Australian Government
Commonwealth Environmental Water Office

Commonwealth Environmental Water Office

Water Management Plan

Chapter 3.2 – Condamine-Balonne

2020–21

This document represents a sub-chapter of 'Commonwealth Environmental Water Office Water Management Plan 2020-21, Commonwealth of Australia, 2020'.

Please visit: https://www.environment.gov.au/water/cewo/publications/water-management-plan-2020-21 for links to the main document.

Acknowledgement of the Traditional Owners of the Murray–Darling Basin

The Commonwealth Environmental Water Office respectfully acknowledges the Traditional Owners, their Elders past and present, their Nations of the Murray–Darling Basin, and their cultural, social, environmental, spiritual and economic connection to their lands and waters.

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3.2 Condamine–Balonne

3.2.1 Region overview

(a) River system

The Condamine–Balonne system is one of the largest catchments in the Murray–Darling Basin and covers the north eastern corner of the Basin. The system is bounded by the Moonie catchment to the east, the Warrego catchment to the west and the Barwon River in the south (Figure 1). The main rivers of the catchment, the Condamine and the Maranoa, rise in elevated country in Queensland. Two-thirds of the catchment is flat floodplain country, with a complex system of rivers and creeks joining and breaking away from the Balonne River as it moves downstream of St George. This system of creeks, channels and flat floodplain areas is generally referred to as the Lower Balonne Floodplain.

While a few main waterways of the catchment flow to the Barwon River, most end in lakes and wetlands in south west Queensland and north-west New South Wales (NSW). Most of the catchment is located in Queensland with only 16 per cent in NSW.

The catchment's extensive floodplains provide habitat for a diverse range of plants, including endangered vegetation communities. The region also provides habitat for waterbirds, native fish and many vulnerable and endangered species. There are several wetlands of national importance in the region as well as the Ramsar-listed Narran Lake Nature Reserve.

The extent of river regulation in the Condamine–Balonne is low. Public dams account for only 13 per cent of stored water in the catchment. The two largest public storages are Leslie Dam (106 gigalitres) near Warwick, and Beardmore Dam (82 gigalitres) near St George, which were built in the 1960s to secure town water and irrigation supplies.

Large-scale irrigation in the region is supported by large capacity pumps or large regulating structures that divert water during natural flow events into on-farm storages for later use. Most of the water use and entitlement is in the form of diversion of river flows and water during natural flow events that breaks out of rivers and becomes overland flows across floodplains.

(b) Traditional Owners

The lands of the Condamine–Balonne catchment have been important to Aboriginal people for thousands of years. Many First Nations retain a connection with the region, and their history, culture and livelihoods are closely intertwined with its river systems. First Nations of the region include Barunggam, Bidjara, Bigambul, Euahlayi, Gomeroi/Kamilaroi, Giabel, Githabul, Gunggari, Guwamu/Kooma, Jarowair, Kambuwal, Mandandanji, Murrawarri, and Wakka Wakka.

(c) Important sites and values

The floodplains of the Condamine–Balonne catchment are ecologically significant because they support endangered ecological communities, such as the brigalow–gidgee woodland/shrubland in the Mulga Lands and Darling Riverine Plains Bioregions. The wetlands support a diverse range of flora and fauna providing habitat for migratory birds and vulnerable and endangered species, such as silver perch, Murray cod, freckled duck, Australian painted snipe, the great egret and the cattle egret.

Wetlands of national importance include the Great Artesian Basin Springs, Lake Broadwater, The Gums Lagoon, the Culgoa River Floodplain, and the Dalrymple and Blackfellow creeks.

The Lower Balonne is a complex floodplain channel system containing a number of nationally significant wetlands, as well as the internationally significant Narran Lake Nature Reserve, which includes significant areas of Ramsar-listed wetlands.

Narran Lake Nature Reserve

The Ramsar site within the Narran Lake Nature Reserve is in north-west NSW about 50 kilometres east of Brewarrina. One section of the site was listed under the convention in 1999, and a further 3 104 hectares were added in 2015. The site was extended to capture more breeding and feeding habitat for waterbirds. Currently the site covers a total area of 8 447 hectares and comprises the whole floodplain area within Narran Lake Nature Reserve. The site was listed under the Ramsar Convention because of its significant values, which include:

- some of the largest expanses of lignum in NSW
- the ability to support:
    - three wetland dependent threatened species – Australasian bittern, Murray cod and winged peppercress
    - a large number of migratory bird species, including 19 listed under international agreements
    - substantial breeding of waterbirds, including colonial nesting species such as ibises, cormorants, egrets and spoonbills.
- the capacity to provide drought refuge for waterbirds following floods.

