
B Buybacks in Australia

Key points

- Clearly identifying environmental assets and ecological objectives, and setting water recovery targets to meet those objectives, improves the transparency and accountability of water recovery programs.
- Assessing water recovery projects (market based measures and infrastructure investments) against common criteria, including least cost per gigalitre (GL), can improve the cost effectiveness and efficiency of these programs.
- Environmental water recovery has been outsourced to an incorporated body with water recovery objectives, powers and required resources. This institutional arrangement can improve the independence of water recovery, lower administrative costs, and improve flexibility and innovation in the water recovery task.
- Water recovery programs have considered inputs, other than just water, in achieving their environmental aims, including research into better use of environmental water, investments in infrastructure to better deliver water, and agreements with land owners on land management practices.
- Tenders and on-market purchases have recovered water entitlements:
 - at a lower average cost per GL long term cap equivalent (LTCE) compared with infrastructure investments
 - in greater quantities compared with infrastructure investments
 - in a more timely manner compared with infrastructure investments.
- On-market purchases have recovered entitlements cost-effectively, in a timely manner, and with low transaction costs compared with tenders.
- The assessment and notification of bids in tenders has occurred quickly, compared with seeking approval for an entitlement sale from irrigation companies, water authorities, and mortgagees. Seeking approvals can delay settlement significantly.
- Water recovery programs have recognised that a portfolio of water products best meets environmental watering needs. Programs have purchased predominantly water entitlements, but seasonal allocations and water from on-farm storages have also been used. Water options contracts are also available.
- Environmental water has been recovered in rules-based systems through the purchase of water from on-farm storage and changes to licence conditions. Shepherding arrangements are needed to direct the water to environmental asset.

Prior to the Restoring the Balance water recovery program that is the focus of this study, a number of other programs have been involved in the recovery of water in the Murray-Darling Basin to meet environmental needs. This appendix summarises the aims and operations of these programs, their progress to date in recovering water and delivering it to environmental assets, and where possible, draws lessons from the programs to inform the approach to water recovery under the Restoring the Balance buyback.

Water recovery programs and actions addressed in this appendix include:

- the Living Murray Initiative
- Water for Rivers
- the New South Wales Rivers Environmental Restoration Program (including the RiverBank tender)
- the use of water instruments other than water entitlements, including:
 - SA Water purchases of seasonal allocations
 - the Murrumbidgee River Reach project for water options contracts
- purchases in flows-based river systems, including:
 - the Narran Lakes Environmental Water Purchase in New South Wales
 - the Victorian Stream Flow Tender in Yarra basin catchments.

B.1 The Living Murray Initiative

Prior to the Restoring the Balance buyback, the Living Murray Initiative (the Living Murray) was the largest water recovery program in Australia. The Living Murray has received \$700 million in funding over 2004 to 2009 from the Commonwealth, NSW, Victorian, SA and ACT Governments to fund the recovery of a portfolio of water entitlements capable of delivering average annual flows of 500 gegalitres (GL) Long Term Cap Equivalent (LTCE)¹ to six icon sites² along the River Murray system by mid 2009. To complement the water recovery program, the Murray-Darling Basin Ministerial Council (MDBMC) has allocated \$250 million over 2003 to 2011 to the Environmental Works and Measures Program to fund

¹ The LTCE is a unit of measure used to create a common currency for volumes of water recovered under the Living Murray. It is the estimated average allocation that would have accrued to a given water entitlement based on climate and inflow data from 1891 to 2003.

² The six icon sites are the Barmah-Millewa Forest; Gunbower and Koondrook-Perricoota Forests; Hattah Lakes; Chowilla Floodplain; the Murray Mouth, Coorong and Lower Lakes; and the River Murray Channel (COAG 2004).

infrastructure works at the six sites to improve delivery of recovered environmental water (COAG 2004).

Two intergovernmental agreements (IGAs), signed by the Living Murray partner governments, set out the funding contributions and water recovery targets for each jurisdiction (table B.1):

- The 2004 IGA on Addressing Water Over-allocation and Achieving Environmental Objectives in the Murray-Darling Basin (IGA 2004) allocated \$500 million from partner governments to water recovery and \$100 million to the Environmental Works and Measures Program (COAG 2004).
- The 2006 Supplementary IGA on Addressing Water Over-allocation and Achieving Environmental Objectives in the Murray-Darling allocated an additional \$200 million from the Commonwealth to water recovery projects and \$100 million to the Environmental Works and Measures Program (COAG 2006).

Table B.1 Government contributions^a and water recovery targets under the Living Murray Initiative

<i>State/territory</i>	<i>State/territory contribution 2004^b</i>	<i>Commonwealth contribution 2004^b</i>	<i>Commonwealth contribution 2006^c</i>	<i>Total</i>	<i>Water recovery target</i>
	\$m	\$m	\$m	\$m	GL(LTCE) ^d
NSW	115	100	100	315	249
Victoria	115	86	86	287	214
SA	65	14	14	93	35
ACT	5	-	-	5	2
Total	300	200	200	700	500

^a Indicative targets. ^b The Intergovernmental Agreement (IGA) 2004 on Addressing Over-allocation and Achieving Environmental Objectives in the MDB. ^c The Supplementary IGA 2006 on Addressing Over-allocation and Achieving Environmental Objectives in the MDB. ^d The Long Term Cap Equivalent is the estimated average allocation that would have accrued to a given water entitlement based on historical climate and inflow data from 1891 to 2003.

Source: COAG (2004; 2006).

This section gives an overview of water recovery under the Living Murray as a whole. It then examines three market-based approaches to buying water entitlements under the Living Murray: the MDBA Pilot Environmental Water tender; the MDBA Water Entitlement tender; and on-market purchases by SA Water.

Governance

The 2004 IGA and the Living Murray Business Plan (the Business Plan) outline the governance and operational framework for the Living Murray. The MDBMC oversees implementation of the program through its approval of the Business Plan and proposed water recovery projects. Jurisdictions, and other parties, implement projects and manage water delivery to the icon sites. The MDBA administers the Living Murray in accordance with the Business Plan. The Business Plan outlines:

- the ecological objectives at each of the six icon sites
- the approval and funding processes for water recovery projects, including the criteria used to assess projects for implementation
- how recovered water is delivered and can be traded to meet environmental watering needs (MDBC 2007b).

The 2004 IGA and the Business Plan also require the development of:

- Environmental Management Plans for each of the six icon sites which identify the specific watering regimes (flow, volume, timing, duration and security) needed to meet the Living Murray ecological objectives
- an overarching annual Living Murray Environmental Watering Plan, based on the icon site Environmental Management Plans, to guide overall use of recovered water across the icon sites (MDBC 2007b).

Water recovery and delivery

The 2004 IGA requires the permanent recovery of water through the acquisition of water entitlements (COAG 2004). The 2006 IGA expanded the scope of the program to include 99-year leases on entitlements (COAG 2006). Water can be recovered through market-based purchases, on-farm and off-farm infrastructure investments, regulatory measures and urban water projects. Water savings from infrastructure investments and regulatory changes are converted into legally secure and tradeable water entitlements, and may be transferred to the Living Murray partner or shared between irrigators and the Living Murray.

Anyone may propose a water recovery project to the MDBMC which assesses all projects against a common set of criteria set out in the IGA 2004. The criteria include:

- ... the degree to which the characteristics of the recovered water will fulfil the requirements of the [Living Murray] Basin Environmental Watering Plan ... or any other environmental objectives which may be agreed

the cost effectiveness of the proposed measure, including initial cost per unit of water, and ongoing costs arising from the management, storage or delivery of the water to achieve the agreed environmental objectives ...

other matters ... [that] include social and economic impacts, salinity and water quality outcomes, ... and third-party impacts. (ss. 32-3)

Projects approved by the MDBMC are listed on the Eligible Measures Register (EMR) and can receive implementation funding. The 'pending' column in table B.2 lists projects on the EMR and the volume of water (GL LTCE) expected to be recovered. Water entitlements recovered from completed projects are listed on the Environmental Water Register (EWR). The 'recovered' column in table B.2 lists the expected annual volume of water available (GL LTCE) from these recovered water entitlements. Living Murray entitlements are usually held by the party which recovered them, including the states, the MDBA, DEWHA or others (MDBC 2007b).

The Living Murray Environmental Watering Group³ (EWG) develops an annual Environmental Watering Plan (annual EWP) based on: the six icon site management plans; scientific data on the condition of the icon sites; and consultations with stakeholders. The annual EWP outlines how seasonal allocations from Living Murray entitlements can be used to meet the watering needs at each icon site. Jurisdictions are responsible for delivering allocations accruing to Living Murray entitlements in their ministerial accounts. The annual EWP also manages allocations accruing to River Murray water entitlements recovered by Water for Rivers (see section B.2) (MDBC 2007b).

