average, net sellers held water entitlements for about 490 megalitres of irrigation water, much lower than the volumes held by net buyers (1970 megalitres) and non-traders (1355 megalitres). However, high security entitlements accounted for a much higher proportion of net sellers' total entitlement (45 per cent) than for net buyers and non-traders (3 per cent and 10 per cent respectively).

For net sellers, the main reason given for not buying water was because it was not needed (62 per cent of net sellers). For the non-trader group, the main reason reported was because the price was too high (50 per cent).

The main reasons reported by net buyers for not selling water were that they had used all available water (70 per cent) and that they had no allocation (36 per cent). These were also nominated by the non-trader group as major reasons for not selling water.

Net sellers recorded an average farm cash income – defined as total cash receipts less total cash costs – of around \$54 500 in 2006-07. This was less than that recorded by net buyers (\$64 230) but higher than the average for non-traders (\$38 950). Reflecting the dominance of horticulture farms in the group, net sellers generated around 50 per cent of total cash receipts from tree and vine crop sales. Temporary water sales accounted for around 12 per cent of total cash receipts.

5 Selected estimates, Murrumbidgee region, 2006-07

average per farm

		net buyers		net sellers		non-traders	
Area operated	ha	1 182	(61)	463	(69)	918	(30)
Sheep	no.	672	(22)	361	(60)	882	(17)
Beef cattle	no.	87	(40)	13	(78)	43	(30)
Dairy cattle	no.	79	(67)	0	–	14	(51)
Area cropped	ha	449	(33)	75	(29)	205	(15)
Area set up for irrigation	ha	599	(21)	73	(19)	351	(14)
Area of crops irrigated	ha	294	(35)	34	(16)	111	(16)
Area of pasture irrigated	ha	19	(47)	6	(75)	5	(65)
Water applied to crops & pasture	ML	1 163	(42)	204	(16)	425	(22)
Water application rate	ML/ha	4	(20)	5	(7)	4	(15)
Net volume water bought/sold	ML	460	(30)	–92	(16)	0	–
Total water entitlements held	ML	1 970	(27)	489	(12)	1 355	(15)
Farm cash income	\$	64 230	(165)	54 497	(24)	38 948	(63)
Farm business profit	\$	–42 090	(100)	2 372	(100)	–50 632	(47)
Total farm debt at 30 June	\$	805 098	(14)	356 129	(20)	537 259	(23)
Equity ratio	%	74	(4)	82	(3)	83	(3)
Rate of return	%	3.5	(71)	1.8	(41)	0.1	(100)
Main reasons for not purchasing water							
Price too high	%	na	–	14	(21)	50	(13)
No water available	%	na	–	3	(69)	16	(27)
Not interested	%	na	–	16	(38)	14	(43)
Extra water not needed	%	na	–	62	(10)	21	(25)
Main reasons for not selling water							
No allocation	%	36	(33)	na	–	26	(21)
Used all water available	%	70	(14)	na	–	37	(20)
Uncertainty of future allocations	%	23	(44)	na	–	7	(57)
May have needed it	%	24	(51)	na	–	26	(23)

Note: Figures in parentheses are standard errors, expressed as percentages of the estimates.

Source: ABARE survey of irrigation farms in the Murray-Darling Basin.

Similarly, the net buyers group comprised mainly broadacre and dairy farms and generated much of their total cash receipts from broadacre crops, milk and livestock sales. On average, this group generated around \$89 000 of cash receipts from selling water, while incurring a cost of around \$68 000 on water purchases in 2006-07. This seemingly contrary result (where net buyers had higher receipts than costs from water trading) is likely to have been the result of trading throughout the irrigation season. That is, it is likely that farms in the surveyed sample purchased a majority of water early in the season when prices were relatively low and sold in the latter part of the season when prices were relatively high.

Net sellers outperformed net buyers and non-traders on farm business profit. However, on rate of return, it was the net buyers (3.5 per cent) that outperformed net sellers (1.8 per cent), who in turn outperformed non-traders (0.1 per cent).

6 Selected estimates, irrigated broadacre farms, Murrumbidgee region, 2006-07 average per farm

		broadacre farms			
		net buyers		non-traders	
Area operated	ha	1 765	(68)	1 466	(33)
Sheep	no.	1 121	(22)	1 546	(18)
Area cropped	ha	603	(41)	294	(18)
Area set up for irrigation	ha	827	(25)	563	(15)
Area of crops irrigated	ha	346	(48)	142	(20)
Area of dryland crops	ha	258	(43)	152	(24)
Area of pasture irrigated	ha	13	(90)	4	(87)
Water applied to crops & pasture	ML	1 624	(49)	516	(27)
Water application rate	ML/ha	5	(11)	4	(20)
Farm cash income	\$	87 489	(99)	45 607	(73)
Farm business profit	\$	-41 162	(99)	-64 721	(51)
Total farm debt at 30 June	\$	753 043	(26)	602 456	(18)
Equity ratio	%	80	(5)	84	(4)
Rate of return	%	4.5	(68)	-0.1	(99)
Water entitlements held					
Ground water	ML	526	(19)	176	(19)
General security (NSW)	ML	2 214	(19)	1 702	(17)
High security (NSW)	ML	45	(100)	80	(89)
Supplementary (NSW)	ML	0	-	24	(65)
Total	ML	2 786	(30)	1 982	(16)
Main reasons for not selling water					
No allocation	%	11	(61)	40	(22)
Used all water available	%	60	(23)	41	(24)
Uncertainty of future allocations	%	32	(48)	7	(59)
May have needed it	%	28	(34)	18	(40)

Note: Figures in parentheses are standard errors, expressed as percentages of the estimates.

