

Environmental water use in New South Wales Outcomes 2013–14



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Front cover: Wavy marsh wort, North Redbank Wetlands, Murrumbidgee Valley. Photo: Joanne Ocock/ Charles Sturt University.

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The primary aim for New South Wales environmental water managers during 2013–14 was to maintain ecological health and resilience for areas that still had good water availability, and to maintain basic ecological functions and resilience in areas where there was less water availability. In 2013 most of NSW experienced a very hot dry summer.

The Office of Environment and Heritage (OEH) delivered over 635 070 megalitres of environmental water to support the health of NSW rivers and floodplain ecosystems during 2013–14. Within this total, OEH collaborated with the Commonwealth Environmental Water Office (CEWO) to provide almost 363 000 megalitres.

Significant outcomes were observed for waterbirds in the Macquarie, Lachlan, Murrumbidgee, Murray and Lower Darling valleys. Flows to support native fish and ecosystem resilience were also delivered to the Gwydir, Murray and Lower Darling valleys. When making environmental water management decisions, OEH considers many factors, such as the condition of wetland vegetation, water-dependent fauna and river channels; the water available; antecedent conditions and seasonal outlook; and operational flow management considerations. Generally, OEH manages water to build resilience during wetter years in order to minimise the impacts of both past and future dry years.

The environmental outcomes described in this report were observed through the monitoring activities of OEH and its partners. Monitoring typically includes both on-ground observation and the interpretation of satellite imagery to quantify the extent and duration of water inundation, vegetation community extent and condition, as well as the response of specific fauna such as waterbirds, fish and frogs.

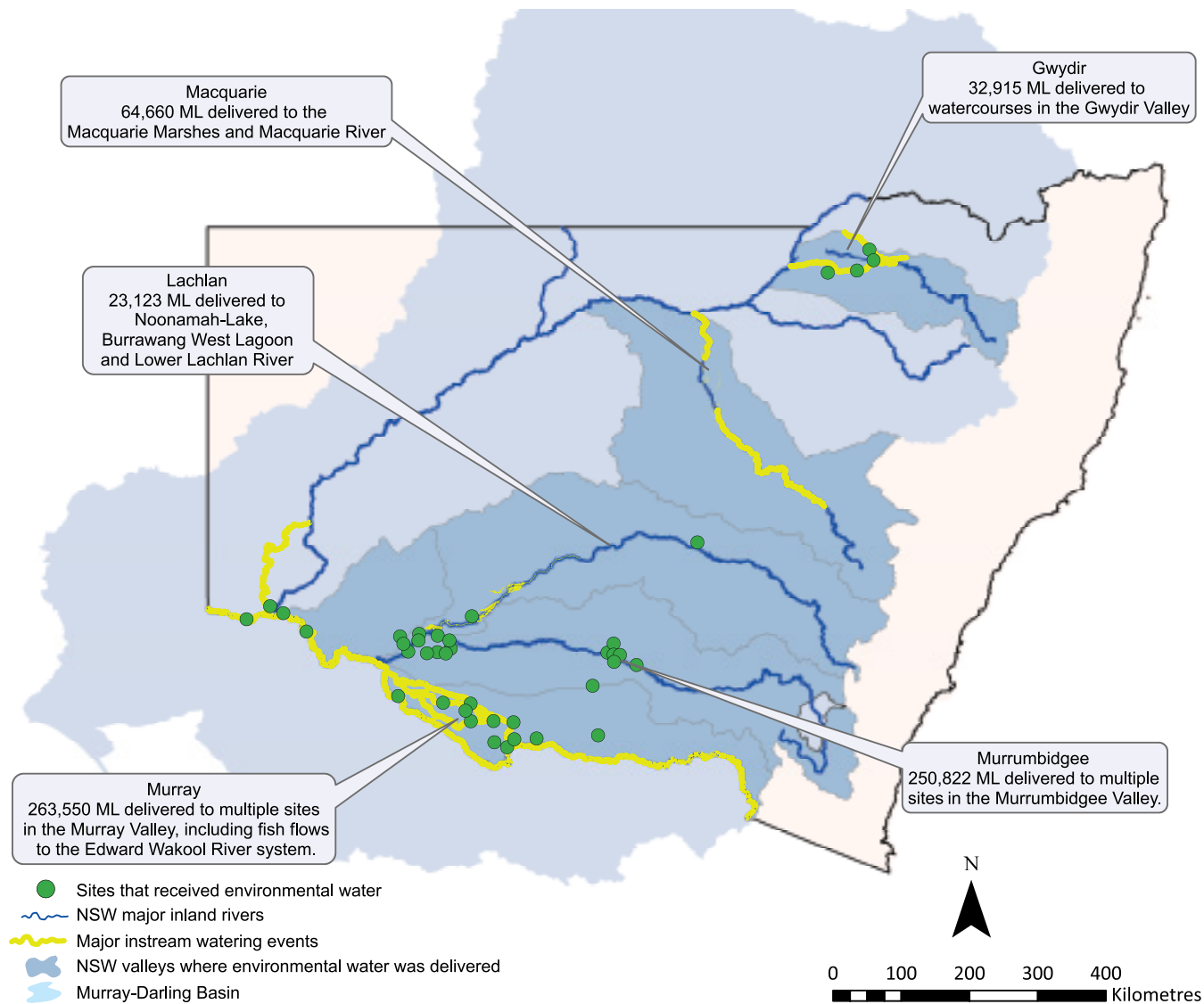
This outcomes report demonstrates that the recovery of key water-dependent ecosystems targeted by environmental managers is continuing, supported by strong partnerships with landholders, local environmental water advisory groups, Local Land Services, CEWO and other state agencies.

OEH will continue monitoring environmental watering outcomes to better understand the links between single event outcomes, annual water management decisions and the long-term objective of restoring and maintaining the health and resilience of the water-dependent assets of NSW.

The delivery and management of environmental water in NSW is undergoing transition following the commencement of the Murray Darling Basin Plan (the Basin Plan) under the Commonwealth Water Act 2007. OEH considers this an opportunity to improve the strategic context of its water management decisions by developing Long Term Environmental Watering Plans for each valley, in cooperation with regional communities and improving environmental monitoring and reporting.

Terry Bailey
Chief Executive
Office of Environment and Heritage

NSW environmental watering event sites 2013–14



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Water for the environment

OEH manages NSW environmental water on behalf of the NSW Government and the people of NSW. It works collaboratively with partner agencies and the community to deliver water to protect and improve the environmental values of rivers, floodplains and wetlands. OEH recognises the economic importance of floodplain agriculture and works with its partners to optimise the benefits of delivering environmental water to floodplains for environment and agricultural outcomes.

OEH is responsible for ensuring that NSW environmental water is managed in accordance with relevant statutory plans and environmental water management plans, including water sharing plans established under the **Water Management Act 2000**. This includes the requirements of the Basin Plan.

This report provides an overview of the environmental watering actions undertaken by OEH during 2013–14 and the ecological outcomes this achieved for NSW. This document reports on water that is:

- held by NSW under water access licences
- held in prescribed allocations under water sharing plans
- provided by the Commonwealth Environmental Water Holder
- provided through such programs as **The Living Murray**.

It does not include environmental water which is released in accordance with the rules in the water sharing plans managed by the **NSW Office of Water**.

Find out more about [environmental water management planning](#).

Environmental water managed by OEH

‘Adaptive’ environmental water is committed from a water access licence for a specified environmental purpose, supported by a statutory water use plan. Water access licences have been purchased from willing sellers or have been created by recovering water savings from infrastructure projects.

These licensees receive allocations on the same terms as other licensees in the same category. For example, if a general security licence is purchased and committed as adaptive environmental water, the same allocations apply as for other general security licences for the same water source.

Annual environmental watering priority statements are produced by OEH to guide environmental water management and operations in the Murray Darling Basin and to meet the requirements of the Basin Plan. The priority statements are based on the detailed annual environmental watering plans for each valley. Long term environmental water plans are being developed to meet the requirements of the Basin Plan, to provide for the long term management of environmental water. They will be consistent with the basin-wide environmental watering strategy.

Environmental Water Advisory Groups (EWAGs) provide the primary means for community input into decisions regarding OEH’s management of environmental water.



River red gums flowered vigorously in areas of the Lower Lachlan Swamp floodplain inundated by environmental flows

Paul Packard / OEH

Planning for the whole of the Murray Darling Basin



Debbie Love/OEH

Common reedbeds along Monkeygar Creek, Macquarie Marshes Nature Reserve

Background

The Murray Darling Basin Plan (Basin Plan) commenced in November 2012 under the **Commonwealth Water Act 2007**. The Basin Plan sets out standards for the management of water resources in the Murray Darling Basin to ensure that they are managed in a coordinated and sustainable way throughout the basin.

On 27 February 2014, the NSW Government signed the Intergovernmental Agreement on implementing reform in the Murray Darling Basin (IGA). This agreement is an undertaking by the Australian and participating Murray Darling Basin state governments to implement the Basin Plan and meet its requirements.

Actions

NSW Government water agencies are undertaking a number of measures to implement the Basin Plan over the next six years.

OEH is developing the long term environmental watering plans required under Chapter 8 of the Basin Plan. Long term plans allow a strategic approach for decision making when it comes to using and trading water for environmental benefits. These plans build upon previous planning by OEH such as the Adaptive Water Use Plans as well as Annual Environmental Watering Plans. These long term plans will be consistent with the basin wide environmental watering strategy prepared by the Murray Darling Basin Authority (MDBA).

OEH will provide input into the development of the Water Resource Plans by the NSW Office of Water (NOW). These plans will be accredited by the Commonwealth under the **Water Act 2007**, and aim to provide an agreed balance of water use between the environment and other uses, and build upon the current NSW water sharing plans.

Outcomes

OEH is committed to implementing the requirements of the Basin Plan which will benefit the environment within the whole Murray Darling Basin. By implementing the Basin Plan OEH will contribute to healthy inland rivers, wetlands and floodplains from site to basin scale, and ensure that water dependant ecosystems are resilient to climate change and other risks and threats.