In 2007-08, due to on-going dry conditions, the Living Murray EWG developed a critical refuge strategy to prioritise delivery of available water to high value refuge areas within the six icon sites (MDBC 2008a). The Commonwealth Environmental Water Holder (the CEWH) is also using the critical refuge strategy to guide the use of available Commonwealth water (DEWHA 2009a). Joint Living Murray and Commonwealth environmental watering actions are being targeted at the critical refuge sites through the Living Murray EWG.

Living Murray entitlements may be traded on the permanent market when this is consistent with the objectives of the annual EWP. However, revenue from trading must be used to acquire other water entitlements that better match the requirements of the annual EWP. The MDBMC approves all trading of Living Murray water entitlements (COAG 2004). No trading has occurred to date.

³ The Living Murray Environmental Watering Group includes partner government agencies, a representative of the Commonwealth Environmental Water Holder, and MDBC staff.

Progress to date — water recovery

The Living Murray did not meet its water recovery target of 500 GL LTCE by June 2009. However, the MDBA expects 485 GL LTCE will have been recovered by 30 June 2010 (MDBA, sub. 87, p. 6). As at December 2009, the EWR held 465.4 GL LTCE of water entitlements (table B.2). The MDBA estimates a further 19.8 GL LTCE will be recovered from projects currently underway (table B.2).

Of the Living Murray water entitlements recovered as at November 2009, approximately 30 per cent were recovered through infrastructure investments, 25 per cent through regulatory changes and 45 per cent through market-based measures. Only permanent water entitlements have been purchased. No allocations, leases or other water products have been acquired (MDBA, pers. comm., 25 November 2009).

The security profile of Living Murray entitlements is heavily weighted toward medium and low security and supplementary licences. As at 30 June 2009, approximately 5 per cent of the entitlements held were high security, 54 per cent were medium and low security, and 41 per cent were supplementary and unregulated licences (MDBA 2009i).

Progress to date — water delivery

In recent years, due to continued dry conditions and the low level of seasonal allocations accruing to entitlements, the Living Murray has had difficulty in meeting the environmental objectives set out in the six icon site Environmental Management Plans. In 2007-08, Living Murray entitlements delivered 16.5 GL of physical water to the refuges (4.2 GL was allocated from the 133 GL LTCE of entitlements on the Environmental Water Register at that time, and 12.8 GL was sourced from Water for Rivers entitlements (MDBC 2008a)). In 2008-09, the Living Murray delivered 6.5 GL of physical water to the six icon sites from the 342 GL LTCE of entitlements recovered as at 30 June 2009. Around 7 GL was carried over for use in 2009-10 (MDBA 2009f). A number of the Living Murray watering actions were supplemented with Commonwealth water managed by the CEWH (DEWHA 2009e).

Table B.2 Living Murray Initiative water recovery as at December 2009

<i>Jurisdiction</i>	<i>Type of project</i>	<i>Recovery source</i>	<i>Recovered^a</i>	<i>Pending^b</i>
			<i>GL (LTCE)^c</i>	<i>GL (LTCE)^c</i>
NSW	Market based	NSW tender to purchase up to 125 GL of entitlements (through RiverBank)	113.7	
NSW	Market / Infra.	Package B	56.0	6.0
NSW	Market based	Murray Irrigation Limited supplementary water access license	17.8	
NSW	Market based	Tandou supplementary access licence	9.3	
NSW	Infrastructure	Ricegrowers Assoc. — On-farm Water Efficiency A1	1.2	
NSW	Infrastructure	Wetlands water savings stage 1		0.6
NSW	Infrastructure	Ricegrower's Assoc. — On Farm Water Efficiency Round 2	2.6	3.6
NSW	Infrastructure	Pipe It	0.2	
Total NSW			200.8	10.2
VIC	Regulatory / Infrastructure	Goulburn-Murray Water Package	144.9	
VIC	Infrastructure	Lake Mokoan Recovery Package	28.1	
VIC	Infrastructure	Shepparton Modernisation Project	29.3	
Total Vic			202.3	
SA	Market based	Securing government held water for environment	13.0	
SA	Market based	Purchase from willing sellers Stage 1	5.0	
SA	Market-based	Securing government held water for environment	17.0	
Total SA			35.0	
MDBA	Market based	Pilot environmental water purchase	13.2	
MDBA	Market based	Environmental water purchase project	13.9	6.6
MDBA	Market based	On-farm reconfiguration demonstration		3.0
Total MDBA			27.1	9.6
Total^d			465.4	19.8

^a Environmental Water Register listings have been completed and seasonal allocations to these entitlements are available for environmental use. ^b Eligible Measures Register listings are being implemented, water is not yet available. ^c The Long Term Cap Equivalent (LTCE) is the estimated average allocation that would have accrued to a given water entitlement based on historical climate and inflow data from 1891 to 2003. ^d Total includes 0.176 GL recovered through infrastructure projects under the Water Through Efficiency Tender.

Source: MDBA (2009q).

Comparing water recovery mechanisms under the Living Murray

A number of reviews of water recovery under the Living Murray have been undertaken to date:

- A 2006 MDBMC issues paper noted that, from 2004 to 2006, when water recovery projects focused on off-farm infrastructure investments, no water entitlements were recovered. It found that the cost of recovering water through infrastructure projects was considerably higher and would take longer than purchasing water from the market (MDBMC 2006).
- An audit of the Living Murray in 2005-06 concluded that it would be difficult to achieve the 500 GL target by mid-2009 if water recovery continued to focus on small-scale infrastructure measures. The report recommended a greater emphasis on market-based recovery to meet investment and volumetric targets (MDBMC 2007). In 2006, in recognition of these findings, the MDBMC expanded water recovery to include on-farm efficiency projects and market-based measures, such as tenders (MDBMC 2007).
- A 2009 MDBA progress report found that the Living Murray would not achieve its recovery target of 500 GL LTCE by mid-2009, although it noted that accelerated implementation of existing projects could see the target met by the end of 2009. The report also found that drought had severely limited the amount of physical water delivered to the icon sites. The report also noted that:
 - the initial focus on infrastructure projects at the expense of market mechanisms had slowed the rate of water recovery
 - across a range of water recovery projects, infrastructure investments had a higher cost per GL of water recovered compared with market mechanisms
 - the Business Plan does not adequately address coordination of watering activities under the annual EWP and noted the importance of cooperation with other environmental water holders, including the Commonwealth Environmental Water Holder (MDBA 2009i).

Data from the MDBA 2009 progress report on the cost per GL LTCE of various Living Murray water recovery projects supports previous findings that market-based mechanisms can recover larger quantities of water entitlements at a lower cost compared with infrastructure measures (table B.3). The seven listed market-based measures recovered 194.2 GL LTCE of water entitlements through a mix of tenders and on-market purchases at an estimated cost of between \$1.1 million and \$2.6 million per GL LTCE. The average cost of water recovered through these market measures was \$1.7 million per GL LTCE. In contrast, the five listed infrastructure projects recovered 74 GL LTCE at an estimated cost of between

\$1.5 million and \$3.1 million per GL. The average cost of water recovered through infrastructure measures was \$2.2 million per GL LTCE (MDBA 2009i).

Table B.3 Cost effectiveness of some water recovery projects under the Living Murray Initiative^{a,b}

	<i>Estimated cost/GL</i>	<i>Quantity recovered</i>	<i>Estimated total cost</i>
	\$m/GL (LTCE)	GL (LTCE)	\$m
Market based measures			
Murray Irrigation Ltd. purchase	1.1	17.8	19.6
Tandou purchase	1.5	15.5	23.3
SA Govt. held water ^c	1.5	13.0	19.5
MDBA pilot water purchase	1.6	13.2	21.6
NSW tender (RiverBank)	1.7	112.7	192.0
SA willing sellers stage 1 ^c	2.2	5.0	11.1
SA Govt./willing sellers ^c	2.6	17.0	43.5
Total		194.2	330.6
Average	1.7		
Infrastructure measures^d			
Lake Mokoan Package	1.5	36.0	54.0
Rice Growers efficiency 1	2.5	2.5	6.3
Rice Growers efficiency 2	2.5	3.0	7.5
Shepparton modernisation	2.8	30.0	84.0
Sustainable dairy farms	3.1	2.5	7.8
Total		74.0	159.6
Average	2.2		

^a Estimated cost per GL LTCE and estimated total cost were derived from figure 22 in the MDBA Living Murray Progress Report 2009 (MDBA 2009c). Water recovery projects from figure 22 were not included in this table if: they recovered 1 GL or less; recovered water through a mix of infrastructure and market-based mechanisms; or had not been implemented. ^b All amounts have been rounded to one decimal place. ^c GL amounts are nominal entitlement volumes, not LTCE. LTCE is between 0.9 and 1.0 the nominal values. ^d The Goulburn-Murray Water Recovery Package was not included as an infrastructure measures as the cost data provided in figure 22 of the MDBA Living Murray Progress Report 2009 was not consistent with other sources.