Source: ABARE survey of irrigation farms in the Murray-Darling Basin.

Broadacre farms – net buyers and non-traders

For broadacre farms in the Murrumbidgee region, net buyers reported higher estimates than non-traders for most measures of both physical and financial performance (table 6). On average, net buyers had larger farms, cropped larger areas (dryland and irrigated), irrigated larger areas and used more irrigation water than non-traders.

On average, both total cash receipts and total cash costs for the net buyer group were much higher than those recorded by non-traders. A majority of net buyers' cash receipts were derived from broadacre crop commodities, including rice sales. Total water purchases accounted for 8 per cent of net buyers' total cash costs. Overall, for farm cash income, farm business profit and rate of return, net buyers had better financial results than non-traders.

The main reasons net buyers did not sell water were that all available water had been used (60 per cent), uncertainty surrounding future allocations (32 per cent) and that they may have needed it (28 per cent).

Horticulture farms – net sellers and non-traders

For horticulture farms in the Murrumbidgee region, net sellers were generally smaller and more specialised than non-trading horticulture farms (table 7). On average, net sellers sold about 40 per cent of their total available water. Non-traders held nearly twice the water entitlements held by net sellers, although both groups held similar volumes of high security water.

7 Selected estimates, irrigated horticulture farms, Murrumbidgee region, 2006-07 average per farm

		horticulture farms			
		net sellers		non-traders	
Area operated	ha	30	(21)	188	(47)
Area cropped	ha	24	(13)	87	(28)
Area set up for irrigation	ha	28	(19)	74	(25)
Area of crops irrigated	ha	24	(13)	75	(32)
Area of dryland crops	ha	0	–	12	(67)
Water applied to crops & pasture	ML	135	(9)	314	(42)
Water application rate	ML/ha	6	(8)	4	(18)
Farm cash income	\$	45 755	(29)	33 646	(100)
Farm business profit	\$	377	(100)	–26 311	(100)
Total farm debt at 30 June	\$	279 313	(16)	439 210	(64)
Equity ratio	%	82	(3)	83	(7)
Rate of return	%	1.8	(51)	0.9	(100)
Water entitlements held					
Ground water	ML	0	(100)	58	(100)
General security (NSW)	ML	31	(100)	191	(78)
High security (NSW)	ML	252	(7)	258	(29)
Supplementary (NSW)	ML	0	–	25	(90)
Unregulated	ML	0	–	18	(83)
Total	ML	283	(13)	560	(42)
Main reasons for not purchasing water					
Not interested	%	17	(41)	25	(57)
Extra water not needed	%	74	(10)	46	(26)
Price too high	%	2	(92)	19	(46)
No water available	%	2	(92)	18	(39)

Note: Figures in parentheses are standard errors, expressed as percentages of the estimates.

Source: ABARE survey of irrigation farms in the Murray-Darling Basin.

The two main reasons net sellers did not purchase water were that it was not required (74 per cent) and they had no interest in buying water (17 per cent). Non-traders also nominated these as the major reasons for not buying water.

Both groups generated the majority of their total cash receipts from tree and vine crop sales. Receipts from temporary water sales accounted for around 15 per cent of total cash receipts for net sellers. Both average total cash receipts and average total cash costs were much larger

for non-traders; however, farm cash incomes were similar between the two groups. Net sellers performed better than non-traders on farm business profit and rate of return.

Murray region

- An estimated 40 per cent of irrigators in the Murray region participated in temporary water trading in 2006-07, of which 65 per cent were net buyers.
- In all three groups (buyers, sellers, non-traders) a majority of farms were horticulture farms.

On average, net buyers in the Murray region operated larger farms, cropped larger areas and irrigated more crop and pasture area than net sellers and non-traders (table 8). Reflecting their larger average irrigation area and higher per hectare water application rates, on average net buyers used more water (512 megalitres) than net sellers (190 megalitres) and non-traders (250 megalitres).