Long term plans will deliver coordinated planning, prioritisation and use of environmental water on both a long-term and annual basis. They will enable adaptive management to be applied to the planning, prioritisation and use of environmental water and will facilitate consultation, coordination and cooperative arrangements between the MDBA, the Commonwealth Environmental Water Holder and basin states.

Long term water plans will set objectives and targets for all environmental water management, increase transparency, include local knowledge and facilitate effective monitoring, reporting and evaluation.

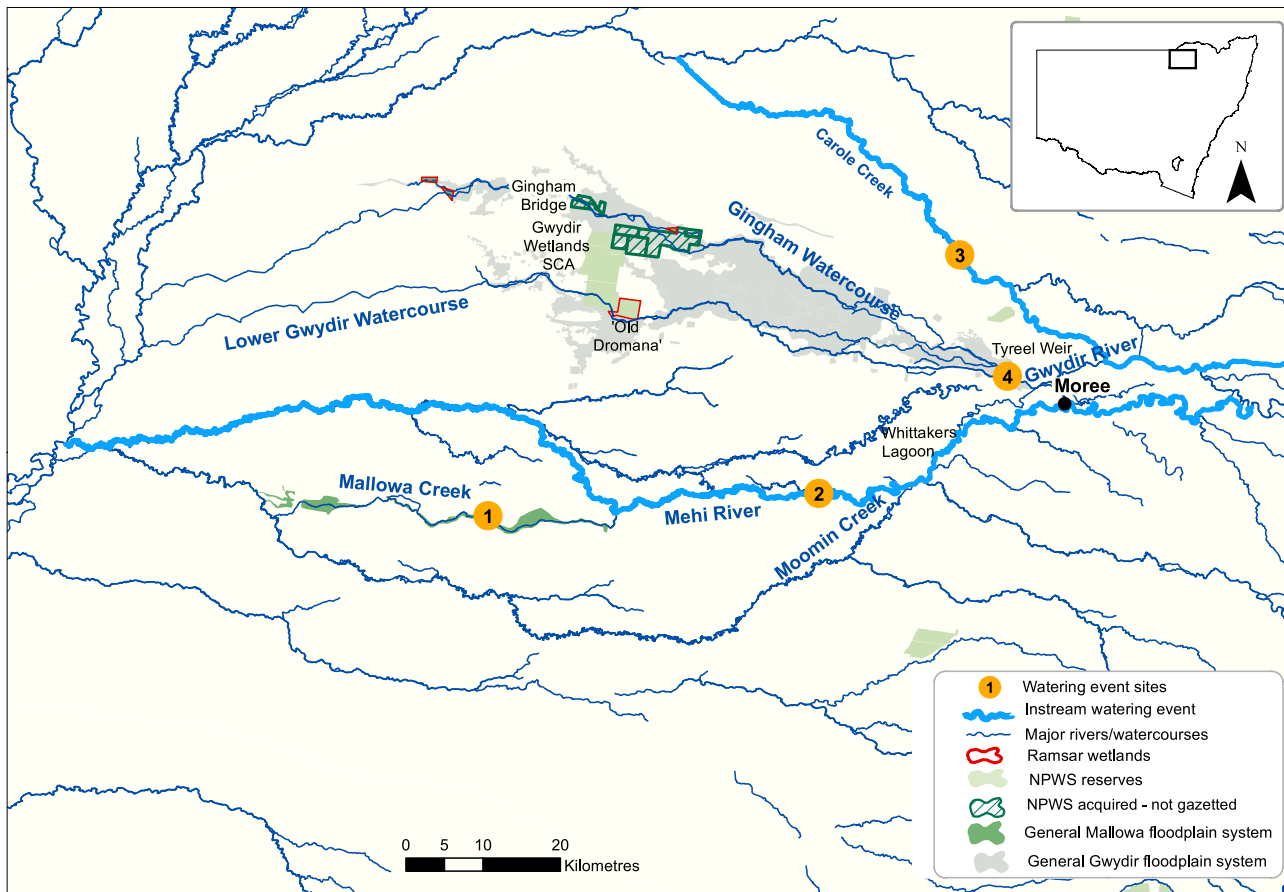
Valley report: Gwydir

The Gwydir Valley catchment covers 26 596 square kilometres and the floodplain contains core wetland areas supporting coolibah and belah woodlands, river cooba and lignum shrublands, and meadows of reeds, marsh club-rush, sedges, spike-rushes and water couch. These vegetation communities provide feeding and breeding habitat for many waterbirds, including spoonbills, herons, cormorants, and migratory species listed in international agreements, such as the great egret, cattle egret and glossy ibis and migratory shorebird species such as Latham and Australian painted snipe.

The Kamilaroi/Gomeri people are the traditional owners of the country that includes the Gwydir Wetlands, with more than 160 cultural heritage sites recorded. In addition, the area's wetlands and rivers are fundamentally linked, as special places, to the local Aboriginal people who place great importance on their ongoing good health.

The **Gwydir Environmental Contingency Allowance Operations Advisory Committee** is chaired by a local land services (LLS) representative and consists of a range of community representatives including Aboriginal, local landholders, water user groups, independent environmental groups and scientists, and Australian and NSW Government stakeholders. The committee provides advice on managing environmental water in the Gwydir catchment. The committee met twice during the year. The second meeting was an annual planning day at Moree with presentations from scientists and policy specialists.

Gwydir Valley environmental watering sites 2013–14



The Mallowa watercourse contains significant areas of wetlands and has historically recorded large bird breeding events. Improved environmental water availability since 2012 has meant greater support for the Mallowa creek and wetland assets.

The Gingham and Lower Gwydir watercourses include areas listed under the **Convention on Wetlands of International Importance** (the Ramsar Convention). Three sites are on privately owned land within the Gingham system and one in the Gwydir Wetlands State Conservation Area (SCA) on the Lower Gwydir. The Lower Gwydir watercourse contains the state's largest stand of marsh club-rush, a critically endangered ecological community listed in the **NSW Threatened Species Conservation Act 1995**.

The Mehi River and Carole Creek are regulated rivers which provide suitable habitat for native fish. Delivery of environmental water into these systems is intended to augment the flow regime to provide more suitable breeding and recruitment conditions for large-bodied native fish.

Catchment condition in 2013–14

River regulation, floodplain development and the mostly dry conditions experienced during the millennium drought caused a serious decline in the health and extent of wetland vegetation and the diversity and numbers of native waterbirds and fish species in the Gwydir.

The wetter conditions experienced between 2010 and 2013 improved remaining wetland vegetation, halted the decline of wetland extent and supported a major waterbird breeding event in 2012. At the commencement of 2013–14 the wetlands retained water throughout most of the core areas and the water dependent vegetation of both the Gingham and Lower Gwydir and those of the Mallowa system were considered to be in relatively good condition.

During 2013–14 the valley experienced a very dry season, reported as being in the lowest 10 per cent of years on record. Low rainfall resulted in a complete drying of the Gingham and Gwydir system wetlands by late summer.

A substantial rainfall event in late March was followed by small inflows and a delivery of 1000 megalitres of environmental contingency allowance. The combination of rainfall, tributary flows and environmental water refilled both the Gingham and Lower Gwydir wetland systems.

Watering aims

Environmental water delivery in the Gwydir valley for 2013-14 focussed on:

- allowing the Gingham and Lower Gwydir wetland systems to respond to natural rainfall triggers
- completing the second year of a three year program of restoration and recovery in the Mallowa system
- enhancing flows in the regulated Mehi and Carole systems to improve opportunities for native fish breeding.



Jane Humphries/OEH

Fish sampling in the Mehi River

Valley report: Gwydir (continued)

Water delivery

Water delivered in Gwydir Valley during the 2013–14 environmental watering year.

Location	Start date	Finish date	ML of water delivered			
			NSW	CEW*	EWA**	Total
Mallowa Creek***	26 Sep 2013	1 Mar 2014	–	20 000	–	20 000
Mehi River***	25 Oct 2013	18 Nov 2013	–	8000	–	8000
Carole Creek***	31 Oct 2013	29 Nov 2013	–	3915	–	3915
Lower Gwydir/ Gingham watercourses	7 Apr 2014	11 Apr 2014	–	–	1000	1000
TOTAL			–	31 915	1000	32 915

Note: The location numbers in the table relate to the watering events marked on the map.

* CEW = Commonwealth Environmental Water

** EWA = Environmental Water Allocation accrued under the Water Sharing Plan for the Gwydir Regulated River Water Source 2002

*** these events were managed by the CEWO and delivered through CEW licences.

Ecological outcomes

Mallowa Creek and its associated wetland assets received environmental water deliveries as part of a restoration program planned to run over three consecutive years. Mapping and on-ground observations of inundation extent estimate an area of between 1500 and 1700 hectares were inundated during the environmental water delivery in the Mallowa system. Vegetation monitoring results indicate that sites in the Mallowa were in good to intermediate condition for understorey and all trees were in good condition, while waterbird monitoring indicated the highest abundance and diversity of waterbirds (compared to other surveys in the valley), indicating positive results from the water deliveries. Up to 44 waterbird species were recorded in the Mehi-Mallowa systems, including threatened species listed under Commonwealth and NSW legislation.



Mallowa Creek wetlands

Jane Humphries/OEH

In the Gingham Watercourse, the core eastern wetland areas of the upper Gingham and Gingham Waterhole were relatively unaffected by the extreme dry season and heatwave conditions that prevailed for almost six months from September to March. Vegetation monitoring indicated that both tree health and understorey were mostly in good or intermediate condition at all sites. However, all of the core wetland areas in the mid-reaches of the Gingham Watercourse dried down over this period. Inundation mapping shows that only 1200 hectares retained water in the Gingham Watercourse between September and March. The upper reaches of the Gingham retained good habitat for waterbirds and, along with the Mallowa, recorded the highest abundance and diversity of waterbirds (compared with other surveys in the valley).