Source: MDBA (2009i); SA Government (sub. 90, p. 11).

Project 1 — the MDBA pilot environmental water tender

The MDBA, under the Living Murray, ran a pilot expression of interest tender in 2007 to purchase up to 20 GL of high and medium security entitlements within the southern Murray-Darling Basin at prevailing market prices (table B.4). The pilot

round was to run from 16 July 2007 until 28 September 2007. Due to oversubscription, the pilot period closed on 13 August 2007 (MDBC 2007a).

The MDBA advertised the opening of the round in regional media and invited willing sellers to lodge non-binding expressions of interest (EOIs) to sell their water entitlements. EOIs were assessed against price information in a weekly market report prepared by external consultants. EOIs were reviewed on a ‘first come, first served’ basis within a week of being received. Sellers were notified of the outcome within 10 days of the assessment. No negotiation was entered into. Successful sellers received the price they bid. Unsuccessful sellers were able to resubmit bids within the round (MDBA 2009p). The MDBA used external solicitors for all water conveyancing work. Due diligence times varied between six weeks to four months depending on the type of water entitlement, the location and the business arrangements of the seller (MDBA, pers. comm., 25 November 2009).

Outcomes

The pilot tender recovered 13.2 GL LTCE (14.2 GL NSW Murray general security, 1.8 GL Victorian high reliability) at a cost per GL LTCE of \$1.6 million⁴ (MDBA 2009i) (table B.3).

Project 2 — the MDBA water entitlement tender

The MDBA, through the Living Murray, ran a single round expression of interest tender to purchase entitlements from willing sellers in the southern Murray-Darling Basin (table B.4). The tender opened on 6 May 2009 and closed 30 June 2009, when the allocated budget of \$50 million was spent. The MDBA did not set a quantitative purchase target for the tender (MDBA 2009m).

The MDBA advertised the opening of the tender round stating that it would purchase high and medium security water entitlements of more than five megalitres (ML) in the southern Murray-Darling Basin at prevailing market prices. Individual sellers and their agents lodged applications to sell to the MDBA. Sellers specified the volume of water entitlements they were willing to sell and the price per ML they would accept. Applications also required additional information about the type of entitlement and any conditions attached to it. All applications were treated as confidential (MDBA 2009m).

⁴ Cost per GL LTCE was estimated from data in the MDBA Living Murray Progress Report 2009 (MDBA 2009i).

Table B.4 Summary of design features of tenders and on-market purchases of water products

<i>Program</i>	<i>Budget target</i>	<i>Volumetric target</i>	<i>Water products</i>	<i>Duration of round</i>	<i>Assessment</i>	<i>Price stacking</i>	<i>Negotiation</i>	<i>Market price benchmark</i>	<i>Non-binding bids</i>	<i>Time to settlement</i>
Tenders										
TLM MDBA pilot tender	no	20 GL	water entitlements	4 weeks	in round	no	no	yes	yes	na
TLM MDBA tender	yes (\$50 m)	no	water entitlements	7 weeks	in round	no	no	yes	yes	18 weeks
RiverBank (yearly tender)	yes (yearly)	no	water entitlements	until budget spent	in round	no	yes	yes	yes	8-12 weeks
Vic. stream flow tender	no	target flow rate	changes to water licence	6 weeks	end of round	yes	no	na	yes	na
On-market purchases										
Water for Rivers	yes (yearly)	no	water entitlements	2007-2008	..	..	yes	yes	yes	10-14 weeks
RiverBank	yes (yearly)	no	water entitlements	on-going	..	..	yes	yes	yes	na
TLM SA Water	no	up to 35GL	water entitlements	2006-2009	..	..	yes	yes	yes	12-16 weeks
SA Water 2008-09	no	50 GL	water allocations	2008-09	..	..	yes	yes	yes	na

na Not available .. Not applicable

Sources: DECCW (2008; 2009c; pers. comm., 23 November 2009); Melbourne Water (2007); MDBA (2009i; 2009j; 2009m; pers. comm., 25 November 2009); MDBC (2007a); SA Department of Premier and Cabinet (pers. comm., 16 November 2009); SA Government (sub. 52); SA Water (pers. comm., 10 March 2010); Water for Rivers (pers. comm., 5 November 2009).

The MDBA assessed EOIs on a fortnightly cycle during the tender round against common assessment criteria, including:

- the price per ML — the MDBA assessed bids against prevailing market prices based on independent market advice updated fortnightly during the tender round
- the entitlement type (location and security) — the MDBA purchased water entitlements that were able to deliver water to the icon sites (MDBA 2009m).

Expressions of interest classified as large were considered within one working day of their receipt by the MDBA. EOIs classed as small were considered at the end of each fortnight. No information was provided on what a large or small EOI constituted. The MDBA advised vendors if their bids were to be pursued within five working days of assessment. Bids were either rejected or accepted — the MDBA did not enter into negotiations. Successful sellers received the price they bid, unsuccessful sellers were able to resubmit bids immediately (MDBA 2009m).

On notifying a seller of an interest in purchasing a water entitlement, the MDBA engaged external conveyancing solicitors to commence the transfer process. At this time, sellers were required to provide additional information, such as a copy of the water entitlement certificate. The tender documents estimated the average conveyancing time at 16 weeks, with the MDBA assessment and notification process taking no longer than 14 working days. The length of time for final approval depended on how complicated the ownership of the water entitlement was, and the length of time for approval from irrigation companies, water authorities and mortgagees. Purchases only became binding on the exchange of contracts (MDBA 2009m).

The NSW embargo on water sales to the Commonwealth for environmental purposes, which came into effect on 29 May 2009, meant that no NSW entitlements were purchased in this tender. The 4 per cent cap on water trade out of Victorian districts restricted purchases in Victoria (MDBA 2009m).

Outcomes

An MDBA progress report indicates the MDBA will recover approximately 20.5 GL LTCE of SA and Victorian high security water entitlements within the budgeted \$50 million at an estimated cost of \$2.4 million per GL LTCE (MDBA 2009i).

Project 3 — SA Water on-market entitlement purchases

Between 2006 and 2009, SA Water, acting as an agent for the SA Government, purchased on-market 19.5 GL of high security SA River Murray water entitlements (table B.4). Additional entitlements were also purchased from SA Government departments. SA Water purchased the water entitlements through negotiations with willing sellers. The SA Government reimbursed SA Water for the costs, and entitlements were transferred to the Minister for the River Murray for use under the Living Murray (sub. 52, p. 11).

A single officer at SA Water undertook the entitlement purchases. Contact with the market and prospective vendors was primarily over the phone. Purchases were negotiated directly between the SA Water officer and individual vendors on a transaction-by-transaction basis. Due diligence was based on vendor declarations included in purchase contracts, and checks conducted by the relevant statutory water authority responsible for approval of entitlement transfers. Payment was not made until the water authority had approved and transferred the entitlement (sub. 52, p. 12).

A market price for entitlements was established by reference to other recently concluded transactions and standing offers. The SA Government engaged independent consultants to monitor and report on current and anticipated prices. Once verbal negotiations were complete, SA Water would confirm an offer to buy a water entitlement in writing within one to two business days. Typically, the time from a verbal agreement to final settlement was 12 to 16 weeks (SA Department of Premier and Cabinet, pers. comm., 16 November 2009).

Outcomes

Results from the SA Water purchases⁵ to date include:

- the Securing Government-held Water for Environmental Use project purchased 13 GL at a cost of \$1.5 million per GL
- the Purchase from Willing Sellers Stage 1 project purchased 5 GL at a cost of \$2.2 million per GL
- the Securing Government-held Water and Purchases from Willing Sellers project purchased 17 GL at a cost of \$2.6 million per GL (table B.3) (sub. 52, p. 11).

⁵ All GL amounts are nominal entitlement volumes, not LTCE. LTCE is between 0.9 and 1.0 of the nominal values.

Lessons from the Living Murray Initiative

Identifying targeted environmental assets and ecological objectives at each icon site, and establishing the water recovery targets to meet those objectives, improves the transparency and accountability of water recovery through the Living Murray Initiative.

Development of the Icon Site Management Plans and investment in water delivery infrastructure through the Environmental Works and Measures program, highlights the importance of inputs other than water in achieving the Living Murray environmental objectives.

Assessing all proposed water recovery projects (market based measures, infrastructure investments, and regulatory changes) against a common set of criteria, including least cost per GL LTCE, improves the cost effectiveness and efficiency of water recovery through the Living Murray.

