

Environmental Impact Summary Fund to Date (2015 – June 2021)

	Summary of Outcomes	
Watering Outcomes	Number of Watering Events	27
	Number of Wetlands watered	31
	Volume of water delivered (ML) <ul style="list-style-type: none"> Fund Donated Water Commonwealth Environmental Water NSW Dept Primary Industries and Environment 	3,277 ML 3,132 ML 760 ML
	Total Volume	7,169 ML
Biodiversity Outcomes	Area of Wetlands directly inundated	630 ha
	Estimated area for improved biodiversity outcomes	6000 ha
	Number of threatened species supported	16

Environmental Water Donation

From the inception of the Murray-Darling Basin Balance Water Fund (the Fund) until 30 June 2021, the Fund has donated a total of 2800.6 ML of water. Table 1 below outlines the water donation and the use of that donation for each year since the Fund's inception. As outlined below, in some years, a portion of the donated water has been traded to fund either the delivery of environmental water, or the development of infrastructure and on-ground works which would enable the sustainability of water delivery to wetlands and to enable new sites to receive environmental water.

Year	Season	Donation (ML)	Delivered Environmental Water to Wetlands (ML)	Traded to support Environmental Water Delivery (ML)	Carried-Over for Future Delivery (ML)*
2017-18	Moderate	400	107	293	0
2018-19	Dry	1,000	657	100	243
2019-20	Dry	1,401	530	790	80
2020-21	Dry	1,797	1,982	0	115
Total		4,598	3,277	1,183	115*

Table 1 – Water Donation Summary *Note – there are some minor losses associated with carry-over.

Environmental Water Delivery

From the inception of the Fund until 30 June 2021, donations of cash and water from the Fund have enabled the delivery of a total of 7,169 ML of water including 3,277 ML of Fund donated water and 3,892 ML of water from the Commonwealth Environmental Water Office (CEWO) and NSW Department of Primary Industries and Environment to 31 wetlands across Victoria and New South Wales through 27 watering events.

Figure 1 below shows the combined environmental water delivered in each financial year. Water donations from the Fund commenced in the FY18 financial year.