The Nature Reserve is also important to Aboriginal people and they are involved in managing the site through the Narran Lake Nature Reserve Aboriginal Co-Management Committee. Key values of the site for Aboriginal people include:

- being a traditional meeting place for Aboriginal tribes in the region
- several Dreaming paths culminate at the lakes
- containing many relatively undisturbed Aboriginal objects.

(d) Stakeholder engagement

In the Condamine–Balonne system, the planning and management of Commonwealth water for the environment is undertaken in conjunction with a range of partners and stakeholder groups. Key stakeholders include the Queensland Departments of Natural Resources, Mines and Energy (DNRME), Environment and Science (DES) and Agriculture and Fisheries, NSW Department of Planning, Industry and Environment (DPIE), NSW Department of Primary Industries (DPI) – Fisheries, SunWater, WaterNSW, the Narran Lake Nature Reserve Aboriginal Co-Management Committee, and the Lower Balonne Working Group.

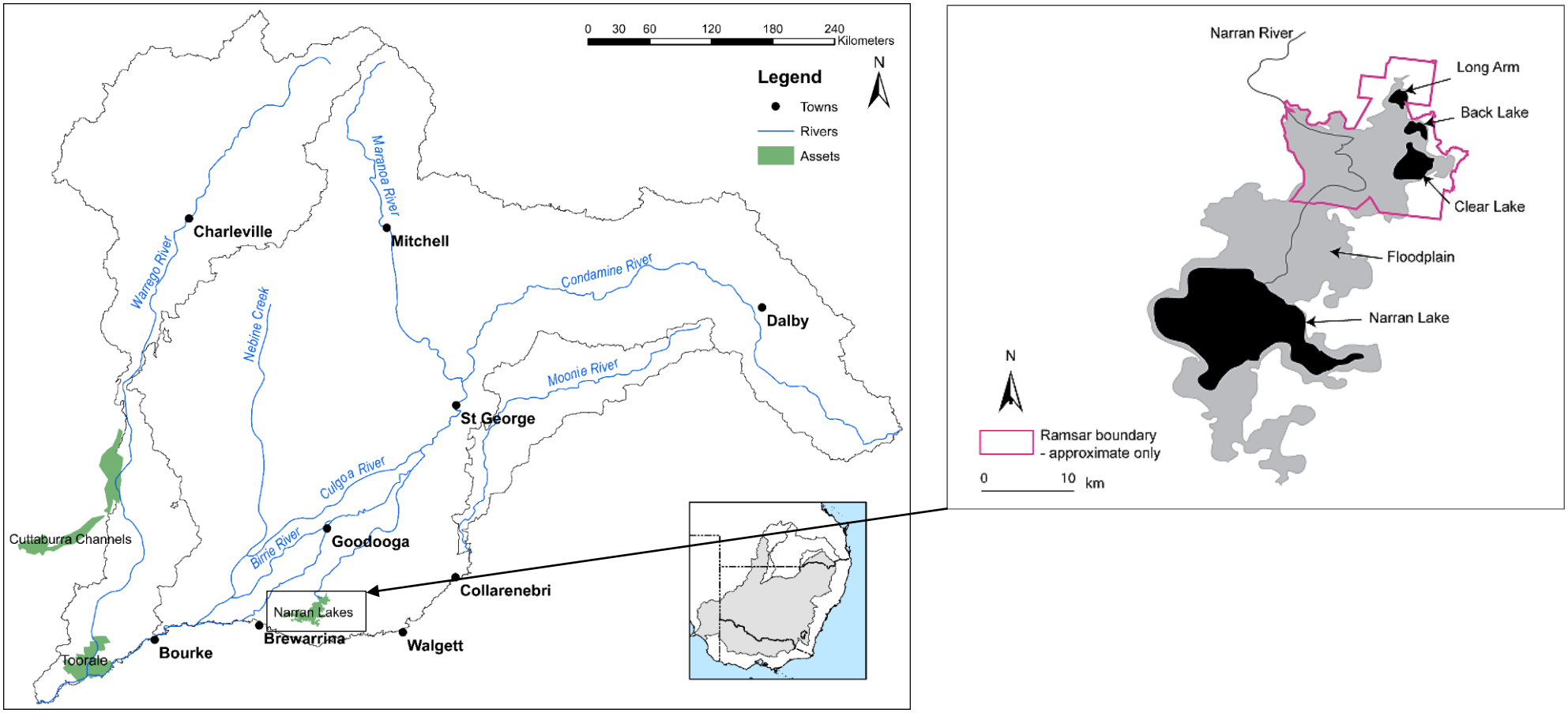

Figure 1: Map of the Condamine–Balonne and surrounding systems, including an inset of the internationally significant Narran Lakes system.

3.2.2 Environmental objectives

Based on long-term environmental objectives in the Basin Plan, relevant state long-term watering plans, site management plans (including Ramsar site ecological character descriptions), and best available knowledge, the following objectives are relevant for environmental watering in the Condamine–Balonne system.

Because of the generally unregulated nature of the Condamine–Balonne system, the objectives that can be achieved in a particular year may vary and are highly dependent on catchment conditions and rainfall events. These objectives will continue to be revised as part of the Commonwealth Environmental Water Office's (CEWO) commitment to adaptive management.

Vegetation: Maintain and improve the condition, growth and survival of riparian, in-channel, floodplain and wetland vegetation.

Waterbirds: Maintain foraging, roosting and breeding habitats at targeted sites on the floodplain to support waterbirds.

Native fish: Improve habitat condition, and support different life stages (migration, spawning, recruitment and refuge), natural flow variability, and connectivity between river channels, wetlands, anabranches and floodplains.

Other vertebrates: Support survival and recruitment of other native aquatic species, including frogs and turtles.

Invertebrates: Maintain and improve the micro and macroinvertebrate communities by providing a variety of habitat and flow conditions.

Connectivity: Support longitudinal connectivity, including with the Barwon River, and lateral connectivity with and between the rivers, wetlands and floodplain systems.

Processes/water quality/resilience: Support key ecosystem functions, biotic dispersal and promote productivity; maintain water quality in channels and pools; and maintain drought refuge habitat.

3.2.3 First Nations environmental objectives

Representatives of the First Nations peoples of the Condamine-Balonne system have identified environmental objectives for their country for 2020–21 (Table 1). These objectives were developed through the First Nations Environmental Guidance project undertaken by the Northern Basin Aboriginal Nations organisation.

