ANNUAL REPORT
COMMONWEALTH ENVIRONMENTAL WATER

Wetlands in the Yanga National Park after Commonwealth environmental watering, November 2010. (Tanya Doody, Commonwealth Scientific and Industrial Research Organisation–Land and Water)

The *Water Act 2007* (Water Act) established the position of Commonwealth Environmental Water Holder (CEWH) to manage the Commonwealth's environmental water holdings to protect or restore environmental assets in the Murray-Darling Basin (the Basin) and other areas where environmental water is held. The Water Act requires that the minister be given a report each financial year on the management of Commonwealth environmental water.

Overview

Since 2009, 554 gigalitres of Commonwealth environmental water has been delivered for the environment across the Basin, of which 387 gigalitres was delivered in 2010–11. Commonwealth environmental water has been delivered with approximately an additional 417 gigalitres contributed by state governments, the Living Murray program, and from private donations. The water has contributed to a range of ecological benefits for rivers, wetlands and floodplains.

During 2010–11 there was a significant change in conditions across the Basin compared to previous years. After one of the most severe droughts on record, the Basin received substantially above average rainfall. Some areas of the Basin, including catchments in northern Victoria and southern Queensland, received record rainfall. The approach to the use of Commonwealth environmental water during the year was adapted to provide the best possible environmental outcomes in the new circumstances.

The focus of 2010–11 water use was to capitalise on the environmental benefits of rainfall by building on natural river flows, and also by providing river freshes in autumn and early winter when rainfall was lower. This was a significant change in approach compared to previous years, where water was mainly used to support important refuges during the recent drought.

During the year the Australian National Audit Office (ANAO) completed a performance audit of the use of Commonwealth environmental water. The ANAO concluded that there were adequate arrangements within the department to support timely and effective decisions by the Commonwealth Environmental Water Holder. The report also noted that further development of these arrangements would be required as the volume of Commonwealth water increases.

In 2010–11 local partnership arrangements to support the future use of Commonwealth environmental water across the Basin were further developed. Commonwealth environmental water use was also better integrated with the environmental water arrangements of state jurisdictions and local level management and advisory bodies.

During the year environmental water delivery documents were developed to identify scalable water use options. The documents provide information on the environmental assets and potential water use in particular catchments. As management of environmental water is an adaptive process it is expected that these use options will be developed over time.

Three hundred and thirty-six gigalitres of Commonwealth environmental water was carried over to 2011–12 and with good allocations expected, there will be increased opportunities in the future to build on previous outcomes.

Commonwealth environmental water being released from Burrinjuck Dam, Murrumbidgee River, by State Water NSW, June 2011.

How Commonwealth environmental water is managed

Commonwealth environmental water is being used to help achieve a healthy, working Basin. It is improving the health of ecological assets and contributing to river flows that connect the Basin and support ecological processes.

The Commonwealth's aim in using environmental water is to achieve the best outcomes for the whole Basin. Decisions on use are guided by the *Framework for determining Commonwealth environmental watering actions* which was published in 2009–10. The framework foresees a range of different water availability scenarios (extreme dry, dry, average and wet) and guides the approach to environmental watering accordingly (see Table 1).

Table 1: Ecological objectives for the use of Commonwealth environmental water under different water resource availability scenarios

	Extreme dry	Dry	Median	Wet
Ecological watering objectives	Avoid damage to key environmental assets	Ensure ecological capacity for recovery	Maintain ecological health and resilience	Improve and restore healthy and resilient aquatic ecosystems

Decisions on the use of Commonwealth environmental water

Decisions on the use of Commonwealth environmental water are informed by advice from the Environmental Water Scientific Advisory Committee (EWSAC). Decisions are made after consultation with a range of groups, including delivery partners such as Basin state governments, Catchment Management Authorities, environmental water managers and river operators in catchments across the Basin.

Decisions on water use are made through a number of key steps:

1. Developing options for the use of water—potential watering options are identified in cooperation with state agencies, other environmental water managers, local groups (such as catchment management authorities, natural resource management boards and environmental water advisory groups) and landholders.
2. Assessing potential actions—potential watering actions are assessed against published criteria:
    - ecological significance of the asset to be watered
    - expected ecological outcomes from the proposed watering action
    - potential risks of the proposed watering action at the site and at connected locations
    - long-term sustainability of the asset, including appropriate management arrangements
    - cost-effectiveness and operational feasibility of undertaking the watering.

3. Seeking local and expert advice—in making decisions on Commonwealth environmental water use, local expertise and advice from the EWSAC and river operators is obtained, including on the environmental need, current conditions and potential delivery arrangements.
4. Delivery arrangements—the Commonwealth enters into arrangements with delivery partners (Basin state governments and other environmental water holders, river operators, or catchment management authorities) to deliver the water and monitor the outcomes.

Environmental Water Scientific Advisory Committee

EWSAC advises the Commonwealth Environmental Water Holder and the department on the use of environmental water including:

- methods for determining relative priority of environmental assets
- areas that merit additional investigation, including additional research
- assessing the benefits of the use of environmental water.

EWSAC comprises scientists and experts in fields such as hydrology, limnology, river operations management, river and floodplain ecology and the management of aquatic ecosystems.

Members in 2010–11:

- Professor Barry Hart (Chair) – Water Science Pty. Ltd
- Professor Angela Arthington – Griffith University
- Mr David Dole– consultant
- Dr Ben Gawne – Murray-Darling Freshwater Research Centre
- Professor Richard Kingsford – University of New South Wales
- Dr Michael Stewardson – University of Melbourne
- Associate Professor Keith Walker – University of Adelaide
- Associate Professor Robyn Watts – Charles Sturt University

Commonwealth environmental water available for use in 2010–11

The southern-connected Basin experienced one of its wettest years on record in 2010–11 and the timing of rainfall was unusual, with significant summer rainfall (see Figure 2). Inflows to the River Murray system were twice the long-term average. There was also exceptional and prolonged wet conditions during spring and summer in the northern Basin and several systems experienced record or near record flow events.