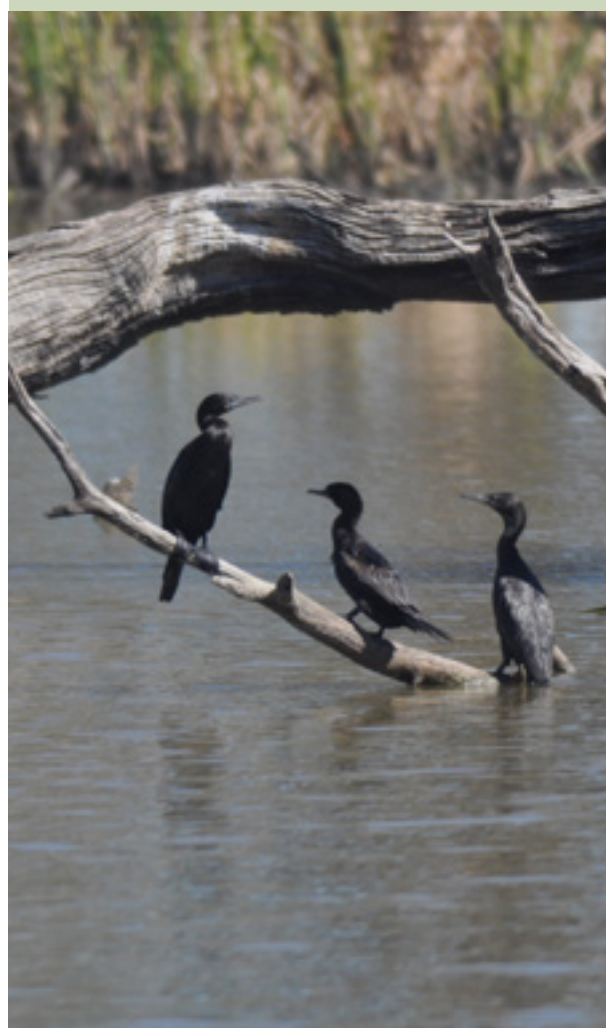
In the Lower Gwydir Wetlands, after a six month drying period, a bushfire burned 1600 hectares of wetland vegetation including stands of the endangered marsh club-rush. Following the fire a substantial rainfall event occurred, and burnt areas within the Gwydir SCA were regenerating – with stands of marsh club-rush, spike rush sedgelands and water couch marsh grassland where there was sufficient water. Tree canopies were scorched in all sites, though no signs of tree mortality were evident. The rainfall event also triggered a small flow to the wetlands (tributary and environmental water), contributing to the recovery of this important vegetation community.

The first delivery of environmental water was made into both the Mehi River and Carole Creek during late 2014, to targeted stretches supporting native fish species and associated aquatic ecological processes. The intent was to provide a small peak in flow followed by a longer recession to enhance breeding opportunities for native fish. Although a stable tail was not possible and fish monitoring was inconclusive, future opportunities to enhance flow conditions for native fish in these systems will be considered.

Water plans

The following plans guided how environmental water was allocated and managed in the Gwydir Valley during 2013–14:

- Water Sharing Plan for the Gwydir Regulated River Water Source 2002
- Adaptive Environmental Water Use Plan for the Gwydir Water Management Area.
- Environmental Watering Plan for the Gwydir Valley 2013–14
- Gwydir Wetlands Adaptive Environmental Management Plan
- Commonwealth Environmental Water Use Options 2013–14: Gwydir River Valley.
- Finding Common Ground: floodplain farming and wetland conservation. 2014 OEH.



Little black cormorants at Gingham Waterhole

Daryl Albertson/OEH

Valley report: Macquarie

The Macquarie Valley includes the Macquarie Marshes, Macquarie River downstream of Burrendong Dam to the marshes and the lower Macquarie River. The Macquarie River catchment covers 75 000 square kilometres. The Macquarie Marshes are the catchment's largest wetland system and the main focus of environmental water releases. The marshes include a range of wetlands from semi-permanent marshes and lagoons to ephemeral wetlands that are only inundated by significant flood events.

The Macquarie River and Macquarie Marshes provide important support for business and social networks in the local community. Approximately 90% of the marshes support primary production. The river and marshes are also intrinsic to the culture and well-being of their traditional owners, the Wailwan people. More than 500 Aboriginal cultural heritage sites are recorded in the wider marshes area, including carved trees, ceremonial and burial sites, oven mounds and stone artefacts.

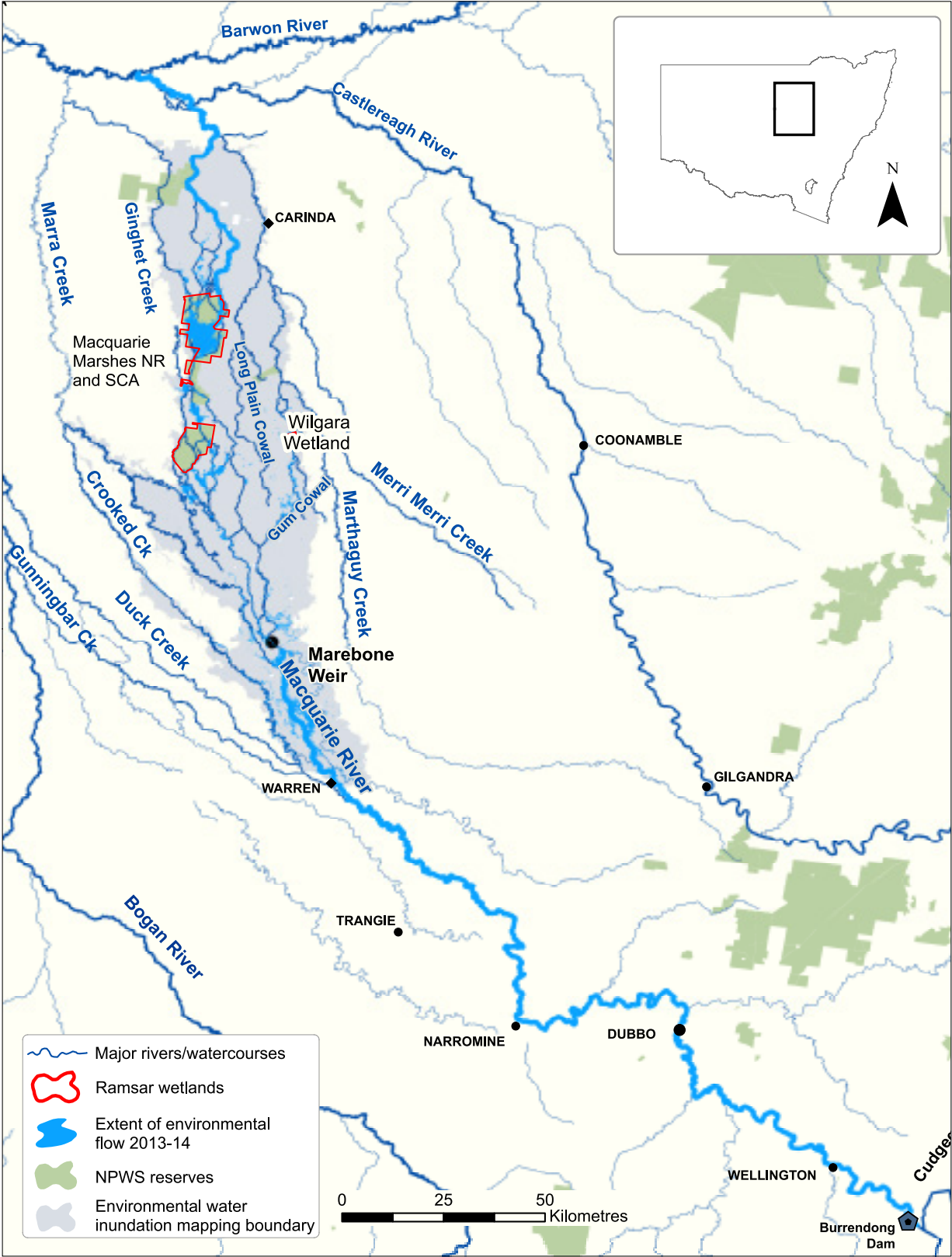
The **Macquarie and Cudgegong Environmental Flow Reference Group** is chaired by a LLS representative and consists of a range of community representatives including Aboriginal, local landholders, environmental/conservation groups, Cudgegong Water User Group, Macquarie Effluent Creeks Association, Macquarie Marshes Environmental Landholder Association, Macquarie River Food & Fibre and Australian and NSW Government stakeholders. The group provides advice on managing environmental water in the Macquarie River and Cudgegong River catchment. The group met on three occasions during the year which included a trip to the Macquarie Marshes, a meeting during an environmental water delivery, to discuss progress, and an annual planning meeting.



Debbie Love/OEH

Black swans on water couch wetland in the Macquarie Marshes

Macquarie Valley environmental watering sites 2013-14



Valley report: Macquarie (continued)

The Macquarie River between Burrendong and Macquarie Marshes are beneficiaries of environmental water deliveries. These areas are critical for achieving connectivity and fish habitat outcomes from these deliveries, and also link catchment communities and economic activity.

The iconic marshes contain extensive tracts of common reed, river red gum woodland, coolabah woodlands and water couch meadows. The marshes are particularly noted for supporting some of the largest colonial waterbird breeding events in recorded Australian history and provide habitat for hundreds of species of animals and plants. The marshes are also notable for several wetland sites listed under the **Ramsar Convention**.

Catchment condition in 2013–14

Conditions in the Macquarie catchment were dry over the spring and summer of 2013–14. Rainfall in the marshes area and general catchment was well below average. Conditions in the marshes were generally dry throughout the year. Overall the condition of vegetation through the marshes was considered intermediate to good following a sequence of wet years from 2010 to 2012. However, areas of inundation had retracted and at the start of the year the inundation was restricted to in-channel areas throughout the marsh channel system and small areas of low-lying reed-bed swamps in the southern and northern areas. The eastern marsh system was completely dry.