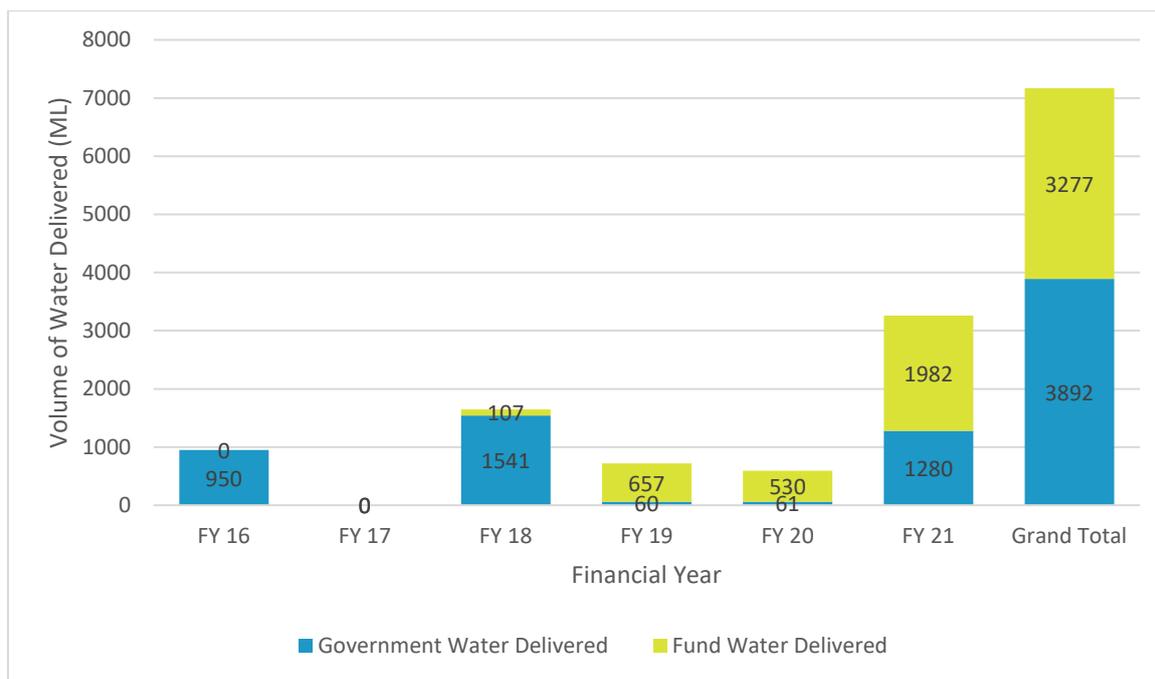
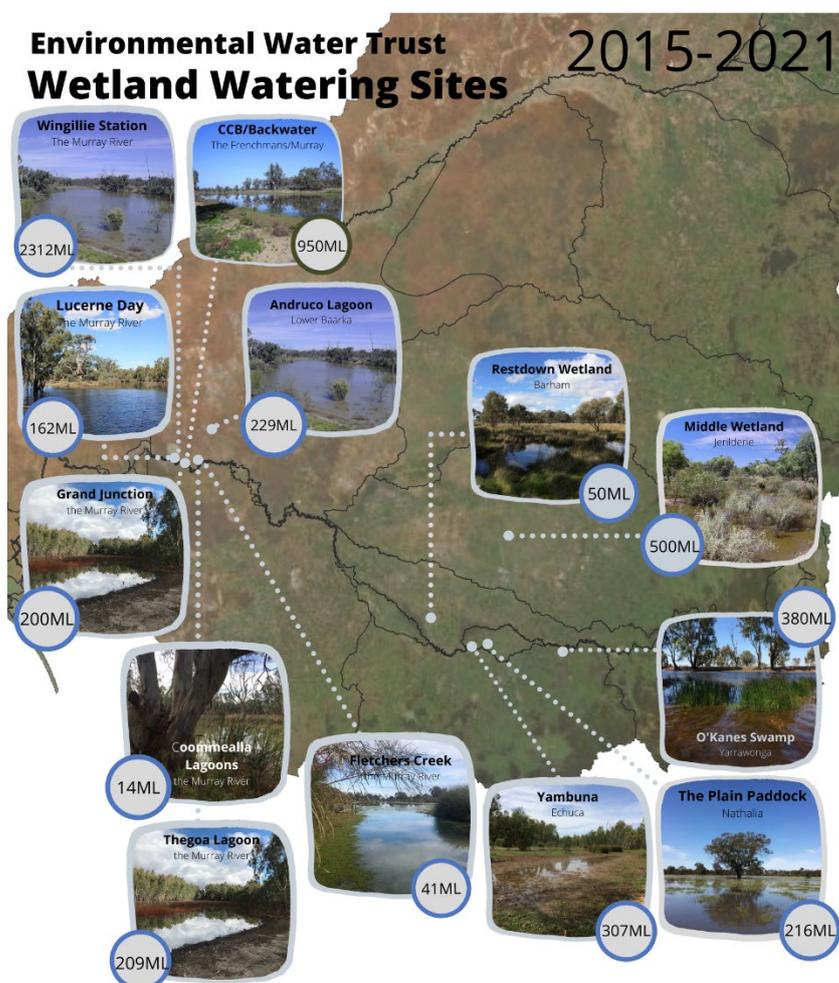


Figure 1 – Environmental Water delivered through the Fund



Wetlands Receiving Environmental Water

The watering events have enabled the direct inundation of a total of 630 hectares of individual wetlands and floodplains. The benefit of watering wetlands extends far beyond the area of wetland directly inundated through improving the condition of terrestrial vegetation, providing important corridors of habitat for mobile species including migratory waterbirds thereby influencing and improving biodiversity across the broader landscape. We estimate nearly 6,000 ha of connected floodplain landscapes have benefitted from the environmental watering supported by the Fund.

A summary is provided in Figure 2 below of the wetlands where repeated watering events over multiple years have been implemented to reinstate the natural flow regimes. This figure also shows the timing of future planned watering events at these sites. A summary of the value and significance of the wetlands and wetland complexes that have benefited from the delivery of environmental water through the Fund is also provided.