Because of the higher rainfall and increase in the size of the Commonwealth environmental water holdings, there was substantially more water available for use than in previous years. At the end of 2010–11 the Commonwealth environmental water holdings were 992.9 gigalitres (see Table 2), compared to 737.8 gigalitres at the end of 2009–10. The volume of water available to the Commonwealth for environmental use in 2010–11 was 777.9 gigalitres, including 744.2 gigalitres of allocations and 33.7 gigalitres carried over from 2009–10 (see Figure 1).

Table 2: Commonwealth environmental water holdings in the Murray-Darling Basin (at 30 June 2011)

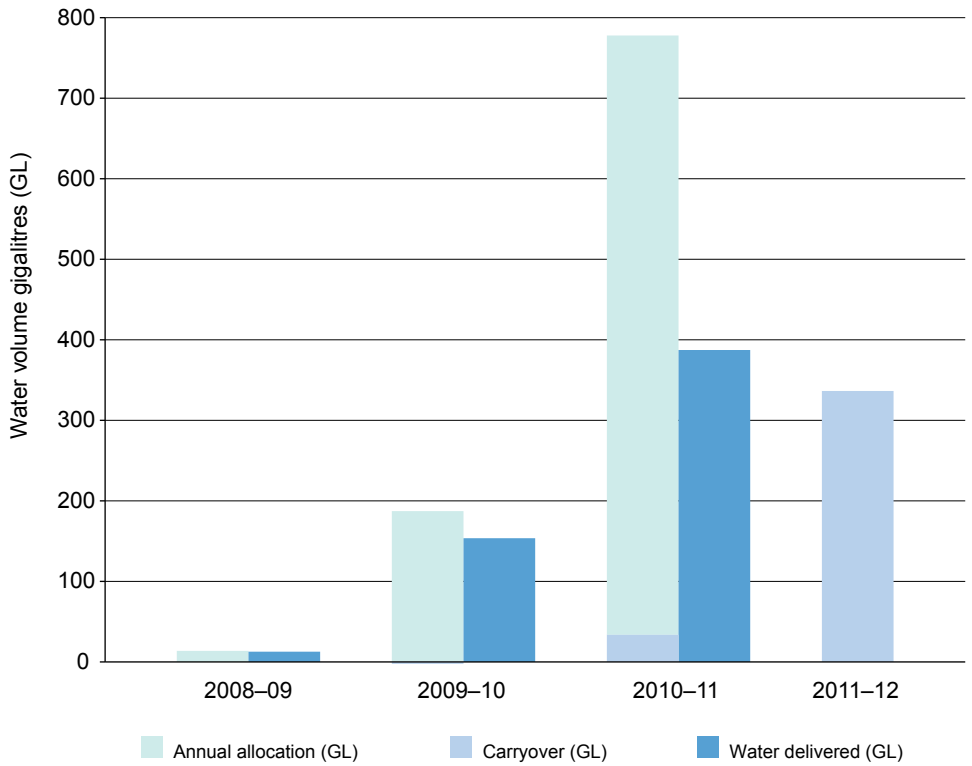
Catchment	State	Security/ reliability	Registered entitlements gigalitre (GL)
Murray	**New South Wales**	High	0.66
		General	209.94
	Victoria	High	140.08
		Low	11.13
	South Australia	High	69.39
Loddon	**Victoria**	High	1.56
		Low	0.53
Campaspe	**Victoria**	High	5.78
		Low	0.40
Goulburn–Broken	**Victoria**	High	100.50
		Low	10.53
Ovens	**Victoria**	High	0.07
Murrumbidgee	**New South Wales**	High	0.30
		General	100.77
		Supplementary	20.82
Lachlan	**New South Wales**	High	0.73
		General	82.71
Lower Darling	**New South Wales**	General	0.49
Barwon–Darling	**New South Wales**	Unregulated	14.60
Macquarie–Castlereagh	**New South Wales**	General	71.41
		Supplementary	1.89
Namoi	**New South Wales**	General	6.20
Gwydir	**New South Wales**	High	0.38
		General	89.53
		Supplementary	19.10
Border Rivers	**Queensland**	Medium	8.73
		Unregulated	1.00
	New South Wales	General	0.27

Table 2 continued

Catchment	State	Security/ reliability	Registered entitlements gigalitre (GL)
Moonie	**Queensland**	Unregulated	1.42
Condamine–Balonne	**Queensland**	Unregulated	5.92
Warrego	**Queensland**	Unregulated	16.05
TOTAL			**992.87**[1]

1 The volume of water currently in the holdings is less than the 1 118 gigalitres secured under Water for the Future, which includes water entitlements secured under contract, but not yet formally transferred to the Commonwealth.