In order to achieve its target of recovering 500 GL LTCE with a budget of \$700 million, the Living Murray needs to recover water at an average cost of \$1.4 million per GL LTCE. If the largest water recovery measure achieved through a regulatory change is deducted from the 500 GL target — the Goulburn-Murray Water Recovery package sales deal⁶ — the Living Murray would need to recover the remaining 380 GL (through market based measures and infrastructure investments) at an average cost of \$ 1.73 million per GL LTCE.⁷

Available data for the Living Murray indicate:

- Market-based mechanisms (tenders and on-market purchases) can recover water entitlements:
 - at a lower average cost per GL LTCE (\$1.7 million) compared with infrastructure investments (\$2.2 million) (table B.3)
 - in greater quantities (185 GL LTCE) compared with infrastructure investments (124 GL LTCE) (table B.2)
 - in a more timely manner compared with infrastructure investments (MDBMC 2006; 2007).

⁶ The Goulburn-Murray Water Recovery Package recovered 120 GL LTCE at a cost of \$43 million through a regulatory change to the administration of sales water in Victoria.

⁷ The \$1.73 million per GL LTCE number is calculated by dividing the remaining Living Murray budget of \$657 million by the remaining 380 GL LTCE recovered through other projects.

- On-market purchases can recover significant quantities of water entitlements cost effectively, in a timely manner and with low transaction costs compared with tenders.
- The assessment and notification of bids in a tender can occur relatively quickly compared with seeking approval for an entitlement sale from irrigation companies, water authorities, and mortgagees. These approval processes can significantly delay settlement.
- The New South Wales trade embargo and the Victorian 4 per cent trading cap have restricted entitlement sales.

B.2 Water for Rivers

The Joint Government Enterprise Limited (registered under the business name Water for Rivers) is a public company established in 2003 by the Commonwealth, NSW and Victorian Governments. Water for Rivers aims to recover a portfolio of water entitlements capable of delivering average annual environmental flows⁸ of 282 GL by June 2012 — 212 GL to return the Snowy River to 21 per cent of its natural flows and 70 GL for increased flows down the River Murray. To achieve this aim, the three shareholder governments have invested \$425 million in the company to fund water recovery (Water for Rivers 2009a). *The Snowy River Inquiry Outcomes Implementation Deed 2002* (the Deed) is a legally binding agreement between the partner governments that sets out funding arrangements (table B.5), river flow targets and ecological objectives for the Snowy and Murray rivers.

Table B.5 **Government funding for Water for Rivers, \$m**

	<i>Commonwealth^a</i>	<i>NSW</i>	<i>Victorian</i>	Total
2003-2012	125	150	150	425

^a Includes a 2003 Commonwealth contribution of \$75 million and an additional \$50 million allocated in 2008-09 in recognition that the cost of recovering water through infrastructure and market purchases had increased.

Source: Water for Rivers (2009a).

This section gives an overview of water recovery by Water for Rivers as a whole. It then examines two methods used by Water for Rivers to recover water entitlements: on-market purchases; and on-farm reconfiguration projects.

⁸ The Water for Rivers unit of ‘average annual flows’ is not directly comparable to the Living Murray Initiative’s Long Term Cap Equivalent (LTCE). However, both terms are used to approximate the expected long term average volume of water available for use.

Governance

The Deed established the corporate governance structure and operational guidelines for the recovery of water entitlements by Water for Rivers. Under the Deed, Water for Rivers is owned by the three partner governments, each with equal shareholdings. A board of three directors — unanimously appointed by the shareholders — develops an annual Business Plan that outlines planned expenditure on water recovery projects during the year. Under direction from the Board, the Water for Rivers Chief Executive Officer and staff implement approved water recovery projects, or may outsource implementation to third parties (Water for Rivers 2002).

Water recovery and delivery

Water for Rivers recovers water entitlements through a range of projects, including:

- investing in on-farm and off-farm water efficiency projects, including the reconfiguration and, in some cases, resale of irrigation properties. Water savings from these investments are converted into legally secure water entitlements. The Deed establishes investment in water efficiency projects as Water for Rivers' primary method of water recovery
- on-market purchases of water entitlements from willing sellers. Tenders have not been used by Water for Rivers. Rather, purchases have been negotiated with individual sellers, or through brokers at prevailing market prices. The Deed allows entitlement purchases as a secondary method of water recovery if deemed necessary to meet water recovery targets (Water for Rivers 2002).

The Board or shareholder governments may propose a water recovery measure. The Board analyses the proposed measure against a common set of criteria set out in the Deed, including:

- that water be recovered from diversions of the River Murray above the Darling River, in the Murrumbidgee River and the Goulburn River systems
- that entitlements must be able to deliver seasonal allocations that contribute to the increased flows in the Snowy and Murray Rivers as set out in the Deed
- that water recovery be through the least cost per unit of water having regard to the level of reliability (Water for Rivers 2002).

In assessing the least cost recovery method, the Board compares the cost of a proposed water recovery project with the prevailing market price for water entitlements in that area. In addition, in 2004, the Board imposed a hurdle price of \$1.25 million per GL based on the requirement to recover average flows of 282 GL

per year within the given budget. As the cost of water recovery increased, the hurdle price was increased to \$1.5-\$1.8 million per GL (Water for Rivers. pers. comm., 5 November 2009).

Under the Deed (p. 20), the Board is also required to assess a proposed water recovery project against third-party impacts, including the extent of any adverse impact on:

- the level of reliability of water entitlements in diversions from the River Murray System, the Murrumbidgee River System and the Goulburn River System ...
- water flows currently providing environmental benefits in the River Murray System, the Murrumbidgee River System and the Goulburn River System ...
- the seasonal availability of the entitlement to be received by South Australia under the MDB Agreement ...
- the quality of the water supplied to South Australia ...
- the relevant market for Water Entitlements ...
- stakeholders including rural communities.

Ownership of water entitlements recovered by Water for Rivers is transferred to the NSW and Victorian Governments. However, under the Deed, all entitlements are managed by the NSW Government (Water for Rivers 2002). The NSW environmental water holder develops an annual environmental watering plan based on seasonal allocations accruing to Water for Rivers entitlements and the environmental objectives set out in the Deed. The NSW water holder takes advice from an expert scientific committee and shareholder governments in developing the annual watering plan. The Snowy Hydro Corporation releases environmental flows into the Snowy and Murray Rivers under a licence agreement with the NSW Government (Water for Rivers 2002). Allocations accruing to Water for Rivers River Murray entitlements are available for use downstream under the annual Living Murray Environmental Watering Plan (Water for Rivers 2009d).

Progress to date — water recovery

Water for Rivers appears likely to meet its target of 282 GL of average annual flows by 2012. As of November 2009, 197 GL of water entitlements of various security levels had been recovered (table B.5). Water for Rivers estimates a further 110 GL of entitlements of various security will be recovered from water efficiency projects underway or under development (table B.6) (Water for Rivers, pers. comm., 5 November 2009).

Table B.6 Water for Rivers water recovery as at November 2009

<i>Source and project type</i>	<i>Entitlements</i>	<i>GL^a</i>	<i>Cost^b</i>	<i>Cost/GL^c</i>
Projects already completed			\$m	\$m
NSW and Vic., On-market purchases	NSW Gen. Sec., Vic. High/Low Reliability	81.5 (39) ^d	(35.3) ^d	(0.9)
NSW and Vic., On-farm reconfigurations	General Security	31.5 (21) ^e	(24.2) ^e	(1.2)
NSW, Forrest Creek 1, Alternate water supply	Murrumbidgee High Sec.	11.3	4.6	0.4
NSW, Forrest Creek 2, Alternate water supply	Murrumbidgee High Sec.	23.4	16.8	0.7
NSW, Coleambally Irrig., Channel automation	Conveyance	3.5	4.9	1.4
NSW, Barren Box Swamp, Storage deepening	Conveyance	20.0	29.2	1.5
Vic., Woorinen, Pipeline	High Reliability	1.5	2.0	1.3
Vic., Normanville, Pipeline	High Reliability	3.9	4.3	1.1
Vic., Goulburn-Murray, Improved measurement	High Reliability	16.4	11.0	0.7
Vic., Goulburn River Irrig., Flow measurement	High Reliability	2.0	6.4	3.2
Lake Mokoan Stage 1	High Reliability	1.0	1.4	1.4
Total recovered^f		197.0		
Projects under way and under development				
NSW and Vic., On-farm reconfiguration	NSW Gen. Sec., Vic. High/Low Reliability	20.0		
NSW, Murrumbidgee River efficiency	Gen. Sec.	30.0		
Old Man Creek	Conveyance	5.0	5.0	1.0
Bundidgerry Creek	Conveyance	2.0	6.0	3.0
NSW, Yanco Creek efficiency	Gen. Sec	10.0		
Vic., Lake Mokoan Stage 2 storage decommissioning	High Reliability	21.0		
Vic., Central Goulburn channel automation	High/Low Reliability	21.0		
Total under recovery and under development^f		110.0		

^a GL amounts are from projects listed as 'Complete' and 'Current' on the Water for Rivers web site. ^b Cost is calculated as the proportion of the total cost of a project multiplied by the proportion of environmental water entitlements recovered from total water savings. ^c Cost/GL is calculated by dividing the reported cost by the reported quantity of environmental water recovered. ^d Cost data were only available for 39 GL NSW General Security of the total 84 GL recovered. ^e Cost data were only available for 21 GL General Security of the total 30 GL recovered. ^f Projects of less than 1 GL have not been listed.