Wetland History and Strategy													
Property Name	Wetland Name	2012/13	2013/14	2014/15	2015/16	2016/17	2017/18	2018/19	2019/20	2020/21	2021/22	2022/23	Ideal years wet out of 10
Murray River (NSW) Zone11													
Wingillie Station	Little Frenchman's Ck	Planned Watering	Dry	Dry	Dry	Planned Watering	Environmental watering	Environmental watering	Environmental watering	Environmental watering	Planned Watering	Planned Watering	10
	Henry Creek	Planned Watering	Dry	Dry	Dry	Planned Watering	Environmental watering	Environmental watering	Environmental watering	Environmental watering	Planned Watering	Planned Watering	6
	451	Planned Watering	Dry	Dry	Dry	Planned Watering	Environmental watering	Dry	Dry	Dry	Planned Watering	Dry	4
	Rick Webster Wetland	Planned Watering	Dry	Dry	Dry	Planned Watering	Environmental watering	Environmental watering	Dry	Dry	Planned Watering	Planned Watering	5
	467	Planned Watering	Dry	Dry	Dry	Planned Watering	Environmental watering	Dry	Dry	Dry	Planned Watering	Dry	4
	481	Planned Watering	Dry	Dry	Dry	Planned Watering	Environmental watering	Dry	Dry	Dry	Planned Watering	Dry	4
	Henry Lake	Planned Watering	Dry	Dry	Dry	Planned Watering	Environmental watering	Environmental watering	Environmental watering	Environmental watering	Planned Watering	Planned Watering	6
	Boundary Creek	Planned Watering	Dry	Dry	Dry	Planned Watering	Environmental watering	Environmental watering	Dry	Dry	Planned Watering	Planned Watering	10
	Wingillie Lagoon	Planned Watering	Dry	Dry	Dry	Planned Watering	Environmental watering	Environmental watering	Dry	Dry	Planned Watering	Planned Watering	10
	Lake Roly Poly	Planned Watering	Dry	Dry	Dry	Planned Watering	Environmental watering	Environmental watering	Dry	Dry	Planned Watering	Planned Watering	6
	3954	Planned Watering	Dry	Dry	Dry	Planned Watering	Environmental watering	Dry	Dry	Dry	Planned Watering	Dry	4
	3955	Planned Watering	Dry	Dry	Dry	Planned Watering	Environmental watering	Dry	Dry	Dry	Planned Watering	Dry	4
Lucerne Day	Planned Watering	Dry	Dry	Dry	Planned Watering	Environmental watering	Dry	Dry	Environmental watering	Planned Watering	Planned Watering	5	
Fletchers Creek	Planned Watering	Environmental watering	Environmental watering	Environmental watering	Environmental watering	Environmental watering	Dry	Environmental watering	Environmental watering	Environmental watering	Planned Watering	Planned Watering	8
Wangumma State Forest	Carrs, Cappitts and Bunberoo	Planned Watering	Dry	Dry	Dry	Planned Watering	Environmental watering	Dry	Dry	Dry	Potential Watering	Planned Watering	6
Darling River (NSW)													
Tapio Sand Hills	Andruco Lagoon	Dry	Dry	Dry	Dry	Environmental watering	Environmental watering	Dry	Dry	Environmental watering	Planned Watering	Planned Watering	4
MIL													
Old Coree Station	Central Wetland	Dry	Dry	Dry	Dry	Planned Watering	Dry	Dry	Dry	Environmental watering	Potential Watering	Dry	3 to 7
	Restdown Wetland	Dry	Dry	Dry	Dry	Planned Watering	Dry	Dry	Dry	Environmental watering	Planned Watering	Dry	3 to 7
Murray River/Shepparton Irrigation Area (Vic)													
	O'Kane's Swamp	Dry	Dry	Dry	Dry	Dry	Dry	Environmental watering	Environmental watering	Environmental watering	Planned Watering	Planned Watering	8
Goulburn River/Shepparton Irrigation Area (Vic)													
	Yambuna Lagoon	Dry	Dry	Dry	Dry	Planned Watering	Environmental watering	Environmental watering	Environmental watering	Environmental watering	Planned Watering	Planned Watering	8
Shepparton Irrigation Area (Vic)													
	The Plain Paddock	Dry	Dry	Dry	Dry	Planned Watering	Dry	Dry	Environmental watering	Environmental watering	Planned Watering	Dry	3 to 7
	Grand Junction Wetland	Dry	Environmental watering	Dry	Dry								
	Coomella Golf Course Lagoons	Dry	Environmental watering	Planned Watering	Dry								
	Thegoa Lagoon	Dry	Environmental watering	Planned Watering	Dry								

	Planned Watering
	Potential Watering
	Environmental watering
	Data deficient
	Flood
	Dry

Figure 2 – Wetland Watering regimes re-established through the Fund

Wetland Descriptions

Wingillie Station Wetland Complex

The Wingillie Station wetland complex is strategically located within a broader floodplain wetland landscape as it is immediately downstream from the Carrs, Cappitts and Bunderoo (CCB)/Backwater Lagoon and Lucerne Day watering sites. It contains a range of vegetation communities and habitat types including semi-permanent and intermittent wetlands which support a range of flora and fauna species including the nationally endangered Southern Bell Frog *Litoria raniformis*.