Figure 1: Commonwealth environmental water availability and use at 30 June 2011



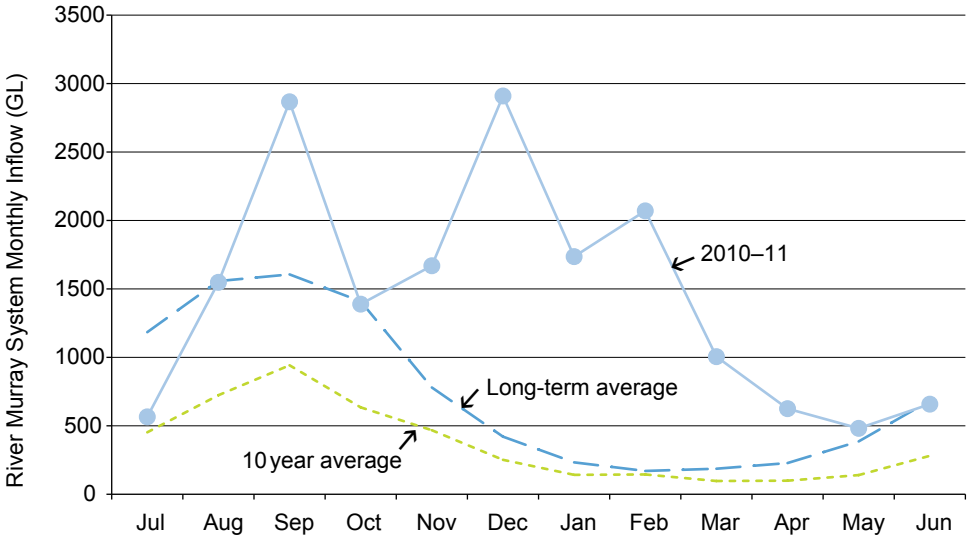
Note: Data has been updated since previous annual reports in accordance with revised accounting treatment of some entitlements and water use. Carryover figures are gross volumes that do not account for evaporative losses.

Use of Commonwealth environmental water in 2010–11

The approach to water use during 2010–11 was adapted in response to changing conditions through the year. The main aim of watering actions during 2009 and through to spring 2010, was to avoid permanent damage to key environmental assets during a period of drought. However, from spring 2010 to the end of 2010–11, the main aim was to complement much improved rainfall and natural flows to help improve ecological condition and restore the health and resilience of environmental assets and aquatic ecosystems.

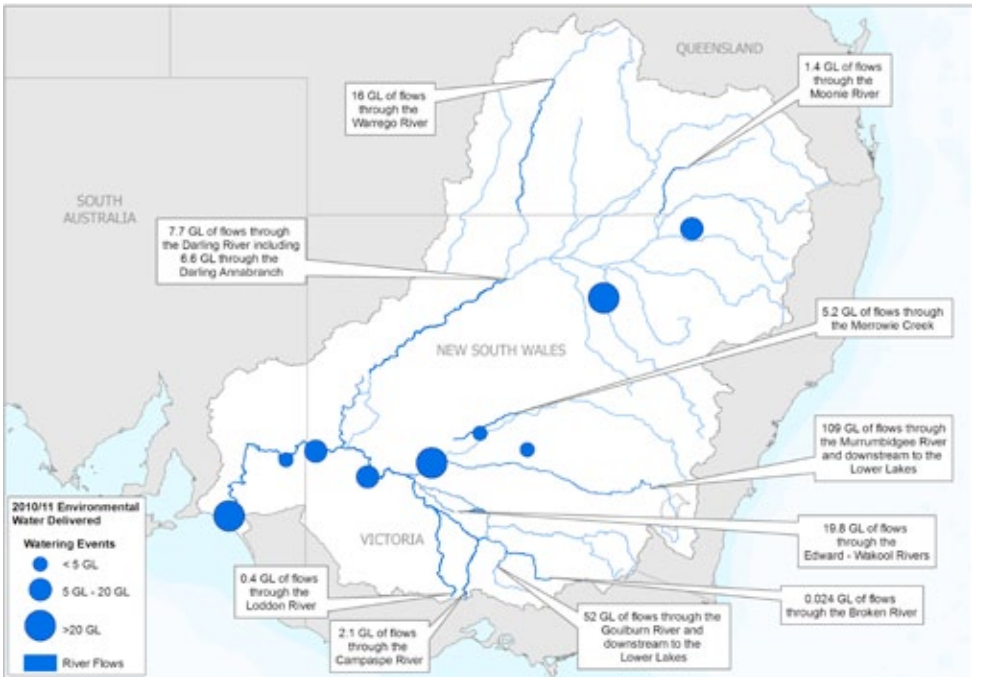
Because there was a larger volume of available water, river connectivity could be promoted and high flow river and floodplain functional processes could be supported. 387 gigalitres were delivered during the 2010–11 water year, summarised in Appendix A. Details of all watering actions undertaken in 2010–11 are provided at Appendix B. An additional graphical depiction of watering locations is provided at Figure 3.

Figure 2: Inflows to the southern-connected Basin in 2010–11 (excluding Snowy and Darling River inflows)



Source: Murray-Darling Basin Authority.

Figure 3: Location of Commonwealth environmental watering in the Murray-Darling Basin in 2010–11



Catchment summaries

Murray catchment

The Murray catchment experienced one of its wettest years on record during 2010–11. As a result, there was widespread inundation and storage levels are significantly improved going into 2011–12.

A total of 66.8 gigalitres of Commonwealth environmental water was delivered to sites and provided as river flows through the catchment during the year (see Appendix B, Table 1). In addition, river flows provided in the Murrumbidgee, Goulburn and Lower Darling flowed into the Murray, providing ecological benefits downstream to the Murray Mouth.

Commonwealth environmental water was used in the Murray catchment to build on the environmental benefits of significant rainfall and higher flows that occurred during the year. A wide range of environmental watering actions were undertaken in the Murray during 2010–11—wetlands were inundated, ephemeral creeks were watered, and fish were given refuge habitat as river flows. Watering actions in the Murray catchment were primarily aimed at:

- supporting mature river red gum and black box communities
- improving water quality
- providing refuge for native flora and fauna
- assisting native fish movement
- improving freshwater and estuarine environments.

Goulburn–Broken, Campaspe and Loddon catchments

Summer inflows into Victorian catchments were the highest on record. A total of 55 gigalitres of Commonwealth environmental water was provided as freshes over autumn and winter 2011, when rainfall in these catchments was lower (see Appendix B, Table 2).

Watering actions were aimed at providing longitudinal connectivity for native fish; maintaining aquatic habitat for macroinvertebrates; maintaining permanent connecting flow for water quality, principally salinity and dissolved oxygen, and supporting in-stream values by supplementing flows.