Watering aims

Environmental water delivery in the Macquarie valley for 2013–14 focused on maintenance of wetland vegetation during the generally dry conditions. The main objectives were to:

- build resilience of wetland vegetation by watering high-dependency wetland vegetation to meet annual water requirements
- provide environmental water to specific areas in the event of:
 - colonial waterbird breeding and/or
 - significant drying, to replenish refuge habitat for native fish.

Water delivery

Water delivered in the Macquarie Valley during the 2013–14 water year.

Location	Start date	Finish date	ML of water delivered			
			NSW	CEW*	EWA**	Total
Macquarie Marshes and Macquarie River	15 Jul 2013	6 Nov 2013	10 985	10 000	43 675	64 660
TOTAL			10 985	10 000	43 675	64 660

* CEW = Commonwealth Environmental Water

** EWA = Environmental Water Allocation accrued under the *Water Sharing Plan for the Macquarie and Cudgegong Regulated Rivers Water Source 2003*.



Macquarie-Cudgegong Environmental Flows Reference Group inspecting the Burrendong Dam temperature curtain

Tim Hosking/OEH

The total gauged inflows to the Macquarie Marshes measured at Marebone Weir during 2013–14 were 207 000 megalitres with 64 660 megalitres managed environmental flows. The total contribution to the Barwon River from the Macquarie catchment during the 2013–14 water year was approximately 19 047 megalitres which was measured at Bells Bridge gauge.

Three short translucent flow events totalling 1826 megalitres were delivered under the rules of the water sharing plan for the Cudgegong River for river maintenance flows.

Ecological outcomes

The total area of inundation resulting from environmental water delivery during 2013–14 was measured as 15 484 hectares within the Macquarie Marshes (north, south and east regions).

Overall, ecological outcomes in the Macquarie remained positive in the inner floodplain areas, despite drying conditions, and the outer areas have seen changes in vegetation due to low rainfall and lack of inundation since 2010–11.

River red gum woodlands and forests: Inner floodplain river red gum sites were generally in good condition although many areas were not flooded this water year. Those in lower condition classes were usually higher in the floodplain where the water was unable to reach. The poorest areas remain dominated by both dead and water stressed mature trees.

Reedbeds, mixed marsh and wet grasslands: Areas of the marshes that were not flooded in 2013–14 remained in intermediate to poor condition with a moderate proportion of terrestrial and exotic species. Areas that received sufficient flooding for consecutive years contain generally healthy water couch and mixed marsh/spike rush sedgeland.

Other vegetation communities: Areas of coolabah, black box and myall further out on the floodplain typically had very dry understorey due to relatively low rainfall and no inundation since 2010–11. Many higher areas have begun to transition back towards chenopod shrublands due to the dry conditions.

Waterbird surveys were conducted throughout the environmental watering event. Moderate numbers of waterbirds were observed in the marshes throughout the wetter months in 2013–14, during environmental water delivery. Several species of birds listed as threatened species were observed in the marshes including the Australian painted snipe, Australasian bitterns, and superb parrots. Limited numbers of international migrant bird species were observed including marsh sandpipers, sharp-tailed sandpipers and Latham's snipe.

No colonial nesting waterbirds were observed this water year. This is thought to be due to the relatively low catchment and local rainfall and subsequent volume of marshes inflows.

Water plans

The following plans guided how environmental water was allocated and managed in the Macquarie–Cudgegong Valley during 2013–14:

- Water Sharing Plan for the Macquarie and Cudgegong Regulated Rivers Water Source 2003
- Water Sharing Plan for the Macquarie Bogan Unregulated and Alluvial Water Sources 2012
- Adaptive Environmental Water Use Plan for the Central West Water Management Plan Area
- Environmental Watering Plan for the Macquarie Valley 2013–14
- Macquarie Marshes Adaptive Environmental Management Plan (OEH 2010).



Tim Hosking/OEH

Dry Macquarie River floodplain, Macquarie Marshes State Conservation Area

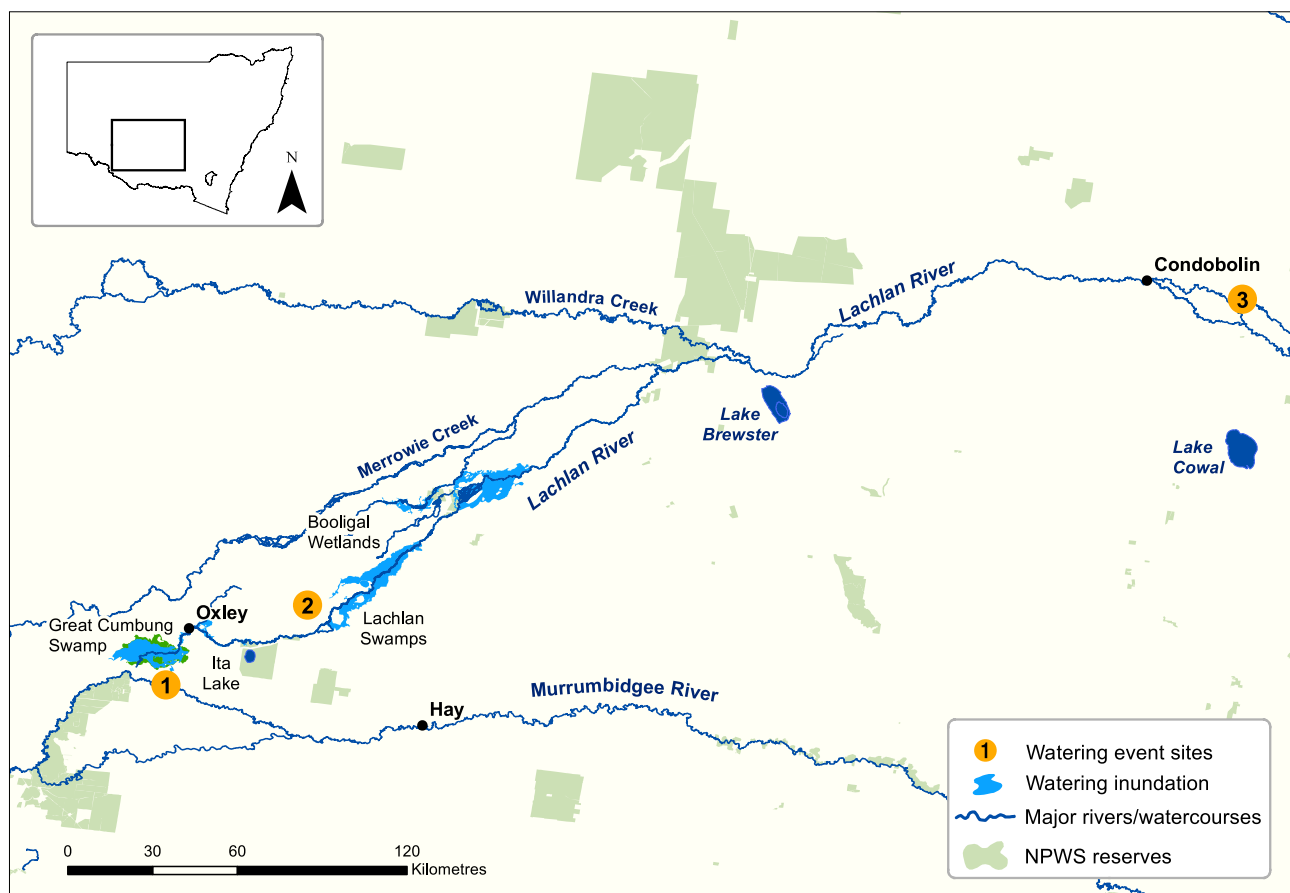
Valley report: Lachlan

The Lachlan Valley catchment has an area of 90 000 square kilometres and contains many wetlands of high ecological value. These include the Booligal Wetlands, Great Cumbung Swamp and Lachlan Swamps, all of which are listed in the Directory of Important Wetlands in Australia.

The Lachlan River below Wyangala is listed as an endangered ecological community in the **Fisheries Management Act 1994**. Since 2006, environmental water has been delivered in the mid Lachlan anabranches and large wetland complexes in the lower Lachlan, sites highly valued by the community and vital for maintaining river health.

The **Lachlan Riverine Working Group** is chaired by a LLS representative and consists of a range of community representatives including Aboriginal, local landholders, water user groups and Australian and NSW Government stakeholders. The group aims to achieve the best outcomes for environmental water delivery in the Lachlan catchment. The Lachlan Riverine Working Group met on four occasions during the year, and had two field trips, one to the mid Lachlan Anabranch and wetlands and another to the Lower Lachlan during an environmental flow.

Lachlan Valley environmental watering sites 2013–14



Booligal Wetlands supports lignum, river red gum, black box and river cooba communities, and provides habitat for many colonial waterbirds including the great egret, glossy ibis and sharp-tailed sandpiper.

Lachlan Swamp supports many vulnerable bird species, including the brown tree creeper, grey-crowned babbler and magpie goose, as well as two listed plants: the Mossie daisy and Menindee nightshade.

Booligal Wetlands and Lachlan Swamps both provide breeding grounds for the Australasian bittern, blue-billed duck and freckled duck, listed under the **NSW Threatened Species Conservation Act 1995**.

Great Cumbung Swamp acts as a drought refuge and contains one of the largest areas of common reed and river red gum in NSW. Several waterbirds listed in international bilateral agreements frequent the swamp, including the great egret, glossy ibis, common greenshank, Latham's snipe, white-bellied sea-eagle, and sharp-tailed sandpiper.

Catchment condition in 2013–14

The overall catchment condition of the mid and lower Lachlan River was generally dry. During 2013, the rainfall was below average with very low storage inflows and no significant natural flows from rivers or tributaries. The first half of 2014 saw average to above average rainfall in the upper to mid Lachlan and drier conditions in the lower Lachlan.