8

Selected estimates, Murray region, 2006-07

average per farm

		net buyers		net sellers		non-traders	
Area operated	ha	425	(22)	375	(51)	385	(43)
Sheep	no.	135	(44)	134	(44)	198	(21)
Beef cattle	no.	36	(31)	21	(63)	40	(37)
Dairy cattle	no.	116	(16)	20	(19)	47	(27)
Area cropped	ha	178	(29)	108	(46)	127	(22)
Area set up for irrigation	ha	164	(17)	106	(28)	164	(48)
Area of crops irrigated	ha	75	(35)	39	(13)	64	(41)
Area of pasture irrigated	ha	22	(26)	4	(47)	12	(26)
Water applied to crops & pasture	ML	512	(27)	190	(12)	253	(14)
Water application rate	ML/ha	5	(8)	4	(11)	3	(26)
Net volume water bought/ sold	ML	240	(34)	-82	(17)	0	
Total water entitlements held	ML	588	(24)	465	(12)	413	(8)
Farm cash income	\$	42 807	(100)	70 434	(35)	50 155	(28)
Farm business profit	\$	-46 748	(100)	7 208	(100)	-7 101	(100)
Total farm debt at 30 June	\$	614 833	(17)	278 018	(17)	314 161	(19)
Equity ratio	%	79	(4)	85	(3)	83	(3)
Rate of return	%	0.8	(100)	1.6	(68)	1.5	(53)
Main reasons for not purchasing water							
Price too high	%	na	-	18	(32)	26	(18)
Extra water not needed	%	na	-	62	(11)	61	(8)
Main reasons for not selling water							
Used all water available	%	70	(9)	na	-	42	(13)
Prefer to carry over water	%	7	(37)	na	-	28	(18)
Not interested	%	7	(37)	na	-	19	(24)
Uncertainty of future allocations	%	15	(25)	na	-	26	(19)
May have needed it	%	22	(22)	na	-	31	(16)

Note: Figures in parentheses are standard errors, expressed as percentages of the estimates.

Source: ABARE survey of irrigation farms in the Murray-Darling Basin.

Net buyers in the Murray region were heavily reliant on purchased water. On average, net buyers purchased almost 50 per cent of their total irrigation water used in 2006-07. In comparison, net sellers sold around 30 per cent of their total available water.

Average total cash receipts and total cash costs for net buyers were up to double that recorded by net sellers and non-traders. The most important source of income was from tree and vine crop sales. Temporary water costs accounted for around 11 per cent of net buyers' total cash costs on average.

Receipts from water sales accounted for around 8 per cent of total cash receipts for net sellers. Overall, for farm cash income, farm business profit and rate of return, net sellers were the best performing group on average. Net buyers recorded the lowest performance for these three measures in 2006-07.

The main reason given by net buyers for not selling water was they had used all available water (70 per cent). A further 22 per cent said they may have needed the water at some future time during the season. Non-traders nominated a wider range of reasons for not selling water, including having used all available water (42 per cent), preferring to carry water over (28 per cent), lack of interest (19 per cent), uncertainty of future allocations (26 per cent), and that they may have needed it (31 per cent).

For the net seller group, the main reason given for not purchasing water was a lack of interest (62 per cent). Non-traders also nominated a lack of interest (61 per cent) as the main reason for not buying water.

Dairy farms – net buyers and non-traders

For dairy farms in the Murray region, net buyers operated larger farms, stocked more dairy cattle, had a larger area set up for irrigation and irrigated larger areas of crops and pasture than non-traders (table 9).

Net buyers used around two and a half times the volume of water used by non-traders on average (1028 megalitres compared with 398 megalitres), with net buyers sourcing more than 40 per cent of their water through market purchases.

Despite generating higher total cash receipts and costs, net buyers recorded lower average farm cash incomes than non-traders. Fodder was a major cost for both groups, at around one-third of total cash costs. Temporary water costs accounted for a further 12 per cent of total cash costs for net buyers.

Non-traders also outperformed net buyers on the financial performance measures of farm business profit and rate of return.

9 Selected estimates, irrigated dairy farms, Murray region, 2006-07

average per farm

		dairy farms			
		net buyers		non-traders	
Area operated	ha	463	(37)	280	(19)
Dairy cattle	no.	509	(16)	319	(27)
Area cropped	ha	144	(38)	111	(20)
Area set up for irrigation	ha	212	(10)	185	(26)
Area of crops irrigated	ha	78	(26)	65	(28)
Area of dryland crops	ha	66	(88)	46	(28)
Area of pasture irrigated	ha	87	(26)	43	(35)
Water applied to crops & pasture	ML	1 028	(13)	398	(24)
Water application rate	ML/ha	6	(8)	4	(10)
Farm cash income	\$	58 010	(100)	87 563	(28)
Farm business profit	\$	-83 684	(100)	3 908	(100)
Total farm debt at 30 June	\$	855 448	(21)	535 417	(35)
Equity ratio	%	81	(3)	81	(5)
Rate of return	%	-0.2	(100)	1.7	(44)
Water entitlements held					
Ground water	ML	239	(42)	160	(42)
General security (NSW)	ML	280	(42)	118	(55)
Water right (Victoria)	ML	379	(27)	351	(27)
Other	ML	45	(100)	3	(96)
Surface (South Australia)	ML	94	(66)	25	(97)
Total	ML	1 037	(11)	658	(17)
Main reasons for not selling water					
No allocation	%	20	(33)	7	(55)
Used all water available	%	80	(7)	52	(35)
Prefer to carry over water	%	6	(65)	30	(68)
Uncertainty of future allocations	%	7	(68)	19	(79)
May have needed it	%	17	(39)	11	(42)

Note: Figures in parentheses are standard errors, expressed as percentages of the estimates.