Murrumbidgee catchment

There were a number of significant rainfall events through the winter and spring of 2010 in the Murrumbidgee catchment, with a major to moderate flood in the upper- and mid-river reaches in December 2010. In 2010–11 there were a number of opportunities to use significant volumes of water in large-scale environmental watering events.

A total of 193.3 gigalitres of Commonwealth environmental water was delivered to sites within the Murrumbidgee catchment and provided as river flows through the catchment during the year (see Appendix B, Table 3). This brings the total amount of Commonwealth environmental water delivered to sites and the Murrumbidgee catchment to over 242 gigalitres since Commonwealth environmental watering began in 2009.

Inundation of a wetland on the Murrumbidgee River—time lapse photos from a webcam over a 10 day period when Commonwealth environmental water was delivered, June 2011.

Case study 1: Murrumbidgee River system

In winter 2011 at a time of lower rainfalls, hundreds of wetlands along the Murrumbidgee River, from Gundagai through to the Murray River, benefited from the largest Commonwealth watering action to date. Over 161 gigalitres of water (including nearly 110 gigalitres of Commonwealth environmental water) was provided as river flows to benefit the Murray system as far downstream as the Lower Lakes. Despite good rainfall over the last nine months, the ecological response in parts of the Murrumbidgee had been limited. The watering action sought to address this by providing a good wetting through to spring for the river and many fringing wetlands. The watering action provided freshwater flows that contributed to:

- Maintaining ecological health and resilience—the water will support the survival of river red gums, black box and littoral zone seedlings that have germinated in response to the floods over the 2010–11 water year.
- Providing a pathway for nutrients to be supplied into the river—this will support the food chains of higher trophic species such as fish, frogs and waterbirds and help these species to build condition in preparation for spring breeding activities.
- Reconnecting wetlands and lagoons along the Murrumbidgee River and Yanco Creek system—water provided to the Murrumbidgee River will allow higher flows to enter the Yanco Creek system, including Yanco, Colombo, Forest and Billabong creeks. Flows will create additional habitat for wetland dependent species, allow for increased movement and contribute to creating suitable breeding habitat for frog species.
- Promoting natural riverine processes—environmental water generated Murrumbidgee River flows downstream of Burrinjuck Dam, contributing to healthy biofilms (collections of microorganisms that live on hard surfaces in the river channel), and also improving fish habitat.

Lachlan catchment

During 2010–11, the Lachlan catchment experienced its first significant flows in over a decade. Significant rainfall in the catchment caused large volumes of water to flow through to the Great Cumbung Swamp at the end of the system. A total of 7.0 gigalitres of Commonwealth environmental water was delivered to sites and provided as river flows within the Lachlan catchment during the year (see Appendix B, Table 4).

During spring and summer 2010–11, Commonwealth environmental water was used to build on natural flows and supported bird breeding events at Merrowie Creek and Merrimajeel Creek in the Booligal Wetlands. This was the first significant bird breeding event in the Booligal Wetlands since 2000. The event included bird breeding of approximately 64 000 pairs of straw-necked ibis and 600 pairs of the migratory glossy ibis, as well as royal spoonbills, white ibis and freckled ducks. Further Commonwealth environmental water was delivered to Merrowie and Merrimajeel creeks in winter 2011.

Strawnecked Ibis eggs, Booligal Blockbank Swamp, during period when Commonwealth water was used, November 2010. (Michelle Crossley, landholder–Riverside, Booligal)

Macquarie–Castlereagh catchment, New South Wales

Since 1 July 2010 over 900 gigalitres of water from significant rainfall has reached the Macquarie Marshes. This water has filled the Macquarie Marshes for the first time in over a decade and inundated 175 000 hectares. As a result of the water flows, over 100 000 pairs of colonial nesting water birds in 12 colonies bred during the year.

In March and April 2011, 26.9 gigalitres of Commonwealth environmental water, along with 112 gigalitres of environmental water from the New South Wales Government, was delivered to the Macquarie Marshes (see Appendix B, Table 5). This watering action contributed to the significant waterbird breeding event and supported a wide range of vegetation communities, including river red gums.

Barwon–Darling catchment

Darling River flows peaked in late March 2011 following the third largest flood in the last 25 years. Over 1 000 gigalitres flowed into the nationally significant Talyawalka Anabranch and Teryawynia Creek wetlands over summer to autumn 2010–11.

Case study 2: Lower Darling

In 2010–11 in response to a proposal from an interested landholder, 7.6 gigalitres of Commonwealth environmental water was used to complement flooding flows and contribute to river flows in the Darling River to Menindee Lakes and downstream to the Darling Anabranch (see Appendix B, Tables 6).

Environmental water that was provided by the Commonwealth, the Living Murray program and the New South Wales Government was used to create a flow down the Great Darling Anabranch and connect to the Murray River. This was the first time that the Anabranch had received significant flows in over a decade, and the water was absorbed in the Anabranch by streams and wetlands.

Gwydir catchment

During 2010–11, the Gwydir catchment experienced increased flows compared to recent years, but lower increases relative to other parts of the Basin. Some parts of the Gwydir Wetlands were inundated from rainfall for the first time in over a decade.

The objective for use of Commonwealth environmental water in 2010–11 was to support six to eight months of continuous wetland inundation across a large portion of the Gwydir Wetlands. This would promote the recovery of wetland vegetation and create habitat for threatened and migratory species.

A total of 13 gigalitres of Commonwealth environmental water was delivered in August 2010 and February to March 2011 to help to achieve the objective for the Gwydir Wetlands (see Appendix B, Table 7).

Warrego and Nebine catchments

The Warrego catchment received above average rainfall during summer 2010–11. Summer stream-flow at Cunnamulla in the mid-catchment was the third highest by volume in the last 20 years.