Some of these objectives sit outside the scope of water for the environment to influence, while for others, the link between water for the environment and the site or species is not well understood.

The CEWO is committed to working with First Nations groups to better understand their objectives. The CEWO will use environmental flows to contribute to these objectives where possible and where this is consistent with the Commonwealth Environmental Water Holder's statutory responsibility of protecting and restoring environmental assets in the Basin.

Table 1: First Nations environmental objectives for the Condamine-Balonne system for 2020–21 (NBAN Ltd. 2020)

River flows and Connectivity
Upper Condamine: Maintain a healthy sustainable flow so that native animal and plant species can thrive to benefit everyone.
Maranoa-Balonne priority sites: The junction between Maranoa and Balonne rivers; the Lakes that feed off the Maranoa River
Maranoa-Balonne river connectivity: Flowing water throughout the system, at all times. There are hardly any fish in the Maranoa because of Beardmore Dam.
Narran Lakes: Sufficient flows to support an abundance of birdlife and bird eggs, as well as fish for food during gatherings.
Culgoa and Nebine rivers: Low and medium flows in both the Culgoa and Nebine Rivers; sufficient flows to increase and protect the health of the rivers; maintain natural flows and restore historical timing of flows. Maintain connectivity.
Native Vegetation
Upper Condamine indicator species: River gum, bulrush, water lily, sedges, sandalwood[i], iron bark (poplar box)[i].
Maranoa -Balonne indicator species: Iron bark [i], blackberries [i], wild bananas [i], salt bush, black box, snotty gobble (mistletoe) [i].
Culgoa and Nebine rivers indicator species: Lignum, water grasses, river redgum, Willbill, black box, coolabah, and snotty gobble (mistletoe) [i].
Native Birds
Upper Condamine indicator species: Kookaburra [i], kingfisher, black cockatoo [i], crimson wing, duck, water hen, shag.
Maranoa -Balonne indicator species: Night owl [i], barking owl[i], pelican, eagle[i], black hawk[i], white dove[i], brolga.
Culgoa and Nebine rivers indicator species: Duck, pelican, heron, ibis, brolga, bush turkey[i], kingfisher, black duck, wood duck and bustard.
Native Animals
Upper Condamine indicator species: River blackfish, spiny crayfish, cod, yellowbelly, platypus[i], catfish, mussel, crayfish, turtle.
Maranoa -Balonne indicator species: Tiger snake [i], carpet snake [i], black goanna [i], red kangaroo [i], native bee [i], brown frog, crucifix Frog, yellowbelly, cod.
Culgoa and Nebine rivers indicator species: Yellowbelly, booglies, black bream (silver perch), cod, shrimps, mussels, catfish, turtles, water spiders, wallabies [i], goanna [i], emu [i] and frogs.
Connecting with Country
Upper Condamine: Water quality to ensure downstream river health.
Maranoa -Balonne: Ceremonies based around water.
Culgoa and Nebine rivers: Increased populations of native birds, as they are a food source and totemic species, which are important for Gatherings.