Source: ABARE survey of irrigation farms in the Murray-Darling Basin.

Broadacre farms – net buyers and non-traders

For broadacre farms in the Murray region, non-traders operated larger farms on average than net buyers (table 10). Non-traders also ran more sheep and cattle, irrigated a much larger area (both crops and pasture) and used twice the amount of irrigation water.

Net buyers sourced almost 70 per cent of their irrigation water through purchases, with these purchases accounting for 10 per cent of total cash costs.

Despite recording generally higher estimates for many physical performance variables, non-traders were outperformed by net buyers on the measures of farm cash income, farm business profit and rates of return in 2006-07.

10 Selected estimates, irrigated broadacre farms, Murray region, 2006-07

average per farm

		broadacre farms			
		net buyers		non-traders	
Area operated	ha	927	(34)	1 532	(55)
Sheep	no.	539	(48)	896	(23)
Beef cattle	no.	113	(38)	184	(41)
Area cropped	ha	403	(48)	449	(31)
Area set up for irrigation	ha	311	(15)	597	(66)
Area of crops irrigated	ha	91	(44)	199	(66)
Area of dryland crops	ha	311	(55)	250	(22)
Area of pasture irrigated	ha	13	(99)	27	(40)
Water applied to crops & pasture	ML	206	(44)	421	(32)
Water application rate	ML/ha	2	(18)	2	(34)
Farm cash income	\$	71 829	(91)	111	(100)
Farm business profit	\$	-17 537	(100)	-78 212	(58)
Total farm debt at 30 June	\$	598 838	(39)	291 916	(49)
Equity ratio	%	74	(7)	90	(5)
Rate of return	%	1.1	(100)	-0.9	(100)
Water entitlements held					
Ground water	ML	23	(36)	119	(36)
General security (NSW)	ML	620	(36)	388	(27)
Water right (Victoria)	ML	55	(95)	216	(25)
Unregulated	ML	0	-	61	(83)
Other	ML	0	-	7	(96)
Surface (South Australia)	ML	30	(91)	10	(91)
Total	ML	728	(33)	804	(14)
Main reasons for not selling water					
No allocation	%	29	(41)	23	(46)
Restrictions on trading	%	0	-	18	(56)
Used all water available	%	56	(39)	30	(35)
Prefer to carry over water	%	8	(100)	29	(41)
Uncertainty of future allocations	%	19	(71)	8	(51)
May have needed it	%	8	(100)	18	(35)

Note: Figures in parentheses are standard errors, expressed as percentages of the estimates.

Source: ABARE survey of irrigation farms in the Murray-Darling Basin.

Horticulture farms – net buyers, net sellers and non-traders

For horticulture farms in the Murray region, net buyers were significantly larger than farms in the other two groups with respect to average farm area operated, area cropped, area irrigated and water used in 2006-07 (table 11).

Net buyers also recorded total cash receipts and total cash costs more than double those for the other two groups. Despite larger receipts and costs, net buyers were outperformed by both net sellers and non-traders on farm cash income, farm business profit and rate of return.

11 Selected estimates, irrigated horticulture farms, Murray region, 2006-07

average per farm

		horticulture farms					
		net buyers		net sellers		non-traders	
Area operated	ha	233	(41)	60	(28)	65	(19)
Area cropped	ha	113	(48)	29	(17)	34	(24)
Area set up for irrigation	ha	92	(49)	48	(50)	29	(16)
Area of crops irrigated	ha	68	(64)	28	(17)	23	(14)
Area of dryland crops	ha	44	(55)	1	(55)	12	(59)
Water applied to crops & pasture	ML	415	(56)	162	(17)	172	(17)
Water application rate	ML/ha	6	(14)	6	(10)	8	(5)
Farm cash income	\$	26 522	(100)	66 062	(40)	56 842	(25)
Farm business profit	\$	-42 316	(100)	9 049	(100)	11 735	(100)
Total farm debt at 30 June	\$	529 873	(26)	244 469	(21)	268 182	(25)
Equity ratio	%	79	(7)	84	(3)	81	(4)
Rate of return	%	1.2	(100)	2.0	(75)	3.4	(37)
Water entitlements held							
Ground water ^a	ML	22	(44)	10	(44)	19	(44)
General security (NSW)	ML	0	-	6	(100)	10	(45)
High security (NSW)	ML	42	(44)	99	(30)	39	(37)
Water right (Victoria)	ML	91	(40)	152	(23)	54	(24)
Surface (South Australia)	ML	204	(100)	59	(100)	117	(21)
Total	ML	359	(64)	328	(19)	242	(13)
Main reasons for not purchasing water							
Price too high	%	na	-	6	(72)	17	(27)
Extra water not needed	%	na	-	69	(13)	69	(9)
Main reasons for not selling water							
Used all water available	%	71	(9)	na	-	44	(16)
Prefer to carry over water	%	8	(46)	na	-	28	(20)
Not interested	%	10	(39)	na	-	26	(26)
Uncertainty of future allocations	%	18	(24)	na	-	33	(21)
May have needed it	%	29	(23)	na	-	39	(19)

Note: Figures in parentheses are standard errors, expressed as percentages of the estimates.