A total of 16 gigalitres of Commonwealth environmental water was delivered within the Warrego catchment during the year (see Appendix B, Table 8). Since 2009 more than 32.6 gigalitres of Commonwealth environmental water have been used to complement natural flows in the Warrego and Nebine catchments. This water made a small but valuable contribution to the ecological benefits of flow events in these systems.

In the Upper Warrego, Commonwealth environmental water complemented natural flow events that occurred between September and April, with benefits including reconnection of waterholes in the Warrego River Waterholes site. In the Lower Warrego, water used in October 2010 contributed to the first post-winter flow in the system, which is known to be a critical spawning cue for native fish species. During March to April 2011 water was used to contribute to an overbank flow that charged the Warrego River distributory system and Yantabulla Swamp.

Moonie catchment

During summer 2010–2011 the Moonie River catchment received above-average rainfall. Summer stream-flow at Nindigully in the lower catchment was the highest by volume since at least 1970. A very large rainfall event in late December provided significant overbank flows to the Moonie River floodplain.

A total of 1.4 gigalitres of Commonwealth environmental water was delivered to the Moonie catchment in December 2010 (see Appendix B, Table 9). Whilst this is a small volume compared to other river inflows, it contributed flows to the floodplain of the lower Moonie River which benefited vegetation, waterbirds and native fish, whilst also initiating carbon and nutrient exchange.

Progress on key issues

Working with others

In 2010–11, partnership arrangements that support the use of Commonwealth water across the Basin were expanded in scope and provided increased opportunities for water use.

There was also improved coordination of Commonwealth environmental water use. This is due to the environmental water arrangements of state jurisdictions and local-level bodies, such as environmental water advisory groups, and catchment management authorities. A key indicator of this integration is that, in addition to the 554 gigalitres of Commonwealth environmental water delivered since 2009, approximately a further 417 gigalitres has been contributed by delivery partners.

Community Consultation

Management of environmental water is an adaptive process and there will always be areas of potential improvement. We are particularly seeking community views on:

- environmental assets and the health of these assets
- the prioritisation of environmental water use
- potential partnership arrangements for the management of environmental water
- potential arrangements for the monitoring, evaluation and reporting of environmental water use.

Comments and suggestions are very welcome and can be provided to: ewater@environment.gov.au.

Case study 3: Edward–Wakool River System (New South Wales)

The recent trial watering action in Jimaringle and Cockran creeks in the Murray catchment is an example of how the local community can be involved in Commonwealth environmental watering.

Local landowners helped to organise consent to the action on private land, provided valuable information on local conditions and helped to monitor the flow fronts and inundation extent. As a result over 3.5 gigalitres of water, including 1.1 gigalitres from the Commonwealth, was delivered to environmental assets through existing irrigation infrastructure.

The watering action was identified and organised by the NSW Murray Catchment Management Authority (CMA), local staff of the NSW Office of Environment and Heritage, Murray Irrigation Limited (MIL) and the department. The Jimaringle and Cockran Creeks Action Plan was launched by the CMA and MIL 4 February 2011. The plan was the basis for considering the watering action and was delivered to environmental assets through existing irrigation infrastructure.

Inundation of riparian vegetation in the Edward-Wakool river system, May 2011.

Environmental water delivery documents

An important element of planning work undertaken in 2010–11 was the development of water use documents for most catchments of the Basin. These documents will provide scalable water use strategies that support efficient water use in different water availability scenarios and ecological conditions. Along with proposals provided by delivery partners and others, the documents will be a key input to water use planning. The material will be updated as further information is received and proposals are developed.

Monitoring, evaluating and reporting on the use of Commonwealth environmental water

In June 2011 the department released a discussion paper for consultation on a proposed framework for monitoring, evaluation and reporting (MER) on the use of Commonwealth environmental water. The paper proposes an approach to MER that supports good governance, accountability and adaptive management, and contributes to the knowledge base for use of environmental water. The framework proposes three levels of MER:

- Operational level MER to assess whether water is being delivered in a way that is consistent with stated ecological and hydrological objectives.
- Intervention level MER to assess the ecological response to Commonwealth environmental water at an asset scale.
- Program level MER to aggregate the results of site-specific intervention MER and incorporate contextual information provided at a catchment and Basin scale to assess the overall ecosystem outcomes of Commonwealth environmental watering.

In 2010–11 operational monitoring was undertaken for all actions to ensure that water was delivered in the way that was planned, and to manage risks. Ecological response monitoring was undertaken in selected areas where Commonwealth environmental water was used, including the Murrumbidgee River and Edward-Wakool area. Ecological monitoring is primarily being undertaken by scientific institutions, including Charles Sturt University, and the local offices of state water, environment and fisheries agencies.

Section of the Gwydir Wetlands taken shortly after Commonwealth environmental water was used, October 2010.

Reporting on the outcomes of the use of Commonwealth environmental water

A report on the outcomes from the use of Commonwealth environmental water in 2009–10 was published in March 2011. The report is available on the department's website.

An outcomes report for 2010–11 is expected to be published in late 2011. Other information about the outcomes of water use will be provided on the department's website as it becomes available.

Environmental water shepherding

The Commonwealth is working with Basin states, initially New South Wales and Queensland, to develop and implement water shepherding arrangements. These arrangements will provide for the legal protection, effective use, and accurate accounting and reporting of environmental outcomes for Commonwealth environmental water used in unregulated rivers.

Agreements are in place with both New South Wales and Queensland on the implementation of water shepherding. A key principle of these agreements is that shepherding of the Commonwealth's environmental water will neither enhance nor diminish the property rights of other water users.

Environmental Water Holdings Special Account Update 2010–11

The Environmental Water Holdings Special Account is established under section 111 of the *Water Act 2007* for the payment of costs, expenses and other obligations incurred in managing Commonwealth environmental water holdings.