The condition of the Lachlan wetlands varies across the catchment. The lower Lachlan floodplain's health has improved significantly from drought conditions in the previous decade. This improvement can be attributed to a combination of flood flows, overall wetter conditions and targeted environmental watering since 2010.

Watering aims

Environmental water delivery in the Lachlan Valley for 2013–14 was intended to protect environmental assets in the following ways:

- supplement small naturally occurring freshes or translucent flows by piggybacking environmental water to extend the duration of the flows, in the mid to lower Lachlan. The aim was to improve and/or maintain the condition of a diversity of wetland types by reinstating the wetting-drying cycles of a natural ephemeral floodplain wetland
- ensure no catastrophic losses of local populations of threatened, water dependent species through drying or water quality decline in refuge habitats
- minimise adverse impacts of regulated stream regimes on in-stream fauna, in particular, provide suitable conditions for native fish breeding and recruitment.



Paul Packard/OEH

Cormorant nests within a flowering river red gum in the Lower Lachlan Swamp near Lake Bullogal

Valley Report: Lachlan (continued)

Water delivery

Water delivered in the Lachlan Valley during the 2013–14 environmental watering year.

Location	Start date	Finish date	ML of water delivered			
			NSW	CEW*	EWA**	Total
Lower Lachlan River and Swamp and Great Cumbung Swamp	1 Jul 2013	15 Jul 2013	–	22 794	–	22 794
Noonamah-Lake Bullogal southern	11 Jan 2014	28 Feb 2014	79	–	–	79
Burrawang West Lagoon	17 April 2014	27 May 2014	250	–	–	250
TOTAL			329	22 794	–	23 123

Note: The location numbers in the table relate to the watering events marked on the map.

* CEW = Commonwealth Environmental Water

** EWA = Environmental Water Allocation accrued under the Water Sharing Plan for the Lachlan Regulated River Water Source 2003.

Ecological outcomes

Over 63 000 hectares of river, wetland and creek/floodplain habitats and over 625 kilometres of Lachlan River channel and associated low-moderate flow billabongs, flood runners and channels were replenished by environmental flows throughout the year, in conjunction with the delivery of 66 000 megalitres in June 2013 (the previous watering year). In the Great Cumbung Swamp, end of system flows inundated the core reed-beds, filled most of the open water bodies, spread through much of the river red gum country and reached into fringing areas of black box. Environmental flows also helped restore a more natural seasonal flow regime in the lower Lachlan.



Paul Packard/OEH

Landholders Anthony and Darcy Booth clearing the inlet to allow environmental flows near the Lake Bullogal southern bell frog site

There has been a vigorous flowering response in river red gum, black box and lignum communities over the spring and summer following the large flow through the creeks and flood runners on the Lower Lachlan Swamp. In areas that received flows, mature river red gum and black box stands showed foliage growth. The flood-initiated seedling and juvenile tree regeneration has continued and consolidated.

More than 20 species of waterbirds were observed in the areas where flows were delivered. In the Lower Lachlan Swamps large-scale cormorant nesting events occurred in Peppermint Swamp and in smaller un-named river red gum wetlands near Lake Bullogal. The bush stone curlew was heard calling within inundated areas of the Lower Lachlan Swamp. Environmental flows filled many of the lower billabongs downstream of Booligal and in one of these billabongs the endangered southern bell frog was heard calling after the flow had passed through. This was only the second recording of this frog within the Lachlan catchment since 1978.

Water plans

The following plans guided how environmental water was allocated and managed in the Lachlan Valley during 2013–14:

- Water Sharing Plan for the Lachlan Regulated River Water Source 2003
- Adaptive Environmental Water Use Plan for the Lachlan Water Management Area
- Environmental Watering Plan for the Lachlan Valley 2013–14
- Lachlan Environmental Water Management Plan
- Commonwealth Environmental Water Use Options 2013–14: Lachlan River Valley.



Carmen Amos/CSU

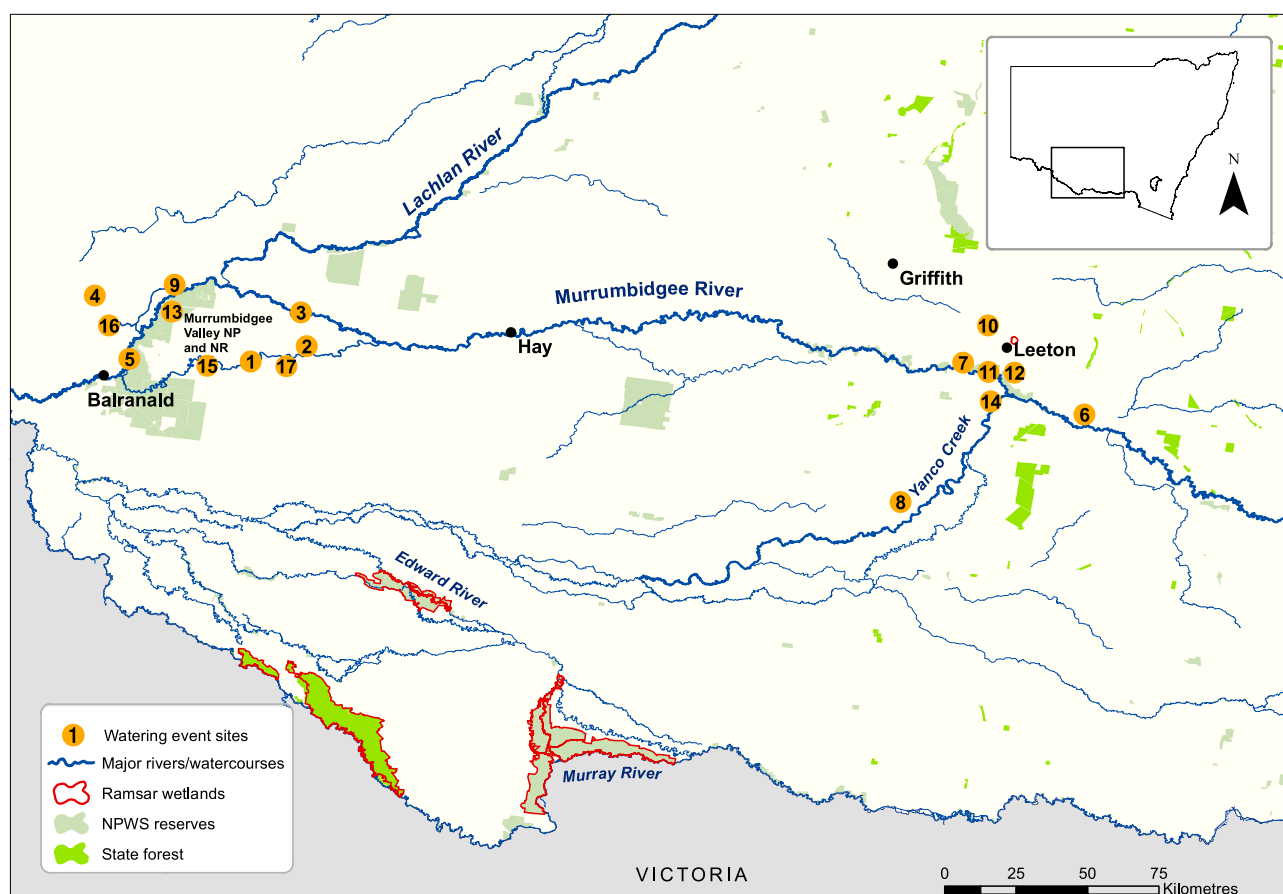
Spotted marsh frog calling after environmental flows near Lake Bullogal

Valley report: Murrumbidgee

The Murrumbidgee Valley is one of Australia's most regulated river systems and this has a major impact on the volume of water received by floodplains and wetlands. The Murrumbidgee catchment covers 81 527 square kilometres. This includes a 1690 kilometre stretch of river with surrounding wetlands, some listed under the Ramsar Convention, and a number of national parks, nature reserves and conservation areas with important wetland values.

The **Murrumbidgee Environmental Water Allowance Reference Group** is chaired by a LLS representative and consists of a range of community representatives including Aboriginal, local landholders, water user groups, environmental groups and Commonwealth and NSW Government stakeholders. The group provides strategic advice on managing environmental water in the Murrumbidgee Catchment. It met on four occasions during 2013–14 and undertook two field trips, with the most significant being to Lowbidgee wetlands.

Murrumbidgee Valley environmental watering sites 2013–14



The mid Murrumbidgee wetlands, listed under the **Directory of Important Wetlands in Australia**, supports a variety of flora including river red gum, spike rush and water lilies. The Lowbidgee floodplain incorporates the Nimmie-Caira and Redbank floodplains. Vegetation includes river red gum, black box, common reed, cumbungi, river cooba, nitre goosefoot, cane grassland and chenopod shrublands.

Various sites in both the mid Murrumbidgee and the Lowbidgee support species listed under the **Environment Protection and Biodiversity Conservation Act 1999**, including Australian painted snipe, regent honeyeater, regent parrot, superb parrot, austral pipewort, Australasian bittern, southern bell frog, chariot wheel, and Menindee nightshade.

Cultural heritage sites in the Murrumbidgee Valley include Tuckerbil Swamp, which contains an ancestral burial ground significant to the Wiradjuri people. The Narrungadera Wiradjuri community have strong connections to Fivebough and Tuckerbil swamps, which are listed under the **Ramsar Convention**.

Catchment condition in 2013–14

The catchment conditions across the Murrumbidgee Valley varied, with a combination of medium environmental water availability and neutral weather conditions resulting in what is considered a moderate condition. However, the prevailing wet conditions of the valley since 2010 brought some good responses from wetland vegetation, waterbirds and frogs. The general health of the Murrumbidgee River floodplain has significantly improved from its previous drought condition.

Watering aims

The primary aim for 2013–14 was to maintain ecological health and resilience. To achieve this, environmental water was delivered to the Western Lakes, North Redbank Wetlands and Yanga National Park located on the Lower Murrumbidgee floodplain, Silver Pines Complex and Yanco Creek. In addition, if rain triggered tributary flows in the Murrumbidgee River, OEH planned an environmental piggyback flow which would ensure continued recovery of river-connected wetlands impacted by drought prior to 2010.