Sources: Water for Rivers (2009b; 2009c; 2009f; pers. comm., 5 November 2009).

For Water for Rivers, as at November 2009:

- around 40 per cent of entitlements (82 GL of various security) have been recovered through on-market purchases, 15 per cent (32 GL NSW general security) through on-farm reconfigurations, and 45 per cent (84 GL of various security) through other infrastructure investments (table B.6)
- over 80 per cent of the water entitlement portfolio is weighted toward higher security entitlements. Of the 197 GL recovered to date, 34.7 GL were Murrumbidgee high security, 24.8 GL were Victorian high reliability, 23.5 were NSW conveyancing licences and 79 GL were NSW general security (table B.6).

Progress to date — water delivery

No data on water deliveries from the Water for Rivers' water entitlement portfolio were provided to this study.

On-market water entitlement purchases

Water for Rivers ran an ongoing program to purchase water entitlements through existing markets and water brokers at prevailing market prices in the Murrumbidgee, Goulburn and Murray River systems in 2007 and 2008 (table B.4). Regionally-based Water for Rivers project officers publicised the water purchases through visits to target areas, using word of mouth and water brokers. Individual sellers and brokers contacted Water for Rivers and directly negotiated the sale of water entitlements. Offers to sell were assessed against common criteria, including:

- prevailing market prices in the area and the Water for Rivers hurdle price (initially \$1.25 million per GL, later increased to \$1.5 to \$1.8 million per GL)
- the ability of the water entitlement to meet environmental objectives in the Snowy and Murray Rivers as set out in the Deed (Water for Rivers, pers. comm., 5 November 2009).

Water for Rivers ran its own internal assessment and transaction process in parallel with outsourced due diligence checks on water entitlements offered for sale. On average, the time from verbal agreement to final settlement took 10 to 14 weeks (Water for Rivers, pers. comm., 5 November 2009).

Outcomes

Water for Rivers purchased 81.5 GL of NSW general security and Victorian high and low reliability entitlements in the NSW Murray and Murrumbidgee Rivers and

Victorian Goulburn and Murray systems (Water for Rivers 2009b). Available data for on-market purchases show 39 GL of NSW general security entitlements were purchased for \$35.3 million at a cost of \$0.91 million per GL (table B.6).

Lessons from Water for Rivers

Identifying stream flow rates and ecological objectives in specific rivers, and establishing the water recovery targets to meet those objectives, improves the transparency and accountability of water recovery by Water for Rivers.

Assessing all proposed water recovery projects (on-market recovery, infrastructure investments and farm reconfigurations) against a common set of criteria, including least cost per GL, improves the cost effectiveness and efficiency of Water for Rivers.

Environmental water recovery can be outsourced to an incorporated body with water recovery objectives, powers and resources. This institutional arrangement can improve the independence of water recovery, lower its administrative costs, and allows flexibility and innovation in the approach to the water recovery task.

In order to achieve its target of recovering 282 GL of average annual flows with a budget of \$425 million, Water for Rivers needs to recover water at an average cost of \$1.5 million per GL of average annual flows. Compared with the estimated average cost of water recovered under the Living Murray of \$1.73 million per GL LTCE (section B.1), Water for Rivers appears to be a more a more cost effective water recovery program.⁹

Evidence from Water for Rivers indicates the cost of water recovery through:

- on-market purchases appears to be lower (\$0.91 million per GL NSW general security), compared with on-farm reconfigurations (\$1.15 million per GL NSW general security)
- infrastructure investments varied between \$0.41 million per GL Murrumbidgee high security and \$3.2 million per GL Victorian high reliability entitlements (table B.6).

The use of on-market purchases and water brokers can recover significant quantities of water entitlements cost effectively, in a timely manner and with low transaction costs compared with tenders and infrastructure investments.

⁹ Direct comparisons between the cost per GL of water recovered by different programs is difficult as GL amounts are not directly comparable, prices differ over catchments and time.

B.3 Rivers Environmental Restoration Program (using the RiverBank tender)

The NSW Rivers Environmental Restoration Program (RERP) is a joint NSW and Australian Government program — \$173.3 million¹⁰ over 2005-06 to 2010-11 — to improve the condition of specific NSW rivers and wetlands primarily through market-based purchases of water entitlements for environmental use. RERP aims to maximise the benefits from the recovered water by also funding research into environmental water use, investing in infrastructure to better deliver the recovered water, and by developing partnerships with private land owners at target sites (DECCW 2009a). NSW DECCW purchases water for RERP using a tender process that operates under the name RiverBank. The RiverBank Business Plan sets out the ongoing funding arrangements for purchases by RiverBank on behalf of the RERP (table B.7) and target environmental assets and objectives.

Table B.7 Rivers Environmental Restoration Program expenditure targets 2006-07 to 2010-11^a

<i>Financial year</i>	<i>Investment target^b</i>	<i>Actual investment</i>
	\$ m	\$ m
2006-07	15.0	16.6
2007-08 ^c	46.0	44.4
2008-09 ^c	37.0	47.4
2009-10 ^c	23.0	15.4 ^d
2010-11	23.0	
Total^e	144.0	123.8

^a Includes \$101.5 million from the NSW Government and \$45.9 million from the Australian Government. ^b To the nearest million. ^c The Australian Government funding is budgeted over 2007-08 to 2009-10. ^d Committed to date. ^e Total includes program costs but not \$3.5 million allocated to the Pipeline NSW Recovery Project.

Source: DECCW (pers. comm., 8 March 2010).

To date, RiverBank has primarily purchased water entitlements for the RERP through an annual expression of interest tender. RiverBank also undertakes on-market purchases as opportunities arise. In establishing RiverBank as a market-based water recovery mechanism, the NSW Government noted that other water recovery programs operating in the state (the Living Murray Initiative and Water for Rivers) were recovering water through infrastructure investments and that

¹⁰ The NSW Government contributed \$101.5 million through its RiverBank Fund from 2005-06 to 2010-11. The Australian Government contributed \$71.8 million over 2007-08 to 2009-10. Of the total program funding of \$173.3 million, \$147.3 million is to purchase water licences with the remaining \$25.9 million used to conduct research, invest in infrastructure and develop partnerships with private land owners at target sites.

this approach could be costlier, take longer and be riskier in terms of final cost and volume of water recovered compared with market-based recovery (DECCW 2008).

The branch of DECCW that conducts RiverBank purchases also acts as a ‘single desk’ buyer of water entitlements for the NSW Wetland Recovery Program and the Basin-wide Living Murray Initiative (section B.1) (DECCW 2008).

Governance

The RiverBank Business Plan (the Business Plan) sets out the ongoing governance and operational framework for RiverBank purchases. The NSW Environmental Trust¹¹ allocates yearly funding and oversees implementation of RiverBank through its approval of the Business Plan. In undertaking this role, the Trust receives advice from a group of experts in river and wetland ecology, environmental water management and water markets. The Water for the Environment Branch of the NSW DECCW conducts the RiverBank purchases in accordance with the Business Plan (DECCW 2008). The annual Business Plan outlines:

- planned water entitlement purchasing and trading targets in each target valley for the year
- water delivery targets for the year
- funding sources and budget allocations
- any coordination with other water recovery programs operating in New South Wales
- strategic partnerships with Catchment Management Authorities, landholders and other bodies to maximise benefits from water delivery
- monitoring and evaluation of trading and environmental outcomes (DECCW 2008).

Water recovery and delivery

The Business Plan requires that RiverBank purchases acquire a portfolio of water access licences in each target valley. Currently, RiverBank is purchasing high security, general security and supplementary water entitlements. RiverBank is investigating the potential for investing in new water products such as leases,

¹¹ The NSW Environment Trust consists of five representatives; the Minister for Climate Change and the Environment (Chair); the Secretary of the Treasury; the Director General of DECCW; a nominee of the NSW Nature Conservation Council; and a nominee of the Local Government and Shires Association (DECCW 2008).

options and forward contracts. However, none has been used to date. Seasonal allocations can not be purchased with government funding but may be bought using profits from water trading (DECCW 2008).

The 2008-09 Business Plan prioritised the purchase of general security water entitlements in each valley, arguing that:

General security is the most commonly available product and strikes an appropriate balance between water availability and management flexibility to form the base of a portfolio for each valley/asset. (DECCW 2009c, p. 30)

RiverBank purchases water entitlements in river valleys that are connected to targeted environmental assets listed in the Business Plan. These include the Narran Lakes, the Gwydir wetlands, the Macquarie Marshes, wetlands along the Lachlan River, and areas on the lower Murrumbidgee River floodplain¹². RiverBank does not have a set volumetric target for water recovery. The Business Plan allocates funding over the five years of the program and between target river valleys. The quantity of water entitlements recovered depends on the availability of entitlements and the prices paid. The water entitlements acquired by RiverBank for the RERP are held by the NSW Minister for Climate Change and the Environment (DECCW 2008).