At the start of 2010–11 the Special Account balance was $5.027 million. Funding of $23.976 million was credited from the Sustainable Rural Water Use and Infrastructure Program to the account during the financial year, and $5.369 million was expended on annual water entitlement fees, allocation trading and delivery costs. At 30 June 2011 the Special Account balance was $23.499 million. The key expenses in 2010–2011 are outlined in Table 3 below.

Table 3: Environmental water holdings Special Account expenses

Category of expense	Total costs
Fees and charges for holdings and allocations and for maintaining and providing for the replacement of rural water infrastructure[1]	$4.961 million
Water delivery (such as pumping)	$0.407 million
Monitoring and evaluation	$0.040 million
Development of environmental registers and other systems[2]	$0.095 million
Total	**$5.504 million**

Notes:

1 Fees and charges include $3.432 million for annual water entitlement fees and $1.530 million for allocation use fees.

2 The Commonwealth received a contribution of $0.053 million from the Murray-Darling Basin Authority towards the expense of $0.148 million on the development of environmental registers and other systems.

Directions given to the Commonwealth Environmental Water Holder

No directions were given in 2010–11 to the Commonwealth Environmental Water Holder by either the minister or the secretary of the department.

Outlook for 2011–12

The volume of Commonwealth environmental water available in 2011–12 is likely to be substantially greater than in 2010-11, taking into account allocations and water carried over from 2010–11. As a result an increased range of water use options will become possible. Watering actions will continue to be directed to the objectives set out in the prioritisation framework for different water availability scenarios.

Partnership arrangements will continue to be developed that support efficient and effective use of water. There will be ongoing opportunities for local groups to bring forward suggestions as to how environmental water could be used and managed.

The Basin Plan is expected to be finalised in 2012. Commonwealth environmental water is required to be managed in accordance with the Environmental Water Plan, which will be set out in the Basin Plan.

Ian Robinson
Commonwealth Environmental Water Holder
July 2011

Appendix A—Commonwealth environmental water delivery volumes

Table 1: Summary of the volume of Commonwealth environmental water that has been delivered across the Basin from 2009 to 30 June 2011

Environmental water decisions and use total			
Catchment	Complex	Water delivered megalitres (ML)	
		Total C'wealth	Total partner
Murray	Barmah–Millewa Forest	1 500	500
	Coorong, Lower Lakes and Murray Mouth	49 183	104 300
	Riverland Chowilla	22 611	1 945
	Edward–Wakool River system	24 267	2 557
	Gunbower–Koondrook Perricoota Forests	–	–
	Hattah Lakes	18 524	11 146
	Murray catchment river flows	–	–
	Other Murray catchment sites	8 635	2 827
Murray		**124 721**	**123 275**
Lower Darling	Lower Darling catchment river flows	6 580	–
	Other Lower Darling catchment sites	–	–
Lower Darling		**6 580**	**–**
Loddon	Loddon catchment river flows	427	–
	Other Loddon catchment sites	–	–
Loddon		**427**	**–**
Campaspe	Campaspe catchment river flows	2 140	–
	Other Campaspe catchment sites	–	–
Campaspe		**2 140**	**–**
Goulburn–Broken	Lower Goulburn River floodplain	–	–
	Goulburn–Broken catchment River flows	52 440	–
	Other Goulburn–Broken catchment sites	24	–
Goulburn–Broken		**52 465**	**–**
Ovens	Ovens catchment river flows	50	–
	Other Ovens catchment sites	–	–

Table 1 continued

Catchment	Complex	Environmental water decisions and use total Water delivered megalitres (ML)	
		Total C'wealth	Total partner
Ovens		**50**	**–**
Murrumbidgee	Lower Murrumbidgee Floodplain	72 086	79 993
	Mid-Murrumbidgee River Wetlands	3 000	300
	Murrumbidgee catchment river flows	167 001	69 524
	Other Murrumbidgee catchment sites	–	–
Murrumbidgee		**242 087**	**149 817**
Lachlan	Booligal Wetlands	1 825	880
	Great Cumbung Swamp	–	–
	Lachlan Swamps	–	–
	Lachlan catchment river flows	–	–
	Other Lachlan catchment sites	5 196	1 147
Lachlan		**7 021**	**2 027**
Barwon–Darling	Barwon–Darling catchment river flows	41 826	–
	Other Barwon–Darling catchment sites	–	–
Barwon–Darling		**41 826**	**–**
Warrego	Warrego catchment river flows	28 210	–
	Other Warrego catchment sites	–	–
Warrego		**28 210**	**–**
Condamine–Balonne	Lower Balonne River Floodplain system	–	–
	Narran Lakes	–	–
	Condamine–Balonne catchment river flows	–	–
	Other Condamine–Balonne catchment sites	4 456	–

Table 1 continued

Environmental water decisions and use total			
Catchment	**Complex**	**Water delivered megalitres (ML)**	
		Total C'wealth	**Total partner**
Condamine–Balonne		**4 456**	**–**
Macquarie-Castlereagh	Macquarie Marshes	27 821	131 886
	Macquarie–Castlereagh catchment river flows	–	–
	Other Macquarie–Castlereagh catchment sites	–	–
Macquarie–Castlereagh		**27 821**	**131 886**
Namoi	Namoi catchment river flows	–	–
	Other Namoi catchment sites	–	–
Namoi		**–**	**–**
Gwydir	Gwydir Wetlands	13 056	10 000
	Gwydir catchment river flows	–	–
	Other Gwydir catchment sites	–	–
Gwydir		**13 056**	**10 000**
Moonie	Moonie catchment river flows	2 830	–
	Other Moonie catchment sites	–	–
Moonie		**2 830**	**–**
Paroo	Paroo catchment river flows	–	–
	Other Paroo catchment sites	–	–
Paroo		**–**	**–**
Border Rivers	Border Rivers catchment river flows	–	–
	Other Border Rivers catchment sites	–	–
Border Rivers		**–**	**–**
Wimmera–Avoca	Wimmera River Terminal Wetlands	–	–
	Wimmera–Avoca catchment river flows	–	–
	Other Wimmera–Avoca catchment sites	–	–
Wimmera–Avoca		**–**	**–**
TOTAL – ALL		**553 690**	**416 905**