Carrs, Cappitts and Bunderoo (CCB) Wetland Complex

The CCB wetland complex is currently jointly managed by NSW National Parks and Wildlife Service and the Tar-Ru Lands Board of Management. It contains a range of vegetation communities and habitat types including semi-permanent and intermittent wetlands which support a range of flora and fauna species including the nationally endangered Southern Bell Frog *Litoria raniformis*. The wetlands also contain several scar trees and 17 culturally significant plant species.



Lucerne Day Wetland

Lucerne Day wetland is strategically located within a broader floodplain wetland landscape with the Wingillie and CCB wetland complexes. It provides habitat for the nationally endangered Southern Bell Frog *Litoria raniformis*.



Yambuna Lagoon

Yambuna Lagoon is in northern Victoria east of Echuca. It is part of the Lower Goulburn River Floodplain Wetlands of National Significance and is listed as a wetland of importance within the Goulburn Broken Catchment Management Authority Waterways Strategy. It supports a diversity of wetland types along with two threatened plant species.



O'Kanes Swamp

O'Kanes Swamp, a private wetland located near Yarrowonga in northern Victoria. O'Kanes Swamp is a rain-fed shallow freshwater marsh that is significant as a known Brolga *Grus rubicundus* breeding site.



The Plain Paddock

The Plain Paddock is 15 ha in size and is located on private property in Northern Victoria adjacent to the Numurkah Natural Features Reserve on the Broken Creek. The wetland supports a threatened vegetation community and is protected by a conservation covenant with Trust for Nature.



Andruco Lagoon

Andruco Lagoon is an oxbow lagoon 20 hectares in size and 2.1 kilometres in length. It is situated on the Darling River approximately 20 kms from Wentworth (Figure 11) on private property. Andruco Lagoon primarily consists of River Red Gum and Black Box communities with a chenopod understorey.



Fletchers Creek

The Fletchers Lake system is an ephemeral complex located near the confluence of the lower Baaka and Murray River systems. It consists of large active freshwater and saline lakes and associated channels which support Lignum shrubland and Black Box open woodland. The system provides widespread habitat for frogs suitable foraging habitat for a range of terrestrial species including the threatened species Regent Parrot *Polytelis anthopeplus monarchoides*.



Coomealla Golf Course Lagoons

Coomealla Golf Course Lagoons are located in Curlwaa (Wentworth NSW) and consists of two wetlands, one small and one substantially larger (~4Ha). Two EPBC listed bird species, the Reed Warbler *Acrocephalus australis* and the Eastern Great Egret *Ardea modesta* have been recorded at the lagoons.



Thegoa Lagoon

Thegoa Lagoon and Reserve covers approximately 550 hectares of wetland and River Red Gum and Black Box woodland areas managed by the Wentworth Shire Council. It is unique in being carp free due to existing carp screens.



Central Wetland

Central Wetland is a large (264 ha) Black Box dominated wetland with an understorey consisting of Lignum and Nitre Goosefoot. The wetland is located on private land 20 km west of Jerilderie on the Billabong Creek.



Restdown Wetland

Restdown Wetland is situated between Barham and Womboota NSW, adjacent to the Koondrook-Perricoota Forest and off the Thule Creek system. It is a good representative of a high quality Black Box Woodland that potentially could support threatened species such as Superb Parrot *Polytelis swainsonii* and Southern Bell Frog *Litoria raniformis*.



Response to Environmental Watering

Birds

Monitoring of waterbird diversity and abundance is undertaken prior to watering, during watering events, and 12 weeks after watering events commenced. The results have demonstrated a clear response to environmental watering events with increases in both diversity and abundance in response to watering. In addition, waterbird breeding has been recorded in response to some watering events with breeding and immature birds recorded at four wetlands in the FY20-21 watering year. Environmental watering has provided suitable habitat across all sites for a range of waterbird guilds with a diversity of feeding/foraging behaviours



including ducks, large waders and shorebirds. waterbirds. In total, the watering events have provided suitable habitat for 50 waterbird species.

There is also evidence to suggest that the watering events also provide important habitat for other fauna including woodland birds, with 46 species recorded across all sites to date, including the vulnerable White-fronted Chat *Epthianura albifrons*.