NSW DECCW decides how to use seasonal allocations accruing to RiverBank entitlements through Annual Watering Plans in each catchment. In New South Wales, Water Sharing Plans (WSP) legally set aside a proportion of water in a catchment for environmental needs. RiverBank purchases of water entitlements provide additional environmental flows. DECCW develops an Annual Watering Plan that sets out how environmental flows from the WSP can be combined with these additional flows best to meet environmental needs in a given catchment. A regional DECCW Wetlands and Rivers Conservation Officer develops the Annual Watering Plan, guided by Water Sharing Plan rules, a catchment level Adaptive Environmental Water Use Plan¹³, data on local conditions and advice from stakeholders¹⁴ (DECCW 2009f).

¹² The RiverBank tender is also used to purchase water entitlements for the Wetland Recovery Project for the Gwydir wetlands and the Macquarie Marshes, and for the Living Murray Initiative in the NSW Murray, Lower Darling and Murrumbidgee regulated river systems to deliver water to downstream icon sites along the Murray River (DECCW 2009a).

¹³ A RiverBank Adaptive Environmental Water Use Plan provides statutory authority for the use of water licence account water for the environment, and lists the environmental assets in a catchment to be watered and broad ecological objectives to be achieved with RiverBank water.

¹⁴ Stakeholders include CMAs, environmental advisory groups established under water sharing plans, the State Water Corporation and community groups (DECCW 2009f).

Seasonal allocations accruing to recovered entitlements can be traded where the water is unlikely to achieve more than marginal environmental improvements at targeted assets, can not be carried forward, or where current prices represent a market opportunity and there is a net environmental benefit from the trade. Revenue generated from the sale of allocations may be used to meet the costs of holding water licences, purchase additional water entitlements, allocations or other water products, and to fund capital works (DECCW 2008).

Design of the RiverBank tender

The RiverBank tender has run yearly tender rounds since 2005-06 to purchase water entitlements for the RERP (table B.4). RiverBank advertises the opening date for a round through rural media and contacts in the target river valleys. Individual sellers and water brokers must lodge a written expression of interest specifying the type and volume of water entitlements they are willing to sell and the price per ML they would accept. All bids are confidential (DECCW 2008).

RiverBank regularly assesses these expressions of interest on a ‘first-come, first-served’ basis against a common set of assessment criteria including:

- the ability to deliver water to targeted environmental assets in the Business Plan
- the price per ML — RiverBank compares the bid price with recent market activity and internal price benchmarks derived from an independent assessment of water markets. DECCW may contact sellers if a bid is slightly above the benchmark price to renegotiate the sale price. Where an acquisition is proposed at a price more than 15 per cent above the price benchmark, RiverBank must seek the approval of the Chair of the Environmental Trust and justify why the entitlement is valuable in meeting RiverBank’s ecological objectives (DECCW 2009c)
- the security type of entitlement — the Business Plan currently prioritises general security entitlements in its target water sources, although high security and supplementary water access entitlements may be considered
- the size of entitlement offered — RiverBank will seek to minimise the number of individual transactions it undertakes for each water source
- any restrictions on the entitlement — these may be on the entitlement itself (for example, a high-flow condition on a supplementary entitlement), or may arise out of the water sharing plan that applies to an entitlement (for example restrictions on the transfer of entitlements downstream of certain points) (DECCW 2008).

RiverBank usually contacts successful bidders within a month of the bid being received. Purchases continue until RiverBank spends the allocated budget for the financial year. Contracting and conveyancing are undertaken by external providers in accordance with the *Water Management Act 2000* (NSW) (DECCW 2008), and this may typically occur over a two to three month time-frame, depending on the clarity of title, removal of encumbrances and any factors affecting registration of the transfer (DECCW, pers. comm., 23 November 2009).

RiverBank has also been purchasing water entitlements outside of tender rounds from willing sellers through direct negotiations (table B.4). Individual sellers or brokers can contact RiverBank and offer to sell entitlements using an expression of interest. RiverBank uses the tender assessment criteria in assessing out of tender bids. RiverBank may also contract with water agents or brokers to facilitate the purchase of water entitlements and allocations on their behalf, and is considering the use of online water trading platforms to purchase licences (DECCW 2008). To date, RiverBank has not purchased seasonal allocations and has not entered into leases over entitlements. The development of derivative water products has been curtailed by continuing drought in most parts of the NSW Murray-Darling Basin (DECCW, pers. comm., 23 November 2009).

Progress to date — water recovery

As of 28 February 2010, RiverBank had recovered around 92.3 GL of NSW general security entitlements and 6.3 GL of supplementary entitlements for the RERP (table B.8) in the four catchments targeted by the Business Plan (DECCW, pers. comm., March 2010).

Table B.8 RiverBank entitlement purchases for Rivers Environment Restoration Program, as at 28 February 2010

<i>Regulated water source</i>	<i>Water entitlements</i>	
	<i>General security</i>	<i>Supplementary access</i>
	GL ^a	GL ^a
Gwydir	14.9	0.44
Macquarie and Cudgegong	39.2	0.14
Lachlan	24.6	–
Murrumbidgee	13.5	5.70
Total	92.3	6.28

^a These quantities have been estimated from unit share data provided by NSW DECCW. Units of measure for entitlements purchased under RiverBank for the Rivers Environmental Restoration Program are in unit shares. Currently one unit share at full allocation is equivalent to one ML in all valleys except the Lachlan, which has a maximum 0.7ML/ unit share at full allocation. – Nil or rounded to zero.

Source: DECCW (2009d; pers. comm. 8 March 2010).

The RiverBank section of DECCW, acting as a ‘single desk’ buyer, has also recovered water entitlements for:

- the NSW Wetland Recovery Program — 6.1 GL of NSW general security entitlements and 1.3 GL of supplementary entitlements (DECCW 2009d)
- the Living Murray NSW Water Purchase — 112.7 GL LTCE of water entitlements of various security (section 9.1).

Progress to date — water delivery

Allocations accruing to RERP water entitlements have been very low in recent years due to the on-going dry period. DECCW has used the available water to target specific environmental assets or in coordination with releases of planned environmental water delivered under Water Sharing Plan rules (table B.9) (DECCW, pers. comm., 8 March 2010).

Table B.9 **Water deliveries from RiverBank entitlements^a**

	2007-08	2008-09	2009-10 ^b
Water source	GL	GL	GL
Gwydir	0	0.1	0.1
Macquarie	0.7	0	2.7
Lachlan	0	0	0
Murrumbidgee	0	0.8	2.0

^a All quantities are rounded to 1 decimal place. ^b As at 30 January 2010.

Source: DECCW (pers. comm., 23 November 2009).

Lessons from RiverBank purchases

While the RERP does not have volumetric targets for its water recovery, purchases in a catchment are guided by Water Use Plans that list targeted environmental assets and environmental outcomes in each catchment. This improves the transparency and accountability of water recovery under RERP.

In addition to recovering water for the environmental, the RERP funds research into environmental water use, investments in water infrastructure at targeted sites, and enters into agreements with CMAs and private land owners to better coordinate water use with other inputs. Using environmental flows with a mix of other inputs improves the productivity of available environmental water and should better achieve the environmental objectives under the RERP.

While the RERP has only purchased water entitlements to date, it explicitly recognises that a diverse portfolio of products can better meet environmental watering needs, and it has the power to purchase these products.

The RERP has used a combination of tenders and on-market purchases to recover large volumes of water entitlements in a timely and cost-effective manner compared with other tenders and infrastructure investments. RiverBank has recovered:

- 90 GL of general security entitlements and 6.1 GL of supplementary licences for the RERP at an average cost of \$1.25 million per GL (DECCW, pers. comm., 23 November 2009).
- 112.7 GL LTCE of water entitlements on behalf of the Living Murray Initiative at an average cost of \$1.7 million per GL LTCE (table B.3).

B.4 Use of water products other than water entitlements

SA Water on-market purchases of seasonal allocations

During 2008-09 the SA Government acquired 50 GL of seasonal allocations on-market as a contingency measure to ensure the government could meet future environmental needs. A significant portion of the water will be used in conjunction with the Clayton regulator. The water has been carried over into 2009-10. (SA Department of Premier and Cabinet, pers. comm., 16 November 2009).

SA Water purchased the seasonal allocations, acting as an agent for the SA Government (table B.4). SA Water used its network of contacts with individuals, brokers and corporate entities and irrigation bodies in the water market to make it known that they were purchasing allocations. Purchases were negotiated through direct contact with a range of vendors and their brokers throughout the Southern Connected Murray Darling Basin.