Appendix B—Basin catchment summary tables on the use of Commonwealth environmental water in 2010–11

Table 1: Commonwealth environmental watering actions for the Murray catchment

Location of watering action		Type of action			Objective of watering action		Water delivered megalitres (ML)		
Complex	Site	River flows	Inundation			Timing	C'wealth	Partner	Total
			Wetland	Floodplain					
Coorong, Lower Lakes and Murray Mouth	Lower Lakes	●	●		Contribute to: 1. Improving salinity in the Coorong and Lake Albert. 2. Extending the period of connectivity. 3. Providing passage for movement and cues for species. 4. Maintaining an open Murray Mouth. 5. Flushing salt and nutrients from the Murray-Darling Basin. 6. Recharging nutrient levels in the Coorong. 7. Maintaining the freshwater and estuarine environment.	March to April 2011	29 183		29 183

Table 1 continued

Location of watering action		Type of action			Objective of watering action				
Complex	Site	River flows	Inundation			Timing	Water delivered megalitres (ML)		
			Wetland	Floodplain			C'wealth	Partner	Total
Riverland Chowilla	Coombool Swamp		●		Avoid further loss of mature black box vegetation and provide critical drought refuge for the southern bell frog and waterbirds before the return of wetter conditions in spring.	July 2010	506	1 000	1 506
	Lake Walla-walla		●		Provide a significant drought refuge for water birds and other wetland-dependant species and to water fringing river red gum and black box woodlands.	July to September 2010	7 850		7 850
	Kulkurna		●		Avoid further loss of black box vegetation and provide a critical drought refuge for the southern bell frog and waterbirds before the return of wetter conditions in spring.	July 2010	57		57

Table 1 continued

Location of watering action		Type of action			Objective of watering action		Water delivered megalitres (ML)		
Complex	Site	River flows	Inundation			Timing	C'wealth	Partner	Total
			Wetland	Floodplain					
Edward-Wakool	Jimaringle and Cockran Creeks	●			1. 'Prime up' and wet the soil in the mid-section of the system. 2. Maintain or improve the health of riparian vegetation, particularly black box and river red gum. 3. Improve our understanding of inundation extents that can be achieved using small volumes of water delivered through strategic irrigation escapes.	April 2011	1 100	2 457	3 557
	Wakool River and Yallakool Creek	●			Assist native fish movement and improve water quality.	January to February 2011	18 667		18 667
Hattah Lakes	Hattah Lakes		●		Further inundate fringing river red gums, maximise soil profile recharge and provide drought refuge for waterbirds and other wetland-dependent species before the return of wetter conditions in spring.	July to September 2010	9 342	2 531	11 873

Table 1 continued

Location of watering action		Type of action			Objective of watering action		Water delivered megalitres (ML)		
Complex	Site	River flows	Inundation			Timing	C'wealth	Partner	Total
			Wetland	Floodplain					
Murray other	Katarapko Floodplain —Carpark Lagoons		●		Before wetter conditions in spring 2010, provide habitat for threatened fish, support long-lived vegetation, provide a drought refuge for threatened species and water dependent birds, and provide potential breeding habitat and conditions for frogs.	October to November 2010	154		154

Table 2: Commonwealth environmental watering actions for the Goulburn, Broken, Loddon and Campaspe catchments

Location of watering action		Type of action			Objective of watering action		Water delivered megalitres (ML)		
Complex	Site	River flows	Inundation			Timing	C'wealth	Partner	Total
			Wetland	Floodplain					
Loddon	Loddon River	●			1. Provide longitudinal connectivity for fish. 2. Maintain aquatic habitat for macroinvertebrates. 3. Maintain permanent connecting flow for water quality, principally salinity and dissolved oxygen.	June 2011 –ongoing	427		427

Table 2 continued

Location of watering action		Type of action			Objective of watering action		Water delivered megalitres (ML)		
Complex	Site	River flows	Inundation			Timing	C'wealth	Partner	Total
			Wetland	Floodplain					
Campaspe	Campaspe River	●			1. Provide longitudinal connectivity for fish. 2. Maintain aquatic habitat for macroinvertebrates. 3. Maintain permanent connecting flow for water quality, principally salinity and dissolved oxygen.	June 2011 –ongoing	2 140		2 140
Goulburn–Broken other	Broken River	●			Support in-stream values of the Broken River by supplementing flows.	May 2011	24		24
Goulburn–Broken River Flows	Goulburn–Broken River	●			Support the seasonal raising of water levels in the Lower Lakes and increase barrage outflows while maximising environmental benefits to the Goulburn River.	May to June 2011	52 440		52 440

Table 3: Commonwealth environmental watering actions for the Murrumbidgee catchment

Location of watering action		Type of action			Objective of watering action		Water delivered megalitres (ML)		
Complex	Site	River flows	Inundation			Timing	C'wealth	Partner	Total
			Wetland	Floodplain					
Lower Murrum-bidgee River wetlands	Lowbidgee —Yanga National Park		●	●	Improve wetland vegetation including river red gum communities, extend the duration of inundation and prime wetlands for spring watering before wetter conditions returning in spring.	August 2010	7 533	32 058	39 591
	Lowbidgee —Yanga Nature Reserve/ Park		●	●	Assist in halting the decline in health of black box and associated wetland vegetation and provide habitat for waterbird species.	September 2010	13 287	21 622	34 909
	Lowbidgee —North Redbank		●		Re-establish the black box wetland and associated vegetation and provide habitat for migratory and threatened water birds.	October 2010	2 525	6 925	9 450
Mid-Murrum-bidgee River wetlands	Barren Box Swamp		●		Improve river red gum and associated vegetation health and provide stable water levels for colonial waterbird breeding.	November to December 2010	3 000	300	3 300