James Maguire/OEH

Egrets at Lowbidgee

Valley report: Murrumbidgee (continued)

Water delivery

Water delivered in the Murrumbidgee Valley during the 2013–14 environmental watering year.

Location	Start date	Finish date	ML of water delivered			
			NSW	CEW*	EWA**	Total
Loorica Lake	26 Aug 2013 27 Sep 2013	3 Sep 2013 7 Oct 2013	–	5217	–	5217
Eulimbah Swamp	26 Aug 2013 27 Sep 2013	3 Sep 2013 7 Oct 2013	–	3809	–	3809
Nap Nap Swamp	1 Nov 2013	14 Nov 2013	–	2475	–	2475
Narwie to Penarie	11 Oct 2013	5 Dec 2013	–	3000	4850	7850
Yanga NP (South)	1 Nov 2013	18 Jan 2014	–	29 450	34 440	63 890
Gras Innes Swamp/Oak Creek	23 Sep 2013	15 Nov 2013	–	0	814	1364
	20 Apr 2014	30 Apr 2014	–	0	550	
Coonancoocabil Lagoon	16 Sep 2013	30 Sep 2013	–	0	500	500
Yanco Creek (Silver pines)	27 Sep 2013	1 Oct 2013	–	0	775	775
North Redbank System	14 Oct 2013	30 Jan 2014	–	49 880	12 825	62 705
Tuckerbil Swamp	6 Nov 2013	20 Nov 2013	–	0	318	318
Turkey Flats Swamp	31 Oct 2013	13 Dec 2013	–	0	242	242
Yanco Ag Lagoon	31 Oct 2013	1 Dec 2013	–	0	468	468
Yanga NP (North)	20 Nov 2013	9 Jan 2014		1540	21 085	22 625
Molleys Lagoon/Silver Pines	16 Jan 2014	26 Jan 2014	–	0	3785	3785
Uara Creek to Yanga Lake (Avalon Swamp)	3 Mar 2014	30 Jun 2014	–	16 005	6676	22 681
Yarrawol wetlands to Paika Lake	25 Mar 2014	21 May 2014	–	10 017	3633	13 650
Fiddlers Creek to Yanga NR	20 Mar 2014	30 Jun 2014	11 144	11 887	15 437	38 468
TOTAL			11 144	133 280	106 398	250 822

Note: The location numbers in the table relate to the watering events marked on the map.

* CEW = Commonwealth Environmental Water

** EWA = Environmental Water Allocation accrued under the Water Sharing Plan for the Murrumbidgee Regulated River Water Source 2003.

Ecological outcomes

Despite moderate conditions during 2013–14 resulting in few higher flow events throughout the season, environmental watering actions brought good responses from wetland vegetation, native fish, waterbirds and frogs. To complete these actions, environmental water was made available from Environmental Water Allocation and General Security accounts from both NSW and Commonwealth environmental water licences.

Environmental water was delivered via infrastructure to areas throughout the Murrumbidgee irrigation area – Yanco and Bundidgerry Creek systems to maintain native fish and turtle populations in wetlands including Oak Creek, Gras Innes near Narrandera, and Molleys Lagoon near Yanco Creek. Other environmental water deliveries



Working with partners CSU, counting turtles and fish at North Redbank wetland

Joanne Ocock/Charles Sturt University

to wetland sites in the Murrumbidgee Valley National Park supported continued recovery of aquatic plants and water-dependent species following the millennium drought. Migratory waterbird habitat was also supported within the Ramsar-listed site of Tuckerbil Swamp.

Wetlands supporting southern bell frog populations across Nimmie-Caira on the Lowbidgee floodplain received maintenance flows to ensure the continued recovery of this endangered species. Other Lowbidgee wetlands to benefit from environmental water during 2013–14 included sites within Yanga National Park. Yanga Lake reached full storage level providing habitat for native fish and recreational opportunities. River red gum woodlands and spike rush lagoons were not only supported through watering actions in Yanga but throughout North Redbank system, which received over 60 000 megalitres of environmental water. This resulted in improved habitat for waterbirds and frogs.

Paika Lake and surrounding wetlands, which first received water in 2011 after being isolated from flooding for over 100 years, continued to be supported

through the delivery of environmental water. The recovery of these wetlands has been assisted through a revegetation program, funded through the Commonwealth's Biodiversity Fund. It is envisaged that this program will continue to improve conditions for wetland-dependent species.

Water plans

The following plans guided how environmental water was allocated and managed in the Murrumbidgee Valley during 2013–14:

- Water Sharing Plan for the Murrumbidgee Regulated River Water Source 2003
- Adaptive Environmental Water Use Plan for the Murrumbidgee Water Management Area
- Environmental Watering Plan for the Murrumbidgee Valley 2013–14
- Commonwealth Environmental Water Use Options 2013–14: Murrumbidgee River Valley.



Peter Morton (landholder) demonstrating a carp screen at Hobbler Lake

Paula D'Santos/OEH

New lease of life on Bottle Bend Reserve in the Murray Valley

Bottle Bend Reserve, near Mildura in the Murray valley, was assessed as a site that would receive environmental water in 2013–14. The reserve had received environmental water in 2012–13 with positive outcomes, so a second environmental water delivery was planned to build upon that initial success.

The environmental watering focused on a 423 hectare site located within the Bottle Bend Reserve, which is managed by Crown Lands, part of NSW Trade & Investment, about 20 kilometres south east of Buronga in the former Gol Gol State Forest. It is the largest area of black box woodland to be targeted with environmental flows in southern NSW.

Prior to environmental flows in 2012–13 and 2013–14, the site had not received natural flows for almost two decades. As a result, the black box woodland and wetland vegetation were showing signs of severe stress and mortality.

In 2012–13, 1650 megalitres of environmental water was delivered, followed by a further 2000 megalitres in 2013–14. The flows were timed to water the black box during periods of most active growth.

The vegetation response has been positive with black box setting seed and saplings emerging. Wetland plants including nardoo, water ribbon and spike rush have responded well to the watering, providing an opportunity for plants to recruit and reset the seed bank.

Environmental flows have improved the condition of scar trees in the reserve and benefited native flora ground-layer species, many of which are likely to be traditional food and medicine plants.

The water has attracted numerous birds including spoonbills, herons and egrets along with confirmed sightings of the threatened hooded robin.

Monitoring has revealed at least five species of frogs as well as large numbers of macroinvertebrates, including cladocerans, daphnids and shield shrimp.

As well as positive plant and animal responses, the watering event in Bottle Bend Reserve has provided an opportunity for members of the Barkindji Maraura Elders Environment Team (BMEET) to assist OEH with ecological monitoring and conduct cultural heritage surveys on the reserve.

OEH accompanied BMEET as it revisited a number of known heritage sites documented more than 20 years ago. A number of additional significant features including canoe trees, burial sites and fireplaces were identified during the survey.

BMEET Project Co-ordinator Tom Fagan said: 'The experience for BMEET employees had been invaluable. The Barkindji men really appreciated the enthusiasm of OEH staff in helping them gain some skills in natural resource management and link cultural knowledge into land and water management.'

Environmental and cultural outcomes continue to be a priority for OEH in the Bottle Bend Reserve, in partnership with Crown Lands which manages the reserve.



BMEET staff member "Albury" working with OEH staff Paula D'Santos and Harvey Johnston at a scar tree at Bottle Bend Reserve