[i] Water for the environment targeting other environmental outcomes may influence this species or objective

3.2.4 Recent conditions and seasonal outlook

(a) Recent conditions and environmental water use

The Condamine–Balonne system experienced very hot and dry conditions between July 2017 and January 2020, with rainfall being well below average, and maximum temperatures the highest on record for some months. Flows passed St George have also been extremely low during this time.

These factors resulted in some downstream sections of the Narran River not flowing for over 650 days, and the Culgoa River for 390 days. These long periods of low or no flow saw a reduction in the number and quality of refuge pools within the river channels of the Lower Balonne floodplain. The reduction in drought refuges is likely to have had a significant impact on the aquatic communities of the Culgoa, Narran and Birrie/Bokhara River systems.

During late summer and early autumn 2020, widespread rainfall occurred across most of the Condamine-Balonne system. This saw most parts of the system receive around 100 mm of rain. During this period, a series intense summer storms saw 200-350 mm of rain fall across the mid and upper sections of the Condamine and Maranoa catchments.

The rainfall generated significant flows particularly in the Condamine and Maranoa Rivers with flows at St George peaking at around 190 000 ML/d. The flows recorded at St George passed the full length of the Lower Balonne system filling the three lakes within the Narran Lake Nature Reserve. It also connected to the Barwon and Darling rivers. Flow rates and total flow volumes for various parts of the Lower Balonne network are shown in Table 2.

Table 2: Maximum flow rate, duration and total flow volume at key flow gauges across the Lower Balonne distributaries

Site	Description	Maximum Flow Rate (ML/d)	Flow Duration (Days)	Total Flow Volume (ML)
Wilby Wilby (Narran River)	Located mid-way between the Queensland/NSW border and the Narran Lake Nature Reserve	5 700	~55	89 000
Narran Park (Narran River)	Located on the western boundary of the Narran Lake Nature Reserve	3 300	~55	61 000
Brenda (Culgoa River)	Located near the Queensland/NSW border	14 000	>80	174 000
Downstream of Collerina (Culgoa River)	Downstream of where Nebine and Birrie systems connect to the Culgoa River. The most downstream gauge	8 800	>85	176 000
Bokhara (Bokhara River)	The most downstream gauge	2 100	~60	32 000

As part of these flows, over 150 000 megalitres of Commonwealth water for the environment, along with 10 000 megalitres contributed by Cubbie Station helped to enhance the condition of the Lower Balonne system.

To further enhance the condition of habitat within the Narran Lakes Nature Reserve Ramsar Site, the Commonwealth implemented the Narran Lakes Water Reimbursement Project. Through this project, a water allocation holder that was legally entitled to pump water from rivers that flow to the Narran Lakes was provided with a grant not to pump from the flow event. The grant contributed a further 9 000 megalitres of water for the environment, most of which inundated the Ramsar site.

The project was a pilot (or 'interim measure') from which the lessons learned will support any future implementation of event-based mechanisms. Event-based mechanisms are a 'Toolkit measure' under the Intergovernmental Agreement on Water Reform in the Murray–Darling Basin. The CEWO will evaluate the benefits from the trial before any consideration of any future implementation of event-based mechanisms.