Source: ABARE survey of irrigation farms in the Murray-Darling Basin.

Temporary water purchases accounted for around one-half of net buyers' total water volume used and for about 11 per cent of net buyers' total cash costs. Conversely, net sellers sold slightly more than 30 per cent of their total available water, with these sales accounting for 9 per cent of total cash receipts.

Goulburn-Broken

- An estimated 47 per cent of irrigators in the Goulburn-Broken region participated in temporary water trading in 2006-07, of which 78 per cent were net buyers.
- Net buyers were mostly dairy and horticulture farms.
- Net sellers were mostly dairy farms with lesser numbers of broadacre farms.
- Non-traders were mostly dairy farms with lesser numbers of horticulture farms.

On average, net buyers in the Goulburn-Broken region operated smaller farms, ran fewer cattle and cropped less total area than the net seller and non-trader groups. However, net buyers irrigated a larger area (for both crops and pasture) and consequently used more irrigation water in 2006-07 than the other two groups (table 12). Net buyers purchased around 46 per cent of their total irrigation water used while net sellers sold around one-third of their total available water in 2006-07.

12 Selected estimates, Goulburn-Broken region, 2006-07

average per farm

		net buyers		net sellers		non-traders	
Area operated	ha	194	(16)	461	(30)	239	(21)
Sheep	no.	129	(54)	78	(70)	350	(51)
Beef cattle	no.	8	(52)	72	(50)	23	(46)
Dairy cattle	no.	139	(13)	242	(41)	190	(20)
Area cropped	ha	89	(23)	165	(22)	97	(32)
Area set up for irrigation	ha	126	(12)	169	(34)	115	(12)
Area of crops irrigated	ha	59	(17)	46	(47)	39	(17)
Area of pasture irrigated	ha	36	(35)	18	(42)	29	(39)
Water applied to crops & pasture	ML	244	(11)	150	(36)	133	(16)
Water application rate	ML/ha	3	(11)	2	(22)	2	(14)
Net volume water bought/sold	ML	113	(18)	-71	(42)	0	
Total water entitlements held	ML	385	(10)	516	(32)	390	(13)
Farm cash income	\$	20 311	(100)	-16 789	(100)	14 398	(100)
Farm business profit	\$	-63 105	(36)	-96 831	(33)	-68 969	(42)
Total farm debt at 30 June	\$	534 093	(21)	755 773	(50)	626 413	(29)
Equity ratio	%	79	(5)	78	(6)	74	(8)
Rate of return	%	-1.0	(96)	-0.9	(100)	-0.6	(100)
Main reasons for not purchasing water							
Price too high	%	na	-	64	(26)	70	(9)
Not interested	%	na	-	15	(40)	11	(45)
Extra water not needed	%	na	-	14	(89)	15	(32)
Main reasons for not selling water							
Used all water available	%	77	(10)	na	-	61	(15)
Uncertainty of future allocations	%	12	(51)	na	-	23	(36)
May have needed it	%	27	(30)	na	-	56	(14)

Note: Figures in parentheses are standard errors, expressed as percentages of the estimates.

Source: ABARE survey of irrigation farms in the Murray-Darling Basin.

Net buyers performed better than the other two groups with respect to farm cash income and farm business profit (albeit negative) and also had a slightly better equity position. On rate of return, net buyers returned slightly worse results than net sellers and non-traders, although all three groups recorded negative rates of return.

The majority of net buyers (77 per cent) said their main reason for not selling water was because they had used it all, while 27 per cent said they may have needed it at a later time.

These were also the two main reasons given by non-traders. For both net sellers and non-traders, the high price of water was the main reason for not purchasing water (64 per cent and 70 per cent respectively).

Dairy farms – net buyers and non-traders

For dairy farms in the Goulburn-Broken region, net buyers reported higher estimates than non-traders for most measures of physical performance. That is, net buyers operated larger farms, carried more livestock and irrigated larger areas of crop and pasture than non-traders. Net buyers also used double the amount of irrigation water used by non-traders (table 13).

On average, net buyers sourced around 40 per cent of their total irrigation water requirements through market purchases. This purchased water accounted for 8 per cent of total cash costs although fodder was the major cost item for both net buyers and non-traders, accounting for around 40 per cent of total cash costs for both groups.

13 Selected estimates, irrigated dairy farms, Goulburn-Broken region, 2006-07

average per farm

		dairy farms			
		net buyers		non-traders	
Area operated	ha	192	(12)	167	(12)
Sheep	no.	88	(97)	0	
Dairy cattle	no.	262	(13)	255	(21)
Area cropped	ha	78	(25)	55	(19)
Area set up for irrigation	ha	169	(14)	122	(14)
Area of crops irrigated	ha	68	(26)	35	(24)
Area of dryland crops	ha	10	(41)	19	(35)
Area of pasture irrigated	ha	69	(35)	35	(45)
Water applied to crops & pasture	ML	264	(13)	133	(21)
Water application rate	ML/ha	2	(11)	2	(18)
Farm cash income	\$	-17 320	(100)	23 564	(100)
Farm business profit	\$	-113 667	(16)	-60 101	(44)
Total farm debt at 30 June	\$	538 427	(21)	486 920	(47)
Equity ratio	%	78	(6)	75	(13)
Rate of return	%	-3.1	(17)	-0.7	(100)
Water entitlements held					
Ground water	ML	21	(13)	89	(13)
Water right (Victoria)	ML	459	(13)	314	(14)
Other	ML	4	(97)	22	(72)
Total	ML	485	(12)	426	(15)
Main reasons for not selling water					
Used all water available	%	79	(15)	63	(19)
Not interested	%	10	(87)	15	(63)
Uncertainty of future allocations	%	12	(74)	23	(46)
May have needed it	%	33	(41)	65	(16)