Bottle Bend Reserve

Sascha Healy/OEH

Sascha Healy/OEH

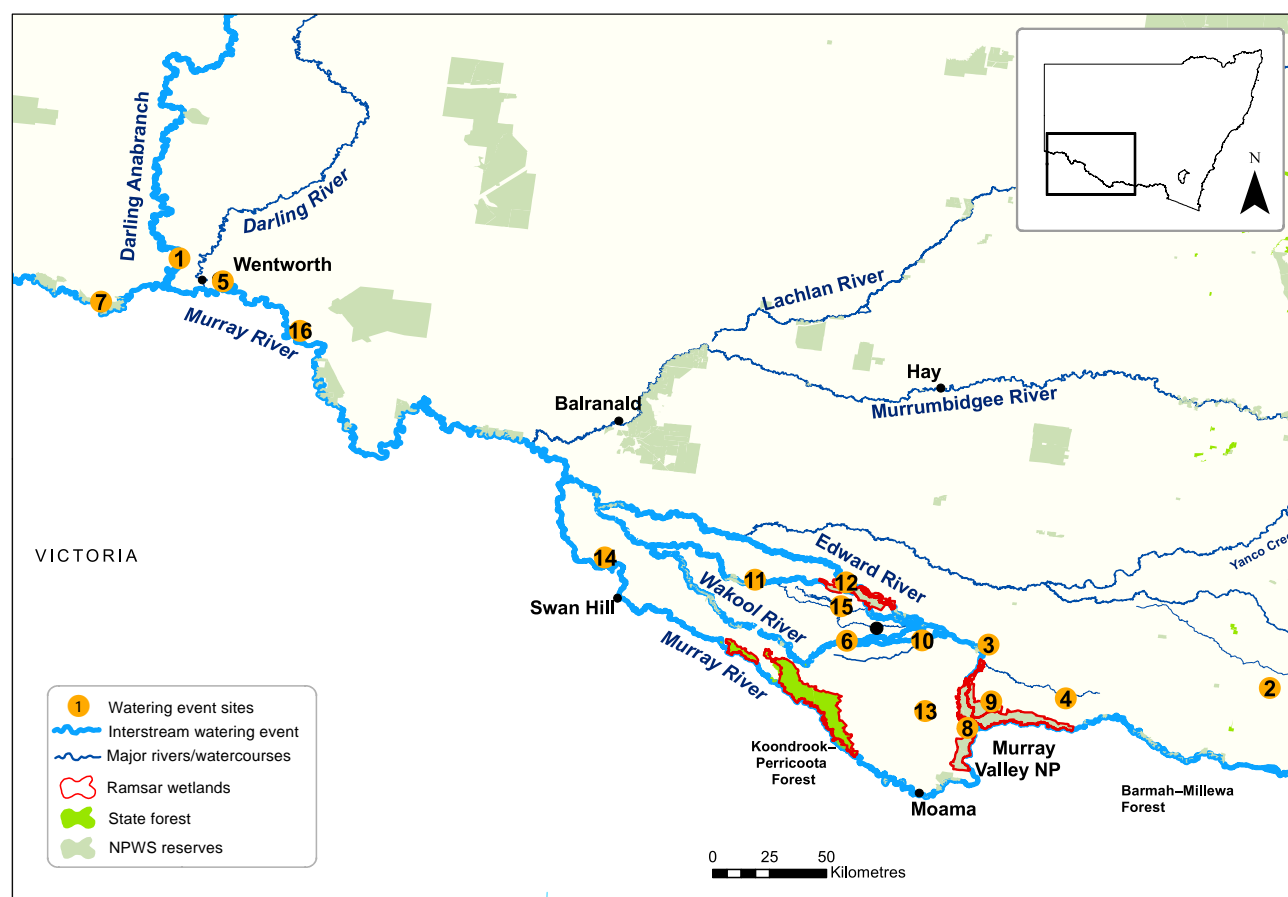
Valley report: Murray and Lower Darling

The Murray and Lower Darling rivers are extensive systems that traverse NSW, Victoria and South Australia. The Murray River stretches over 1800 kilometres and makes up part of the border between NSW and Victoria. The Murray and Lower Darling portion includes a floodplain area of 98 300 square kilometres which contains a mosaic of wetland types, ranging from ephemeral wetlands and creeks to permanently wet lagoons and rivers.

The Murray Valley has records of more than 968 cultural heritage sites. Most of these are within the Millewa Forest (Yorta Yorta Nations Aboriginal Corporation and Cummeragunja Local Aboriginal Land Council), Werai Forest (Wamba Wamba/Wemba Wemba and Barapa Barapa/Perepa Perepa Nations) and the eastern portion of Koondrook Forest (Barapa Barapa/Perepa Perepa and Yorta Yorta Nation Aboriginal Corporation, Cummeragunja Local Aboriginal Land Council and Perrepa Perrepa Nation).

The **Murray Lower Darling Environmental Water Advisory Group** is chaired by a LLS representative and consists of a range of community representatives including Aboriginal, local landholders, water user groups, Murray Darling Freshwater Research Centre, Murray Darling Wetlands Working Group and Commonwealth and NSW Government stakeholders. The group provides advice to OEH on managing environmental water within the valley, and met on four occasions during 2013–14, and attended a field trip to Bottle Bend and Fletchers Creek.

Murray and Lower Darling valleys environmental watering sites 2013–14



Valley report: Murray and Lower Darling (continued)

The Murray and Lower Darling valleys contain hydrological and ecologically complex ecosystems that include in-stream habitats, floodplain wetlands and ephemeral lakes and waterways. A number of sites in the region are recognised internationally under the **Ramsar Convention** (the NSW Millewa Forest, Koondrook-Perricoota Forest and Werai Forest) or have national and/or regional significance, such as the Darling Anabranch and its associated lakes.

The Millewa Forest makes up over half of the Barmah-Millewa Forest, an icon site under **The Living Murray**, and contains the largest river red gum forest in Australia, extending across the border of NSW and Victoria. The Murray and Lower Darling valleys support important habitat for threatened and vulnerable fauna listed in the Commonwealth **Environment Protection and Biodiversity Conservation Act 1999**, including the southern pygmy perch, superb parrot, colonial nesting birds and migratory bird species.

Several sites in the region support the southern bell frog and bush stone curlew as well as many other fauna and flora species listed in the NSW **Fisheries Management Act 1994** or **NSW Threatened Species Conservation Act 1995**.

Non-government organisations have provided invaluable cooperative support to OEH in the delivery of environmental water projects, including the Barkindji/Mauraura Elders Environment Team with monitoring at Bottle Bend, and Murray Darling Wetlands Working Group with the delivery of water at Fletchers Creek.

Catchment condition in 2013–14

Significant early rain fell across large parts of the Murray-Darling Basin in 2013–14 with water storages nearing full in spring to early summer. Weather conditions then turned dry from December 2013 with no significant rain for the remaining months. The Murray Darling Basin overall recorded its driest summer since 1984–85 with lower than average rainfall across the Murray and Lower Darling valley.

Watering aims

The primary aim for the delivery of environmental water to the Murray and Lower Darling valleys in 2013–14, based on asset conditions, water availability and weather forecast, was to maintain basic ecological functions and to continue to build resilience of wetlands following recent wet years.



Sascha Healy/OEH

Environmental flows into Gwynnes Creek

Water delivery

Water delivered in the Murray and Lower Darling valleys during the 2013-14 environmental watering year.

Location	Start date	Finish date	ML of water delivered				Total
			NSW	CEW*	EWA**	TLM***	
Darling Anabranh	16 Sep 2013	9 Dec 2013	8243	47 000	–	–	55 243
Rilverside	13 Sep 2013	14 Oct 2013	230	–	–	–	230
Private property wetlands Project (Murray Irrigation)	5 Oct 2013 1 Apr 2014	4 Jan 2014 14 Apr 2014	516	–	–	–	516
Tuppall Creek	8 Oct 2013 26 Mar 2014	6 Dec 2013 28 Apr 2014	2725	2562	–	–	5287
Fletchers Creek	10 Dec 2013 2 Apr 2014	16 Dec 2013 8 Apr 2014	291	–	–	–	291
Edward Wakool fish flows/MUR multi site trial stage 1 & 2.	4 Oct 2013	16 Dec 2013	–	100 000	–	67 994	167 994
Lock 8/9 weirpool manipulation	16 Oct 13	30 Apr 2014	–	216	–	–	216
Rilverside	6 Dec 2013	12 Dec 2013	69	–	–	–	69
Reed Beds Swamp/Gulpa Creek	14 Dec 2013	16 Feb 2014	13 016	–	–	1000	14 016
St Helena Swamp (Murray Valley NP – Millewa Precinct)	14 Dec 2013	30 Dec 2013	–	750	–	1518	2268
Yallakool Creek fish flow recession	17 Dec 2013	6 Feb 2014	–	8494	–	–	8494
Niemur River	7 Feb 2014	14 Mar 2014	–	5759	–	–	5759
Reed Beds Creek (Wera)	20 Feb 2014	23 Feb 2014	512	–	–	–	512
Sandridge Wetland	12 Apr 2014	16 Apr 2014	43	–	–	–	43
Speewa Creek	24 May 2014	28 Jun 2014	500	–	–	–	500
Gwynnes Creek (Aintree)	1 Apr 2014	13 Apr 2014	112	–	–	–	112
Bottle Bend Reserve/Gol Gol	21 May 2014	21 Jun 2014	2000	–	–	–	2000
TOTAL			28 257	164 781	–	70 512	263 550

Note: The location numbers in the table relate to the watering events marked on the map.

*CEW = Commonwealth environmental water

** EWA = Environmental water allocation accrued under the Water Sharing Plan for the NSW Murray and Lower Darling Regulated Rivers Water Sources 2003

***TLM = The Living Murray.

Ecological outcomes

Positive ecological outcomes were generally observed across the Murray and Lower Darling Valley in 2013–14.

Flows down the Darling Anabranh improved the condition of riparian trees as well as increasing the diversity of understorey vegetation. This flow was the first time a flow has been delivered solely from environmental accounts, with previous events also including unregulated flows. There was also notable improvement in black box condition and vegetation response at Bottle Bend Reserve floodplain. Numerous aquatic invertebrates and dozens of waterbirds were observed at the 425 hectare site. Hooded robins, currently listed as vulnerable in NSW under the *Threatened Species Conservation Act 1995*, have been observed at Bottle Bend Reserve following the environmental water event.

Six private wetlands across the Murray and Lower Darling valley received environmental water, bringing positive response from the flora and fauna such as growth of wetland plants and common frog species including the wrinkled toadlet.

Valley report: Murray and Lower Darling (continued)



Speewa Island Trust landholders and OEH staff

Good water quality was maintained in mid Murray ephemeral creek systems including Tuppal, Gwynnes and Speewa creeks, providing habitat to water dependent fauna such as fish and frogs. An improvement in riparian tree condition and an increase in aquatic vegetation across these creek systems were observed at established photo points. OEH worked closely with landholders and communities towards positive outcomes that continued to build upon ongoing partnerships.

Environmental flows down the Edward-Wakool river system provided a flow regime to benefit Murray cod habitats and provide opportunity for their recruitment. The event will continue for several years and will be monitored under the Long Term Intervention Monitoring program managed by the CEWO. Colonial nesting waterbird rookeries were established within Murray Valley National Park (Millewa Icon Site and Central Murray Ramsar Wetland) following Murray River unregulated flows. NSW environmental water was used to maintain water heights at the rookeries over summer to sustain breeding. Careful and responsive environmental water management helped most hatchlings to reach the fledgling stage. Reed Beds Creek Lagoon received environmental water to help control river red gum sapling regeneration and maintain a more natural open water habitat.

Water plans

The following plans guided how environmental water was allocated and managed in the Murray and Lower Darling valleys during 2013–14:

- Water Sharing Plan for the NSW Murray and Lower Darling Regulated Rivers Water Sources 2003
- Adaptive Environmental Water Use Plan for the NSW Murray and Lower Darling Water Management Areas
- Environmental Watering Plan for the Murray Valley 2013–14
- The Living Murray Annual Environmental Watering Plan 2013–14
- Commonwealth Environmental water Use Options 2013–14: Mid Murray Region
- Commonwealth Environmental Water Use Options 2013–14: Lower Murray River Valley.