Before these flows, floodplain and terminal wetland systems, including the Narran Lakes Nature Reserve Ramsar site, had not been inundated for an extended period. The last time flows where sufficient to enter Clear Lake (the largest of the Lakes contained with the Ramsar Site) was in October 2016. Similarly, core lignum areas within the Ramsar site had not been completely inundated since March 2013, and extensive inundation of the broader Lower Balonne floodplain had not occurred since February 2012. The extended period between watering events has resulted in a significant decline in the condition of lignum shrublands across the Ramsar site as well as riparian and floodplain vegetation communities located across the entire Lower Balonne floodplain.

(b) Seasonal outlook

According to the Bureau of Meteorology outlook on 2 July 2020, above median rainfall is forecast to occur across the Condamine–Balonne system from winter through into spring. While this forecast suggests that the recent severe dry conditions may continue to ease somewhat, follow up rain over the forthcoming summer is needed to ensure continued recovery from the drought. Wetter conditions can return suddenly in the northern Basin. Maximum temperatures are also forecast to remain above average over the coming months.

(c) Water availability

The Condamine–Balonne's two main public storages have a combined storage volume of 188 gigalitres, while the average annual stream flow at St George is 1 305 gigalitres. Thus, entitlements reliant on regulated releases from these storages are relatively small compared to the entitlements used to access unregulated or natural flow events. Consistent with this, Commonwealth environmental water holdings in the Condamine–Balonne system are almost exclusively made up of unregulated entitlements and can only be sourced as a share of an unregulated flow event determined by entitlement conditions.

Availability of water for the environment in the Condamine–Balonne depends on the nature of flow events that occur. Unregulated entitlements provide opportunistic access to unregulated river flows and overland flows when water resource plan rules are triggered, and a period of access is announced. Each entitlement will contribute to restoring in-stream flows reflecting its particular flow access windows, take rates and location. Daily, instantaneous, annual or multi-year limits cap overall diversions in any given year or flow event, and likewise the in-stream contributions that can be attributed to unregulated Commonwealth entitlements.

(d) Environmental demands

Considering the prolonged drought and the need to support recovery of key assets, there are a number of environmental demands that require water in 2020–21.

The environmental water demands for assets in the Condamine-Balonne system in 2020–21 are represented in Table 3. Note that the capacity to contribute to these environmental demands is contingent on the nature of flow events that occur in the catchment.

Table 3: Environmental demands, priority for watering in 2020–21 and outlook for coming year in the Condamine-Balonne System.