Note: Figures in parentheses are standard errors, expressed as percentages of the estimates.

Source: ABARE survey of irrigation farms in the Murray-Darling Basin.

Despite having similar total cash receipts, non-traders had lower total cash costs, and were therefore able to record a superior farm cash income, than net buyers. The non-trading group also outperformed net buyers on farm business profit and rate of return, although both groups recorded negative values for the two measures.

Horticulture farms – net buyers and non-traders

For horticulture farms in the Goulburn-Broken region, both net buyers and non-traders had relatively diverse farming operations with a mix of horticultural crops, livestock and dryland cropping activities.

On average, total farm area, livestock numbers and dryland cropping area for non-trading farms were much larger than net buyers (table 14). However, net buyers irrigated a slightly larger area on average than non-traders and used around twice the average volume of irrigation water in 2006-07.

14 Selected estimates, irrigated horticulture farms, Goulburn-Broken region, 2006-07 average per farm

		horticulture farms			
		net buyers		non-traders	
Area operated	ha	191	(34)	432	(61)
Sheep	no.	210	(64)	1,354	(73)
Area cropped	ha	110	(39)	238	(72)
Area set up for irrigation	ha	84	(24)	78	(47)
Area of crops irrigated	ha	55	(19)	44	(32)
Area of dryland crops	ha	55	(70)	195	(84)
Area of pasture irrigated	ha	0	–	1	(100)
Water applied to crops & pasture	ML	253	(20)	122	(29)
Water application rate	ML/ha	5	(11)	3	(8)
Farm cash income	\$	71 867	(66)	–33 425	(100)
Farm business profit	\$	–1 329	(100)	–118 848	(100)
Total farm debt at 30 June	\$	620 839	(41)	1 376 027	(31)
Equity ratio	%	79	(9)	67	(9)
Rate of return	%	1.4	(100)	–0.3	(100)
Water entitlements held					
Ground water	ML	37	(18)	68	(18)
Water right (Victoria)	ML	247	(18)	139	(35)
Other	ML	0	–	43	(64)
Total	ML	284	(19)	250	(23)
Main reasons for not selling water					
Restrictions on trading	%	0	–	44	(21)
Used all water available	%	73	(15)	51	(18)
May have needed it	%	22	(43)	22	(61)

Note: Figures in parentheses are standard errors, expressed as percentages of the estimates.

Source: ABARE survey of irrigation farms in the Murray-Darling Basin.

Net buyers held more than 85 per cent of their water entitlements in the form of water rights, while for non-traders it was considerably less at around 55 per cent. Groundwater and other entitlements were more important for non-traders than for net buyers.

Non-traders generated average total cash receipts about 25 per cent higher than net buyers, yet also incurred costs around 45 per cent higher than those incurred by net buyers. This resulted in non-traders achieving a much lower average farm cash income than net buyers. Net buyers also outperformed non-traders on average farm business profit and rate of return.

Loddon-Avoca

- An estimated 49 per cent of irrigators in the Loddon-Avoca region participated in temporary water trading in 2006-07 of which slightly more than half were net sellers.
- Net buyers comprised all three industry farms with no dominant industry.
- Net sellers were mostly broadacre farms with lesser numbers of dairy and horticulture farms.
- Non-traders comprised all three industry farms with no dominant industry.

Reflecting the higher proportion of broadacre farms in the group, net sellers operated larger farm areas on average, ran more sheep and cattle and cropped larger areas (mostly dryland) than either net buyers or non-traders (table 15). Net buyers on the other hand, had more dairy cattle and irrigated a larger average pasture area than the other two groups. On average, net buyers also applied the most water to crops and pasture (460 megalitres) at the highest per hectare rate (5 megalitres per hectare).

Net sellers sold around 38 per cent of their total available water while net buyers purchased slightly more than 40 per cent of their total irrigation water needs in 2006-07.

On average, net sellers held the highest total water entitlement volume (around 560 megalitres) of which 40 per cent was groundwater entitlement. In contrast, net buyers and non-traders held only around 15 per cent and 10 per cent respectively of their total entitlement as groundwater.

Net sellers nominated the high price of water as the main reason for not purchasing water (71 per cent) with lack of available water as the next most important reason (26 per cent). For net buyers, the main reason for not selling water was that all available water had been used (69 per cent).

For the three financial measures of farm cash income, farm business profit and return on capital, it was the net seller group which reported the best performance of the three groups. Non-traders recorded the second best estimates for each of the three financial measures and net buyers reported the lowest estimates.