Threatened Species

Three species listed as nationally threatened under the *Environment Protection and Biodiversity Conservation Act 1999* were recorded in response to the watering events, specifically the Regent Parrot *Polytelis anthopeplus*, Southern Bell Frog *Litoria raniformis* and Murray Hardyhead *Craterocephalus fluviatilis*. A further eleven species listed as threatened in either New South Wales or Victoria have been recorded at seven different wetlands and in response to eight of the watering events. These include the Eastern Great Egret *Ardea modesta* and the White-bellied Sea-Eagle *Haliaeetus leucogaster*. In addition, two significant migratory species were recorded, Sharp-tailed Sandpiper *Calidris acuminata* and Common Greenshank *Tringa nebularia*, both of which are listed under the federal *Environment Protection and Biodiversity Conservation Act 1999* as part of international migratory bird agreements.

Frogs

Ten species of frog have been identified in wetlands in response to the watering events. Breeding and recruitment (egg masses and tadpoles) of common frogs was observed in 2020-2021 across several priority wetlands following inundation. Significantly, Lake Henry, located on Wingillie Station and the neighboring Frenchman's Creek overflow continued to be a stronghold for the endangered Southern Bell Frog in 2020-2021, supporting high numbers of calling males.



Southern bell frog
Photo: Sascha Healy

Murray Hardyhead Reintroduction

Environmental Watering events supported by the Fund at Wingillie over the past three years have enabled and continue to support the return of a locally extinct fish species to Murray River waters in New South Wales. The nationally endangered Murray Hardyhead *Craterocephalus fluviatilis* was reintroduced to wetlands within the Wingillie Station Wetland Complex in November 2018. This small, short-lived native fish had not been recorded in rivers or wetlands in New South Wales for more than 10 years.

The Funds' support and environmental water donations have contributed to improve the environmental value of floodplain and wetland habitats on the property for several years in preparation for the reintroduction of Murray Hardyhead. Further watering in FY20 and FY20 has assisted to dilute saline water and support fish recruitment in the creek and the establishment of a self-sustaining population. Surveys by DPI Fisheries staff regularly detected multiple



Murray Hardyhead captured at Little Frenchman's Creek during 2020-2021 surveys conducted by DPI Fisheries. Source: Iain Ellis, DPI Fisheries

MHH cohorts within Little Frenchman's Creek in 2018-2019, 2019-2020 and 2020-2021 which indicates the translocated fish successfully bred.

The reintroduction represents the first attempt in New South Wales re-establish a freshwater fish species that is likely to have been locally extinct. The translocation is a joint project involving the Commonwealth Government, the NSW Department of Primary Industries Fisheries, Western Local Land Services, the SA Department for Environment and Water, Aquasave - Nature Glenelg Trust, the Murray Darling Wetlands Working Group, the owners of the Wingillie Station in western NSW. The watering event supporting the translocation was made possible with support and water provided through the Murray-Darling Basin Balanced Water Fund in partnership with Murray Darling Wetlands Working Group, Environmental Water Trust and The Nature Conservancy.

Vegetation

The environmental water delivery has maintained and enhanced native wetland vegetation covering an area of approximately 630 hectares, being the areas directly inundated through watering events. The watering events have improved the condition of River Red Gum and communities with mature trees typically exhibiting fresh flushes of growth and a thickening of the canopy within months of being inundated. *Lignum Duma florulenta* condition also generally improved with leaves and flowering occurring within months of receiving water. Wetland dependent vegetation diversity and abundance across all the priority wetlands increased over time with 153 plant species identified to date. Wetland vegetation response is highly variable over space and time, thus oftentimes individual wetlands are unique, exhibiting different plant community composition and contribute to wetland diversity across the Murray Darling Basin.

Vegetation monitoring carried out at selected wetlands across all years has resulted in the identification of 153 plant species including the nationally threatened River Swamp Wallaby-grass *Amphibromus fluitans* and two species which are Vulnerable in Victoria, cane grass *Eragrostis australasica* and jerry jerry *Ammannia multiflora*. The beneficial impacts of environmental watering on improving vegetation condition extends far beyond the area of wetland inundated.

This report provides an update on the outcomes achieved through the donations of water and cash from the Murray-Darling Basin Balanced Water Fund under its constitution. The donations are made to the Environmental Water Trust, which has engaged the Murray Darling Wetlands Working Group to deliver environmental watering services with scientific oversight and review provided by The Nature Conservancy.