Environmental assets	Indicative demand (for all sources of water in the system)			Watering history	2020–2021		Implications for future demands
	Physical and process assets	Flow/volume	Average required frequency (maximum interval)	(from all sources of water)	Environmental demands for water	Potential Commonwealth environmental water contribution	Likely urgency of demand in 2021–22 if watering occurred as planned in 2020–21
Lower Balonne River channels (Culgoa River, Narran River and inner distributary channels) and Barwon–Darling	Drought refuge (waterholes)	Flow reaches end of all channels within a three-month period, indicated by: • 30 ML/day Birrie River @ Talawanta for 1 day • 30 ML/day Bokhara River @ Bokhara for 1 day • 30 ML/day Culgoa River @ Weilmoringle for 1 day • 30 ML/d Narran River @ Narran Park for 1 day	Annually (no longer than 12 months between last flow)	Water is required annually to replenish refugial waterholes (contributing to persistence, connectivity and quality). Since 2009–10, flow requirements for the maintenance of drought refuges have generally been met. Requirements specified for the Bokhara and Culgoa have been met each year since 2009–10. The requirements specified for the Birrie and Bokhara systems are more difficult to achieve, with the Birrie requirement met 8 out of 11 years and the Narran requirement met 10 out of 11 years. While a filling flow recently passed through each of the 4 targets systems (March–April 2020), these flows are needed each year, so the requirement remains high.	High	**Moderate priority for CEW under all water resource availability scenarios.** The demand should be met by planned environmental water (environmental stock and domestic flows). After a water harvesting event has been announced, water left in the river as a result of the Commonwealth owning licences will be distributed across channels in the lower Balonne.	High
	Culgoa River – longitudinal connectivity	Small in channel fresh 1 000 ML/day @ Brenda for 7 days	8 in 10 years	Small freshes have occurred 7 in 10 years, including the flow event during March–April 2020. However, the average required frequency has not been met so the requirement for this demand is high.	High	A high priority for CEW under all water resource availability scenarios.	High
	Narran River – fish migration	Large in-channel fresh 1 700 ML/day @ Wilby Wilby (August–May) for 14 days	4–6 in 10 years	Large in-channel freshes have been met in 4 of the past 10 years, including during March–April 2020. While the average required frequency has been met, the requirement was not achieved during the period between the 2012–13 and 2019–20 water years. To increase recruitment opportunities, the requirement for this demand is high.	High	A high priority for CEW under all water resource availability scenarios.	Moderate
	Culgoa River – fish migration	Large in-channel fresh 3 500 ML/day @ Brenda (August–May) for 14 days	4–6 in 10 years	The last large in-channel fresh that met the demand occurred 8 years ago, which exceeds or approaches the lifespan of short-lived fish species. A large fresh is required in 2020–21 to provide opportunities for the dispersal and recruitment of native fish species.	Critical	Possible use of CEW, however, requires further investigation. Uncertain if sufficient additional flows could be obtained, and would likely have to target one channel not whole system.	High
Lower Balonne River floodplain	Connectivity with the riparian zone	9 200 ML/day Culgoa River @ Brenda for 12 days	Every 2–3 years	The last flow of this magnitude occurred 8 years ago, which exceeds the critical interval (3 years) to maintain condition of river red gum, ephemeral wetlands and lignum communities. Inundation is required in 2020–21 to maintain ecosystem health and function.	Critical	Possible use of EW, however, requires further investigation, including ecological outcomes from watering.	High
	Connectivity with the inner floodplain	15 000 ML/day Culgoa River @ Brenda for 10 days	Every 3.5–4 years	The last flow of this magnitude occurred 8 years ago. Inundation is required in 2020–21 to maintain ecosystem health and function.	Critical	Low priority for use of CEW. Benefit of supplying additional Commonwealth environmental water would be negligible.	High
	Connectivity with the mid floodplain	24 500 ML/day Culgoa River @ Brenda for 7 days	Every 6–8 years	The last flow that met the demand occurred 8 years ago. Inundation is required within the next year to maintain ecosystem health and function	High	Low priority for use of CEW. Benefit of supplying additional Commonwealth environmental water would be negligible.	Low
	Connectivity with outer floodplain	38 000 ML/day Culgoa River @ Brenda for 6 days	Every 10–20 years	The last flow that met the demand occurred 8 years ago. Critical interval for inundation will be in 2021–22.	Low	Low priority for use of CEW. Benefit of additional Commonwealth environmental water would be negligible.	Low

Environmental assets	Indicative demand (for all sources of water in the system)			Watering history	2020–2021		Implications for future demands
	Physical and process assets	Flow/volume	Average required frequency (maximum interval)	(from all sources of water)	Environmental demands for water	Potential Commonwealth environmental water contribution	Likely urgency of demand in 2021–22 if watering occurred as planned in 2020–21
Narran Lakes	Waterbird breeding habitat in northern lakes (Ramsar site**)	25 GL @ Wilby Wilby (Narran River) over 60 days	Every 1–1.3 years	This demand has been met 4 out of the past 10 years, which exceeds the frequency range for this requirement. While this demand was met by the flow event during March–April 2020, the requirement for this demand is high	High	A high priority for CEW under all water resource availability scenarios.	Moderate
	Waterbird breeding and foraging habitat northern lakes zone**	50 GL @ Wilby Wilby over 90 days	Every 1.3–1.7 years	This demand has been met 4 out of the past 10 years, which exceeds the frequency range for this requirement. While this demand was met by the flow event during March–April 2020, the requirement for this demand is high. Inflows are required this year to sustain lignum shrublands and maintain condition of riparian red gum forests.	High		Moderate
	Trigger and maintain large scale colonial waterbird breeding	154 GL @ Wilby Wilby Narran Park over 90 days	Twice in every 8–10 years	This demand was last met 8 years ago. While significant flows entered the Narran Lakes systems during March–April 2020, the last large-scale waterbird breeding event was in early 2013. An event is required this year or next to provide ibis populations (with Narran site fidelity) with 2 breeding opportunities in their lifetime. An acute and chronic shortage of waterbird breeding across the Basin and the likelihood of this demand not being met in the long term, increases its urgency.	High	Commonwealth water portfolio is likely to contribute during large flow events	Moderate
	Water all floodplain and wetland habitat in Narran Lakes complex, initiate waterbird breeding, provide long-term refuge**	250 GL over 180 days @ Wilby Wilby	Every 10 to 12 years	This demand was met 8 years ago. Following the 2010–11 and 2011–12 floods, the critical interval for inundation will be from 2022 (if not received before then).	Low	Commonwealth water portfolio is likely to contribute during large flow events	Low