Red rump parrot at Bottle Bend Reserve

NSW environmental water holdings

Cumulative environmental water holdings recovered to 30 June 2014 (ML).

Valley	NSW environmental water holdings				The Living Murray	Total
	High security	General security	Supplementary allocation	Unregulated	Long-term cap equivalent	
Gwydir	1249	17 092	3141	–	–	21 482
Macquarie	–	48 417	1450	2980	–	52 847
Lachlan	1795	36 569	–	184	–	38 548
Murrumbidgee	–	28 508	5680	7962	–	42 150
NSW southern Murray-Darling Basin	2027	30 000	–	–	221 487	253 514
Subtotal	5071	160 586	10 271	11 126	221 487	
TOTAL						408 541

Note: This table is an operational record, so some minor adjustments may need to be incorporated when the data is verified by audit. Find out **more about environmental water holdings**.

NSW environmental water trade

OEH's **Environmental Water Business Plan** allows for the periodic trading of water allocations in the accounts of OEH water access licences to provide revenue to meet a proportion of the costs of managing water for the environment. Funds may also be used to implement small scale projects that improve environmental watering outcomes.

In 2013–14, OEH traded 22 650 megalitres of water across the Gwydir, Macquarie, Lachlan, Murrumbidgee and NSW southern Murray Darling Basin valleys. Trading will continue to occur in future years, to manage the portfolio for the maximum environmental benefit.



Sascha Healy/OEH

Swans on Bottle Bend

The management and delivery of environmental water by OEH relies on cooperation with a number of NSW agencies, the Australian Government and other partners. OEH would like to acknowledge the contribution of the following partners:

Environmental Water Advisory Groups provide invaluable advice and expertise, including local knowledge and experience, when advising OEH on managing environmental water.

Private and public landholders provide advice and on-ground support to OEH during watering events as well as access to their properties in many cases.

The **Commonwealth Environmental Water Holder**, supported by the **Commonwealth Environmental Water Office**, makes decisions on the use and management of environmental water holdings that have been purchased by the Australian Government through the water market or acquired through investment in water savings infrastructure. Commonwealth environmental water is allocated to NSW events undertaken by OEH and its partners. The NSW and Australian Governments work cooperatively to ensure the best environmental outcomes from managing environmental water. The CEWO also administers the Ramsar wetland and migratory bird conventions (Australia is a signatory), with many sites being high priority targets for environmental water use.

The **NSW Office of Water** is responsible for implementing the **Water Act 1912** and **Water Management Act 2000**. It determines water availability, manages flow events in unregulated and regulated rivers, monitors water use, and implements and monitors the outcomes of rules-based planned environmental water under water sharing plans. It is an agency within the Department of Trade and Investment, Regional Infrastructure and Services.

NSW Department of Primary Industries – Fisheries and Aquaculture provides specialist technical and policy advice on fisheries management in water recovery and environmental water use projects and plans. It is an agency within the Department of Primary Industries.

State Water manages river operations and water delivery in regulated river systems across NSW under licence to the NSW Government.

Local Land Services (Since 1 January 2014, CMAs have been replaced by LLS). LLS work with regional communities to respond to key natural resource management issues facing their catchments and have a role representing local communities on environmental water advisory groups in NSW.

The **Murray Darling Basin Authority** (MDBA) is the Australian Government agency responsible for managing the water resources within the Basin, including preparing a Basin Plan and coordinating the management of water recovered for The Living Murray icon sites. River Murray Operations is part of the MDBA and has been crucial in the success of environmental water projects through providing information, cooperation in flow management, as well as coordination and facilitation for various operational advisory groups throughout the Murray valley.

Irrigation companies including Murray Irrigation, Murrumbidgee Irrigation and Colleambally Irrigation help deliver environmental water projects using their infrastructure.

The Commonwealth **Department of the Environment** leads implementation of national water reforms and administers the Australian Government's investment in water programs.

Universities and other organisations that support OEH in monitoring and research assistance include:

- Charles Sturt University
- University of New England
- University of New South Wales
- University of Technology, Sydney
- Macquarie University
- Murray-Darling Freshwater Research Centre.

Environmental water enhancement programs

Environmental water enhancement programs in NSW improve environmental outcomes for rivers and wetlands while supporting regional, social and economic objectives. Historically, these programs have operated through investment in efficient water delivery and management infrastructure, and buying water access licences from willing sellers. All NSW water purchase programs are now complete, although the Commonwealth Environmental Water Holder is still purchasing water.

A number of current major programs are detailed below. These programs have already delivered significant environmental benefits for NSW and have strong ongoing community support.

Current programs

Biodiversity Fund – Paika Lake and surrounding wetlands

For over 100 years Paika Lake and associated wetlands were isolated from flooding and disconnected from the rest of the iconic Lowbidgee floodplain system by a series of levee banks and roads. In 2012, property owners OEH and CSIRO received \$528 000 from the Australian Government's Department of Environment, through the Clean Energy Futures Biodiversity Fund, to support restoration and monitoring of Paika Lake and surrounds. Specifically the project aimed to return a more natural water regime to the wetlands, improve grazing management, increase native vegetation, facilitate the control of feral animals and inform adaptive management.

Since the installation of new watering infrastructure and the removal of levees, the Paika wetlands have received environmental water on an annual basis. The delivery has facilitated regeneration of native species, including aquatic plants, and has also supported the revegetation program currently being undertaken by landholders and volunteers. Other project activities undertaken during 2013–14 included completion of fencing to protect the lake and other wetland areas through improved grazing management and the control of feral animals to protect native species, particularly waterbird species such as the endangered Australasian bittern, which frequents the area. Find out more **about the project**.

Healthy Floodplains Project

The Australian and NSW Governments have combined to fund the NSW Healthy Floodplains Project to a value of \$50 million, aiming to reform water management in the northern basin floodplains of NSW. The purpose of the project is to prepare valley-wide Floodplain Management Plans (FMPs) which will contain rules and management zones to coordinate the approval of new flood works or amendments to existing flood works. FMPs are currently being developed in five rural valleys in northern NSW: Gwydir, Border Rivers (Macintyre), Namoi, Macquarie and Barwon-Darling.

The new FMPs will:

- integrate existing adopted **rural floodplain management plans**
- provide certainty for landholders about where they can construct works on the floodplain
- streamline the approval process for new and amended flood works
- manage the passage of floodwaters through the floodplain to minimise the risk to life and property from the effects of flooding
- maintain flood connectivity to key ecological and cultural assets that are dependent on flooding.

These new FMPs are being developed by NOW in partnership with OEH.

The Healthy Floodplains Project will also better manage floodwater extractions by implementing the **NSW Floodplain Harvesting Policy** (2013) which will license water extractions from the designated floodplain.

Visit the **NSW Office of Water** website for further information.

Murray-Darling Basin Plan long-term watering plans

The **Murray-Darling Basin Plan** was developed by the MDBA and commenced under the **Commonwealth Water Act 2007** in 2012. The Basin Plan provides a consistent planning framework across the basin and aims to balance environmental, economic and social considerations in water management. NSW water agencies and the Commonwealth Government are working, together with local communities, to implement the Basin Plan.

OEH is developing long-term environmental watering plans and annual environmental watering priorities, and contributing to monitoring the environmental outcomes of the Basin Plan.

Basin Pipe

The \$137 million **Basin Pipe** water efficiency infrastructure project will replace stock and domestic replenishment systems and treat inefficient infrastructure – including open drains, channels and dams – with pipeline schemes to provide rural landholders with more secure and better quality supplies of stock and domestic water. The water efficiency gains from the project will deliver additional environmental water entitlements within the inland rivers of NSW. The project is jointly funded by the NSW and Australian Governments, with NOW responsible for delivering the project.

Other programs

Murrumbidgee Swamp

OEH undertook a consultancy to assess the ecological condition of Murrumbidgee Swamp in October 2013. The swamp is a relatively small wetland on Merrimajeel Creek, lower Lachlan River. The project assessed the ecological condition and recovery of the swamp and another mound channel wetland (Lake Tarwong), the progress towards specified targets, and developed a target for regeneration.

The assessment revealed that the tree condition of the river red gum woodland had greatly improved since 2007. This was likely due to the combination of regional flooding in 2011–12 and opportunistic environmental watering.

Southern Marshes Stream Restoration

The Macquarie Marshes wetland system has been subject to a range of changes in its streams, channels and wetlands. These changes, thought to be accelerated by human activities, include accelerated erosion and scouring, increased sediment loads entering the marshes, stream bank de-stabilisation and reduction of riparian vegetation and direct stream intervention.

A scoping study funded by the Australian Government and managed by OEH was commissioned to identify possible erosion, sedimentation and stream restoration works in the southern Macquarie Marshes, and examine their effects at the wetland system level. A report completed in 2013 identified a number of works that are currently being implemented as resources allow, including the Breakaway and Monkeygar Creek on National Parks and Wildlife Service estate and Oxley Break No.3 on private lands.



James Maguire/OEH

Uara Creek aquatic vegetation response following environmental watering

Burrendong Dam Cold Water Curtain

A \$3.4 million project to design and construct a flexible cold water curtain around the Burrendong Dam intake tower has recently been completed by State Water. Until now the water supplied by the dam for a variety of uses was from a fixed intake point towards the bottom of the dam, resulting in quite cold water with low dissolved oxygen during warmer months. This has been shown to have impacts on aquatic plants and animals, in particular fish.

The new curtain will allow warmer, oxygen rich surface water to be released downstream enhancing the environmental effects of all flows released from the dam. The initial concept design was funded by NSW Rivers Environmental Restoration Program, and was a collaborative effort by the Australian and NSW Governments. The detailed design and construction was funded by the NSW government and Macquarie-Cudgegong water users. OEH and the Commonwealth Environmental Water Holder, with advice from the Macquarie-Cudgegong Environmental Flows Reference Group, will be taking advantage of this warmer water during spring 2014 to deliver a pulse of environmental water along the Macquarie River.



Debbie Love/OEH

Burrendong Outlet Tower with temperature control curtain