The price paid was negotiated for each transaction, and was based on various sources of information, including contact with market participants and sellers, on-line sources of price and offer information, and by testing the market with prices. SA Water's standard terms of contract require that full payment is made within 14 days of receiving notification of a trade approval. In most cases, payment was made within 5 to 7 days of approval (SA Water, pers. comm., 10 March 2010).

Murrumbidgee River Reach Project for options contracts

The aim of the Murrumbidgee River Reach Project (River Reach) is developing and trialing a water options exchange for the Murrumbidgee Valley to trade new water products (such as options contracts). Through the River Reach exchange, an environmental water manager would be able to purchase options contracts on water entitlements made available by entitlement holders. Murrumbidgee Irrigation Limited (MIL), as an entitlement holder, is able to directly supply River Reach products and has indicated that it can make up to 40 GL available per annum. In addition, there is expected to be opportunities to broker exchanges through packaging River Reach products (with specific triggers) from various entitlements (MIL, pers. comm., 10 March 2010).

The contracts would be triggered in wetter years allowing water to be diverted to supplement environmental flows and induce flooding of targeted environmental assets in the Murrumbidgee Valley. In drier years, when the options contract is not triggered, any seasonal allocations accruing to the water entitlements would be retained by the entitlement owner for consumptive use. The outcome of the trial will inform the possible establishment of similar markets in other parts of the Basin (DEWHA 2009h).

How would River Reach work?

Environmental demands for water are, in part, counter-cyclical to irrigation demands. Permanent plantings demand regular and reliable water to maintain agricultural output. To meet this demand, irrigators tend to hold high security and general security water entitlements that, on average, supply more secure and reliable water flows in drier years than low security or supplementary licences. In wetter years, seasonal allocations surplus to irrigators' needs can be sold on allocations markets. Many environmental assets tend to require intermittent, high-volume flow events followed by a number of years of less water. To provide for environmental flows in wetter years under the current system of water licences, an environmental manager may hold supplementary licences and purchase seasonal allocations.

Using River Reach options contracts, water entitlement holders, with higher security than supplementary entitlement, will be able to sell a given volume of the water allocated to their entitlement under agreed terms and conditions, such as when allocations exceed a trigger level. The options contract enables the buyer to purchase an option over the water, at agreed terms and conditions, that can be exercised at the discretion of the buyer. The buyer would only pay for the option, and payment for the water would only occur if the buyer chose to exercise the option.

The entitlement would remain the property of the irrigator, and in drier years all allocations up to the trigger level would be retained by the irrigator. In wetter years, once the irrigator has received the specified level of allocations and the trigger has been reached, the environmental water manager would have the right to further allocations. For a given high security or general security entitlement, this type of options contract gives individual irrigators the ability to identify water of least value to them in terms of their production, and sell it, while maintaining a secure supply below the trigger (sub. 39, p. 15).

Murrumbidgee Irrigation Limited argues that the primary benefits of River Reach are that options contracts allow the permanent acquisition of more supplementary-type water that best matches environmental demands, and that this water can be acquired at a lower cost per ML (compared with acquiring water for the environment through purchasing permanent high, medium and low security entitlements). MIL argues that options contracts could:

- make additional supplementary water (of around 250 GL) available by enabling environmental water managers to access to allocations accruing to high and general security entitlements without having to buy those entitlements
- deliver environmental water at a lower cost per ML compared to water entitlements in two ways. First, River Reach would enable environmental buyers to avoid the cost of buying unneeded security when purchasing existing high and general security entitlements. Second, risk-averse irrigators may prefer to hold their entitlements and sell unwanted allocations to an environmental water holder through an options contract, rather than sell their entitlement and buy seasonal allocations as needed. River Reach buyers may be able to acquire a given quantity of environmental water at a lower cost by entering into an options contract with an entitlement holder, rather than by acquiring the whole entitlement (MIL, sub. 39, p. 23).

Outcomes

To date, there has not been an exchange of a River Reach options contract with an environmental buyer, although River Reach has received in-principle support from potential sellers and buyers. A trial with commercial buyers did occur during the 2009-10 water season.

MIL has identified a number of impediments for environmental buyers of options contracts, including:

- a lack of legislative and regulatory backing to support the rights of buyers and sellers under a River Reach contract

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- the modelling of environmental demands in a form that enables a match with River Reach products has yet to be completed to the satisfaction of some potential buyers
 - the pricing of potential River Reach products is untested. The risks of being ‘first in’ may be quite large, especially for environmental buyers (MIL, pers. comm., 10 March 2010).

Lessons from River Reach

Options contracts may allow:

- an increase in the supply of supplementary-type water by accessing lower valued allocations accruing to high and general security entitlements held by irrigators
- acquisition of environmental water at a lower cost per ML by allowing an environmental water holder to purchase an option on an entitlement instead of purchasing the entitlement.

B.5 Water recovery in flow-based river systems

This section summarizes two programs used to purchase water for the environment in flow-based river systems — the Narran Lakes Environmental Water Purchase and the Victorian Stream Flow Tender.

The Narran Lakes environmental water purchase

In April 2008, the MDBC paid \$2 million for 10.4 GL of water from a private on-farm storage in Queensland. The water was released in accordance with an agreed program and shepherded downstream to the Narran Lakes in northern NSW to maintain water levels to extend and enhance a waterbird breeding event. The Narran River is one of a network of river channels in the Lower Balonne system. Unlike the other major streams in this network which flow through to the Barwon River, it feeds into a terminal wetland system. The extent of wetland flooding has decreased in recent years due to lower annual rainfalls, reductions in stream flow and flooding events, and increased upstream extraction for irrigation. The Narran Lakes Nature Reserve is a Ramsar Wetland in recognition of its significance for waterbirds (MDBA 2009h).

As a result of the good summer rainfall in early 2008 and extended flow in the Narran River, large bird colonies — predominantly ibis — established breeding sites at the Narran Lakes. In early March 2008, monitoring by officers from the

NSW DECCW showed that falling water levels in the lake were putting the breeding event at risk. DECCW decided to give the breeding event a high priority as it was one of the largest waterbird breeding events recorded in the Narran Lakes and the most significant in the Murray-Darling Basin since 1998. In addition, there was a high risk the ibis population would collapse if the breeding event failed as the birds had not bred for the last nine years of their ten-year breeding life (MDBA 2009h).

Officers from NSW DECCW, working with officers from the Queensland Department of Environment and Resource Management (DERM), purchased water from a Queensland water entitlement holders' storage to maintain lake levels at a sufficient depth and for sufficient time to allow the ibis chicks to fledge. The steps undertaken were as follows:

- Determining how much water was needed in the Narran Lakes and for what length of time to allow a successful breeding event. DECCW officials used available data and hydrological modelling to set a goal of delivering enough water to maintain the water level at the Back Lake (where the breeding colony was concentrated) at 300 mm for 30 days.
- Determining how much, and at what rate, water needed to be released from the contracted Queensland storage to achieve the watering goal in the Narran Lakes, 140 kilometres downstream. DECCW used available data and hydrological modelling to establish a release schedule for a total of 11 GL.
- Establishing a price for the water in the absence of a market. Under flow-based regimes in Queensland and northern NSW river systems, water is primarily stored in private on-farm storages with little market trade. NSW and Queensland officers estimated a market value for physical water of around \$180 per ML by using the marginal returns to water from irrigating a hectare of wheat (assuming a wheat price of \$350 per tonne, a yield in tonnes per hectare and a water application rate).
- Locating and buying the water. It was determined that seasonally assigning water from water allocation holders out of Beardmore Dam to enhance minor releases downstream to the Narran would not provide the size of inflows within the timeframe required. DECCW officers then approached the MDBC to secure funding for a water purchase from on-farm storages in Queensland. The MDBC's Natural Resource Management Committee authorised \$2.5 million for the purchase. DECCW officers telephoned irrigators in Queensland looking for willing sellers from private on-farm storages. An irrigator with 30 GL of stored water agreed to sell 11 GL earmarked for wheat production for the \$180 per ML price. Importantly, the irrigator was able to start releasing the water the next day in good faith while purchase contracts were drawn up.

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- Shepherding the water down river and across the state border. The Queensland water entitlement holders along the intervening section of the Narran River are metered and can only pump from flow events under announcement by DERM. At the time of the Narran Lakes purchase, river flow had diminished to below access trigger levels thereby providing clear passage for any released water. In addition, the NSW Department of Energy and Water (DEW) contacted the NSW down-river licence holders to notify them that an environmental flow was passing. Gauging stations on the Queensland side of the border and in New South Wales enabled DECCW to accurately monitor flows and account for losses on route. To ensure the correct amount of water passed through each weir, Queensland officers marked the river level at the weirs before the environmental water arrived and ensured the water was drawn down to that level as the water passed through (MDBA 2009h).