Temporary water purchases accounted for around 14 per cent (or \$61 500) of net buyers' total cash costs, while water sales accounted for almost 20 per cent (or \$91 000) of net sellers' total cash receipts.

15 Selected estimates, Loddon-Avoca region, 2006-07

average per farm

		net buyers		net sellers		non-traders	
Area operated	ha	208	(33)	662	(18)	440	(25)
Sheep	no.	1	(95)	822	(34)	479	(41)
Beef cattle	no.	0	(90)	27	(56)	16	(44)
Dairy cattle	no.	191	(17)	37	(46)	118	(29)
Area cropped	ha	56	(34)	327	(20)	192	(52)
Area set up for irrigation	ha	112	(26)	206	(17)	174	(24)
Area of crops irrigated	ha	32	(28)	66	(50)	76	(29)
Area of pasture irrigated	ha	70	(20)	32	(39)	34	(34)
Water applied to crops & pasture	ML	460	(12)	158	(43)	360	(26)
Water application rate	ML/ha	5	(17)	2	(14)	3	(17)
Net volume water bought/ sold	ML	197	(24)	-96	(37)	0	-
Total water entitlements held	ML	410	(12)	565	(35)	482	(22)
Farm cash income	\$	16 314	(100)	194 064	(34)	84 762	(30)
Farm business profit	\$	-47 865	(60)	85 560	(79)	-3 202	(100)
Total farm debt at 30 June	\$	508 787	(29)	537 584	(52)	191 948	(33)
Equity ratio	%	73	(8)	86	(9)	92	(3)
Rate of return	%	-0.9	(100)	2.3	(85)	1.0	(100)
Main reasons for not purchasing water							
Restrictions on trading	%	na	-	0	-	30	(26)
Price too high	%	na	-	71	(10)	44	(17)
No water available	%	na	-	26	(46)	25	(34)
Main reasons for not selling water							
Used all water available	%	69	(22)	na	-	56	(16)
Prefer to carry over water	%	20	(67)	na	-	7	(63)
May have needed it	%	10	(60)	na	-	44	(17)

Note: Figures in parentheses are standard errors, expressed as percentages of the estimates.

Source: ABARE survey of irrigation farms in the Murray-Darling Basin.

Broadacre farms – net sellers and non-traders

For broadacre farms in the Loddon-Avoca region, non-traders and net sellers had similar total farm areas, although non-traders had a greater emphasis on livestock enterprises than net sellers (table 16). In contrast, net sellers cropped larger areas of both irrigated and dryland crops.

On average, net sellers recorded higher farm cash income than non-traders, with net sellers having higher total cash receipts and lower total cash costs. Around 25 per cent of total cash receipts for net sellers were derived from temporary water sales.

16 Selected estimates, irrigated broadacre farms, Loddon-Avoca region, 2006-07 average per farm

		broadacre farms			
		net sellers		non-traders	
Area operated	ha	909	(20)	931	(33)
Sheep	no.	1 348	(34)	1 527	(41)
Dairy cattle	no.	0	–	77	(96)
Area cropped	ha	507	(21)	446	(71)
Area set up for irrigation	ha	220	(19)	282	(38)
Area of crops irrigated	ha	96	(55)	73	(52)
Area of dryland crops	ha	411	(23)	374	(83)
Area of pasture irrigated	ha	6	(100)	56	(54)
Water applied to crops & pasture	ML	151	(66)	537	(53)
Water application rate	ML/ha	1	(17)	4	(12)
Farm cash income	\$	245 288	(32)	109 010	(53)
Farm business profit	\$	132 058	(75)	–29 650	(100)
Total farm debt at 30 June	\$	730 560	(67)	160 406	(32)
Equity ratio	%	80	(16)	95	(3)
Rate of return	%	5.7	(52)	0.3	(100)
Water entitlements held					
Ground water	ML	369	(23)	8	(23)
Water right (Victoria)	ML	305	(23)	689	(45)
Total	ML	675	(48)	697	(45)
Main reasons for not purchasing water					
Price too high	%	81	(14)	43	(41)
No water available	%	10	(96)	23	(68)
Extra water not needed	%	30	(67)	34	(52)

Note: Figures in parentheses are standard errors, expressed as percentages of the estimates.

Source: ABARE survey of irrigation farms in the Murray-Darling Basin.

Eastern Mount Lofty Ranges

- An estimated 17 per cent of irrigators in the Eastern Mount Lofty Ranges region participated in temporary water trading in 2006-07, of which slightly more than half were net sellers.
- Both net buyers and non-traders were mostly horticulture farms with lesser numbers of dairy farms.
- There were insufficient sample numbers to report estimates for net selling farms.

Net buyers in the Eastern Mount Lofty Ranges region were, on average, significantly larger than non-traders for almost all measures of physical performance (table 17). Net buyers operated much larger farms, ran more livestock, and cropped and irrigated larger areas than non-traders. Net buyers were also characterised by irrigating a large area of vegetable crops on average (more than 60 per cent of total area irrigated) whereas the non-trading group grew no vegetable crops.