Table 3 continued

Location of watering action		Type of action			Objective of watering action		Water delivered megalitres (ML)		
Complex	Site	River flows	Inundation			Timing	C'wealth	Partner	Total
			Wetland	Floodplain					
Murrum-bidgee River flows	Murrum-bidgee River replenish-ment	●		●	Provide suitable habitat for water-dependent species downstream of Maude Weir, and provide secondary benefits in the Murray River by increasing flows through to the Lower Lakes, Coorong and Murray Mouth.	February to March 2011	57 751	17 115	74 866
Murrum-bidgee	Mid-Murrum-bidgee Wetlands and the Yanco-Colombo-Billabong Creek system	●	●	●	1. Maintain ecological health and resilience. 2. provide a pathway for nutrients to be supplied into the river. 3. reconnect wetlands and lagoons along the Murrumbidgee River and Yanco Creek system. 4. promote natural riverine processes.	June to September 2011	109 250	52 409	161 659

Table 4: Commonwealth environmental watering actions for the Lachlan catchment

Location of watering action		Type of action			Objective of watering action		Water delivered megalitres (ML)		
Complex	Site	River flows	Inundation			Timing	C'wealth	Partner	Total
			Wetland	Floodplain					
Booligal Wetlands	Merrimajeel Creek—Booligal Swamp	●	●		Support a bird breeding event in the Booligal Wetlands.	October 2010	1 573	787	2 360
Lachlan—other	Merrowie Creek—Tarwong Lakes	●	●		Support a bird breeding event on Merrowie Creek and to inundate the Tarwong Lakes.	November to December 2010	2 145	855	3 000
Lachlan—other	Merrowie Creek	●	●		Support ecological values including birds, vegetation and fish, and Sloane's froglet.	June 2010–ongoing	3 051	292	3 343
Booligal Wetlands	Merrimajeel Creek—Murrumbidgil Swamp	●	●		Improve hydrological connectivity and provide habitat for threatened and migratory birds in the Murrumbidgil Swamp.	June 2011–ongoing	252	93	345

Table 5: Commonwealth environmental watering actions for the Macquarie–Castlereagh catchment

Location of watering action		Type of action			Objective of watering action		Water delivered megalitres (ML)		
Complex	Site	River flows	Inundation			Timing	C'wealth	Partner	Total
			Wetland	Floodplain					
Macquarie	Macquarie Marshes		●		Maintain and improve wetland vegetation, extend the duration of existing natural flows and prime wetlands for spring watering.	August 2010	1 888	1 442	3 330
	Macquarie Marshes		●		Maintain water levels to support the success of colonial bird breeding.	March to April 2011	25 000	110 594	135 594

Table 6: Commonwealth environmental watering actions for the Barwon–Darling and Lower Darling catchments

Location of watering action		Type of action			Objective of watering action		Water delivered megalitres (ML)		
Complex	Site	River flows	Inundation			Timing	C'wealth	Partner	Total
			Wetland	Floodplain					
Darling River Flows	Darling River and Great Darling Anabranch	●			Maximise the environmental benefits to the Darling River from a watering action involving delivery of environmental water to Menindee Lakes, i.e. to provide in-stream benefits including support for key ecosystem functions such as nutrient cycling and inundation of river benches. 7 672 megalitres, including 6 580 megalitres that flowed through the Darling Anabranch for the purpose of providing in-stream habitat, triggers for native fish breeding, and longitudinal connectivity between the Menindee Lakes system and the Murray River; and to support riparian vegetation health.	August to September 2010	7 672		7 672

Table 7: Commonwealth environmental watering actions for the Gwydir catchment

Location of watering action		Type of action			Objective of watering action		Water delivered megalitres (ML)		
Complex	Site	River flows	Inundation			Timing	C'wealth	Partner	Total
			Wetland	Floodplain					
Gwydir Wetlands	Gwydir Wetlands	●	●	●	Contribute to tributary flows to: 1. Inundate as much of the Lower Gwydir Wetlands as possible. 2. Wet as much of the Gingham Wetlands above the Gingham Bridge as possible.	August 2010	3 056		3 056
	Gwydir Wetlands	●	●	●	Support the inundation of the Gwydir Wetlands for two to four months to promote the recovery of wetland vegetation and create habitat for threatened and migratory listed species.	February to March 2011	10 000	10 000	20 000

Table 8: Commonwealth environmental watering actions for the Warrego catchment

Location of watering action		Type of action			Objective of watering action		Water delivered megalitres (ML)		
Complex	Site	River flows	Inundation			Timing	C'wealth	Partner	Total
			Wetland	Floodplain					
Warrego	Upper Warrego	●			Support near-natural flow regime in the upper catchment, extending lateral and longitudinal connectivity.	September to March 2011	6 050		6 050
	Lower Warrego	●		●	1. Contribute to the first post-winter flow–a critical spawning trigger for native fish species (October event). 2. Contribute to overbank flows.	October to April 2011	10 000		10 000

Table 9: Commonwealth environmental watering actions for the Moonie catchment

Location of watering action		Type of action			Objective of watering action		Water delivered megalitres (ML)		
Complex	Site	River flows	Inundation			Timing	C'wealth	Partner	Total
			Wetland	Floodplain					
Moonie River	Moonie River	●	●	●	Contribute to an overbank flow with benefits to floodplain vegetation, waterbirds and native fish, and also initiate carbon and nutrient exchange.	December 2010	1 415		1 415

Resources

The following resources relate to information referred to in Outcome 4, Sustainable Water Legislation.

Operational aspects of the WELS Act www.waterrating.gov.au

Reporting on the outcomes of the use of Commonwealth environmental water www.environment.gov.au/water/publications/action/cewh-outcomes-report-2009-10.html.