Outcomes

A total of 10.4 GL of water was purchased in Queensland and shepherded to the Narran Lakes at an approximate cost of \$1.88 million dollars. The price of \$180 per ML is difficult to compare with any established market price at the time as no trade of this type of water occurs in the area. Upstream at St George, where a government-owned and run irrigation scheme exists, it has been known for supplemented water to trade in the range of \$100 to \$250 per ML on a seasonal basis.

The primary outcomes observed during and after the water delivery were:

- Water levels at the Back Lake were maintained at (a minimum of) 300 mm for 30 days thereby achieving the water delivery goal.
- Close to 50 000 ibis chicks fledged from two colonies. However, mortality in the second colony appears to have been very high – of 120 000 eggs, 24 600 chicks fledged with losses likely due to nest abandonment (due to falling water levels).
- Other bird species, vegetation, fish and other biota, and the ecosystem generally would also have benefited (MDBA 2009h).

A Murray-Darling Basin Authority (MDBA) evaluation of the Narran Lakes purchase found that it was reasonable to assume that the water purchase had extended the breeding event and allowed more chicks successfully to hatch (MDBA 2009h).

Lessons from the Narran Lakes purchase

Physical water can be purchased and shepherded downstream in flow-based river systems to meet urgent environmental needs. However, this requires:

- monitoring of environmental assets and hydrological modelling
- willing sellers with on-farm storage
- fast and effective coordination between relevant parties
- available funding
- appropriate regulation and metering of licence holders
- gauges to measure river flows and calculate losses.

The MDBA evaluation argues that temporary purchases of physical water could form part of a portfolio of measures to provide water for the environment in unregulated river systems. The evaluation suggests that the portfolio could also include:

- the purchase or lease of strategically located on-farm storages
- the contracting of put-options and sell-options on on-farm water
- purchasing changes to water licence conditions (MDBA 2009h).

Victorian stream flow tender

In 2007, the Victorian Government held a tender, asking water licence holders in three Yarra Basin catchments to offer to vary permanently their licence conditions in ways that would contribute to increased environmental stream flows in exchange for a one-off payment (table B.4). Under section 51 of the *Water Act 1989* (Vic), the take and use of surface water in unregulated catchments is governed by water licences issued by the relevant water corporation. In the Yarra Basin, this is Melbourne Water. Stream Flow Management Plans (SFMPs) may be developed to place conditions on these licences. SFMPs are approved by the Victorian Minister for Water, specify the total amount of water available in a catchment for extraction, and describe how the water will be shared between the environment and consumptive users. For a given catchment, a SFMP may establish:

- an environmental flow regime, including minimum stream flow rates in ML per day. The stream flow rate must be exceeded at gauging stations/compliance points along the river to allow pumping to occur
- a cap on the total volume of water that can be taken from a catchment in a year

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- trading rules that apply to transfers of water entitlements into, out of, and within, the catchment
 - conditions on take and use licences. These conditions may include variations in the minimum stream flow rate or bans and restrictions on pumping (Melbourne Water 2009).

Stream Flow Management Plans are developed by a community-based consultative committee¹⁵ and are reviewed every five years. The stream flow regimes recommended by the consultative committee are based on scientific studies that determine minimum flows required to achieve the ecological objectives of the rivers (DSE 2007).

Under the *Water Act 1989* (Vic), the water corporation (Melbourne Water in the Yarra Basin), must ensure water licences issued in a catchment comply with the minimum flow rules, the diversion cap and other requirements as set out in the SFMP. Melbourne Water issues various types of water licences to regulate water use in a catchment, including licences for:

- pumping water for irrigation, domestic and stock use, or commercial irrigation. When the minimum stream flow rate is exceeded and extraction permitted, a licence sets a maximum daily extraction rate and a cap on the annual volume of water extracted
- off-stream dam filling and on-stream dam harvesting. These licences specify limits on how much water can be taken and used
- use of irrigation or commercial dams
- water trading into or within a catchment (Melbourne Water 2009).

The stream flow tender process

In 2006, draft SFMPs prepared for the three catchments of Olinda Creek, Stringybark Creek, and Pauls, Steels and Dixons Creeks recommended increased minimum environmental stream flow rates. Under the *Water Act 1989*, all water licences needed to be amended to reflect the higher minimum flow rates within five years (by 1 July 2012). The Victorian Government held the pilot stream flow tender in 2007 to:

- help increase environmental flows before the July 2012 change

¹⁵ Membership includes licence holders, representatives from local and state governments, Environment Victoria and the relevant water corporation.

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- allow licence holders to assist in achieving the higher stream flow rates through voluntary changes to their licence conditions (DSE 2007).

Through the tender, all licence holders in the three catchments were invited to submit a bid to make voluntary and permanent changes to their licence conditions that would contribute toward achieving the stream flow rates in the draft SFMP in exchange for a one-off payment. A bid had to specify the proposed change to licence conditions, the price of making the change and when the change would happen. The tender permitted three methods for changing licence conditions, including:

- changing the timing of access to water. For example, for a licence permitting pumping all year round the holder could offer to restrict pumping to winter only, thereby increasing summer flows
- reducing the annual licence volume by a specified amount. The minimum stream flow rate and daily extraction rate would remain unchanged but the total volume of water pumped would be lower, thereby increasing stream flows overall
- surrendering their entire licence (Melbourne Water 2007).

The tender was conducted in a single round over two months from May to July 2007. The total budget of the tender was not disclosed to bidders and bid details were treated in confidence. Licence holders were allowed one bid per licence. All bids were assessed against standard criteria after the close of the round. The overarching criterion for assessing bids was ‘value for money’ determined by sub-criterion, including:

- how the proposed licence change or surrender would contribute toward meeting the new environmental stream flow rates. Bids to change the timing of access to water and bids to reduce licence volume competed directly in the tender although they were assessed separately
- timing of licence condition change. Bids to change licence conditions sooner were preferred over bids to change later
- least cost
- length of river receiving the benefit. Bids from licence holders in the upper catchment were preferred over bids from the lower catchment (Melbourne Water 2007).

Bids were rejected or accepted without negotiation and no rebidding was allowed. The tender used discriminatory pricing where sellers received the price they bid. All bidders were notified of the outcome on 3 August 2007 (Melbourne Water 2007).

Outcomes

The water recovered through the changes to licence conditions in the Olinda Creek and Stringybark Creek catchments will achieve 56 per cent and 65 per cent of the required increase in stream flow rates, respectively, once the draft SFMPs are adopted (table B.10). Changes to licence conditions in Steel Creek and Dixon Creek will achieve only limited progress toward the new stream flow rate, 2 per cent and 5 per cent respectively (table B.10).

Table B.10 Stream flow tender outcomes, 2007^a

<i>Catchment</i>	<i>Bids</i>	<i>Outcomes</i>
Olinda Creek	21 received 9 accepted	43 ML of licence volume surrendered 48 ML of licence volume managed in line with draft stream flow management plans (SFMP) flow rates Annual cap reduced from 728.7 ML to 685.7 ML Changes (would) achieve 56 per cent of increased stream flow required under the draft SFMP Licence conditions altered 1 July 2008
Stringybark Creek	19 received 15 accepted	12 ML of licence volume surrendered (2 ML all-year licence and 10 ML on-stream dam-filling licence) 566 ML of licence volume managed in line with draft SFMP rates Annual cap reduced from 2676 ML to 2664 ML Changes (would) achieve 65 per cent of increased stream flow required under the draft SFMP Licence conditions altered 1 July 2008
Steels, Pauls and Dixon Creeks	2 received 2 accepted	50 ML of licence volume managed in line with draft SFMP rate Annual cap remains 1884 ML Changes (would) achieve 2 per cent (Steels Creek) and 5 per cent (Dixons Creek) of increased flows required under the draft SFMP Licence conditions altered 1 July 2008

^a Estimated percentage increases in stream flow resulting from changes to licence conditions are dependent on the adoption in 2012 of the higher minimum stream flow rates proposed in the draft SFMPs.

Source: Melbourne Water (2007).

In an unregulated river, the water recovered through changes to licence conditions can often increase the reliability of supply for users downstream. However, the recovered water can be protected by raising minimum stream flow rates to maintain reliability of supply at the pre-tender level.

Under the Victorian tender, increased stream flow from changes to water licences purchased upstream will be protected by an increase in the stream flow rate for all licence holders when the SFMPs are adopted in 2012. In the interim, the changes to licence conditions may increase the reliability of downstream licences in the catchment.

In future tenders, DSE proposes to model the increase in reliability of downstream licences as a result of changes to upstream licences, and increase the minimum stream flow rates on all licence holders to ensure recovered water remains in the river (Department of Sustainability and Environment, pers. comm., 16 November 2009).

Lessons from the stream flow tender

Tenders can be used to purchase changes to licence conditions in flow-based river systems to increase stream flows. However, this requires shepherding arrangements to ensure water recovered through variations to licences is retained in the river system.