17 Selected estimates, Eastern Mount Lofty Ranges region, 2006-07

average per farm

		net buyers		non-traders	
Area operated	ha	675	(44)	106	(17)
Sheep	no.	234	(88)	19	(72)
Beef cattle	no.	28	(61)	17	(23)
Dairy cattle	no.	64	(89)	31	(18)
Area cropped	ha	245	(29)	53	(19)
Area set up for irrigation	ha	329	(56)	36	(18)
Area of crops irrigated	ha	93	(20)	28	(18)
Area of pasture irrigated	ha	18	(92)	4	(31)
Water applied to crops & pasture	ML	512	(26)	91	(14)
Water application rate	ML/ha	5	(5)	3	(11)
Net volume water bought/ sold	ML	167	(16)	0	–
Total water entitlements held	ML	525	(50)	124	(20)
Farm cash income	\$	159 271	(60)	52 534	(45)
Farm business profit	\$	51 859	(100)	1 334	(100)
Total farm debt at 30 June	\$	1 424 089	(23)	278 830	(22)
Equity ratio	%	61	(16)	84	(4)
Rate of return	%	4.6	(55)	1.4	(87)
Main reasons for not purchasing water					
Not interested	%	na	–	34	(45)
Extra water not needed	%	na	–	63	(23)
Main reasons for not selling water					
No allocation	%	0	–	36	(43)
Used all water available	%	69	(26)	10	(24)
Prefer to carry over water	%	0	–	33	(40)
Not interested	%	0	–	35	(41)
May have needed it	%	11	(96)	45	(32)

Note: Figures in parentheses are standard errors, expressed as percentages of the estimates.

Source: ABARE survey of irrigation farms in the Murray-Darling Basin.

Net buyers held total water entitlements of around 525 megalitres. This was more than four times the volume held by non-traders. The main reason given by net buyers for not selling water was that they had used all their available water (69 per cent). In contrast, non-traders reported a much wider range of reasons for not selling water.

On average, net buyers achieved a farm cash income around three times that achieved by non-traders. Average farm business profit and rates of return were also significantly above those achieved by non-traders. A majority of net sellers' cash receipts were derived from vegetables, wine grapes and, less significantly, from broadacre crop sales. Temporary water purchases accounted for 6 per cent of net buyers' total cash costs.

References

- Ashton, D and Oliver, M 2008, *An economic survey of irrigation farms in the Murray-Darling Basin: Industry overview and region profiles*, ABARE Research Report 08.9, Canberra, November.
- Australian Bureau of Statistics 2006, *Water Access Entitlements, Allocations and Trading 2004-05*, Catalogue no. 4610.0.55.003, Canberra.
- Australian Bureau of Statistics 2008, *Water and the Murray-Darling Basin: A Statistical Profile 2000-01 to 2005-06*, Catalogue no. 4610.0.55.007, Canberra.
- CSIRO 2008, *Murray-Darling Basin Sustainable Yields Project Report*. Available from <http://www.csiro.au/partnerships/MurrayDarlingBasinSustainableYields.html>.
- Goesch, T, Hone, S, Hafi, A, Thorpe, S, Lawson, K, Page, S, Hughes, N and Gooday, P 2008, 'Murray-Darling Basin: Economic implications of water scarcity', *Australian commodities*, vol. 15, no. 1, March quarter, pp. 265-81, Canberra.
- Goesch, Tim, Hafi, A, Oliver, M, Page, S, Ashton, D, Hone, S and Dyack, B 2007, 'Drought and irrigation in Australia's Murray-Darling Basin', *Australian commodities*, vol. 14, no. 2, June quarter, pp. 343-52, Canberra.
- Mallawaarachchi T and Foster, A 2009, *Dealing with irrigation drought: The role of water trading in adapting to water shortages in 2007-08 in the southern Murray-Darling Basin*, ABARE Research Report 09.6 to the Australian Government Department of the Environment, Water, Heritage and the Arts, Canberra, March.
- National Water Commission 2007, *Australian Water Markets Report*. Available from <http://www.nwc.gov.au/www/html/804-water-markets-report.asp?intSiteID=1>.

RESEARCH FUNDING ABARE relies on financial support from external organisations to complete its research program. As at the date of this publication, the following organisations had provided financial support for ABARE's research program in 2007-08 and in 2008-09. We gratefully acknowledge this assistance.

02.09

AusAid	Fisheries Research and Development Corporation
Australian Fisheries Management Authority	Fisheries Resources Research Fund
Australian Government Department of Climate Change	Forest and Wood Products Australia
Australian Government Department of the Environment, Water , Heritage and the Arts	Grains Research and Development Corporation
Australian Government Department of Resources, Energy and Tourism	Grape and Wine Research and Development Corporation
CRC Plant Biosecurity	Horticulture Australia
CSIRO (Commonwealth Scientific and Industrial Research Organisation)	International Food Policy Research Institute
Dairy Australia	Land and Water Australia
Department of Primary Industries, Victoria	Meat and Livestock Australia
DN Harris and Associates	National Australia Bank
European commission	OECD
	Rural Industries Research and Development Corporation
	The Treasury