**Vegetation types/communities that are identified as critical components of the Ramsar site include lignum shrublands, riparian forest/woodland and ephemeral herbfields. All other critical components, processes and services of the Ramsar site would be supported by meeting the indicative demand.

Note: Contributions to meet Barwon–Darling environmental requirements may be considered subject to water availability, antecedent conditions, and environmental demands. Refer to CEWO's Water Management Plan 2020-21:Chapter 3.7 Barwon–Darling.

Key - potential watering in 2020-21

- High priority for Commonwealth environmental watering (likely to receive water even under low water resource availability)
- Secondary priority for Commonwealth environmental watering (watering to occur only if natural trigger is met, or under moderate - high water resource availability); or water demand likely to be met via other means
- Low priority for Commonwealth environmental watering (under high - very high water resource availability)
- Unable to provide Commonwealth water because of constraints or insufficient water

Key - environmental demands

- Critical demand i.e. urgent need for water in that particular year to manage risk of irretrievable loss or damage
- High demand for water i.e. needed in that particular year
- Moderate demand for water i.e. water needed that particular year and/or next
- Low demand for water i.e. water generally not needed that particular year
- Very low demand for water i.e. water generally not needed that particular year or the following year

Note that demand is considered at a generalised scale; there may be specific requirements that are more or less urgent within the flow regime

3.2.5 Water delivery in 2020–21

Unregulated entitlements provide opportunistic access to unregulated river flows and overland flows when a flow event reaches levels specified in entitlement conditions and/or water resource plan triggers at which a period of access may be announced are met. Each entitlement will make a contribution to restoring in-stream flows reflecting its particular flow access windows, take rates and location.

3.2.6 Monitoring and Lessons learned

In the Condamine–Balonne catchment, monitoring is undertaken by Queensland and NSW agencies, including Queensland DNRME and DES (flow, hydrology, water quality, native fish) and NSW DPIE (vegetation, waterbirds and other animals), NSW DPI – Fisheries (native fish), and WaterNSW (hydrology and flow delivery data). The CEWO is also funding several short-term intervention monitoring projects to evaluate the environmental responses of native fish, waterbirds and vegetation in the Condamine-Balonne.

Details of monitoring activities funded by the CEWO in the Condamine-Balonne catchment can be found at: https://www.environment.gov.au/water/cewo/catchment/northern-unregulated-rivers/monitoring

Outcomes from monitoring and lessons learned in previous years are a critical component for the effective and efficient use of Commonwealth water for the environment. These learnings are incorporated into the way environmental water is managed. In 2016 the Murray-Darling Basin Authority re-assessed the environmental water requirements of the Condamine-Balonne system based on an improved science base[1]. There are also ongoing research activities contributing to our understanding of environmental water requirements of the Condamine–Balonne catchment (and other Northern Basin catchments) including the joint-venture science program and state planning assessments as part of the long-term water plans.

The Commonwealth funded the Murray-Darling Environmental Water Knowledge and Research (EWKR) project (for five years to June 2019) which provided important information, including several research projects in the Lower Balonne, to support environmental water management in the Basin[2].

Key findings from fish,[3] native vegetation[4], flows[5] and waterbird[6] monitoring in the Condamine-Balonne is summarised in Table 4.

Table 4: Key lessons learned in the Condamine–Balonne catchment

Theme	Lesson learned
Native fish	• Lagoons in the Lower Balonne (Queensland) have been known to provide habitat for fish species including golden perch, Australian smelt, spangled perch, bony bream, carp gudgeons, Murray-Darling rainbow fish, olive perchlet and Hyrtl's tandan. Historically, the native fish communities in the NSW Narran and Culgoa rivers were assessed as being in moderate to good condition. • Several refugial waterholes on the Narran River system, including one waterhole that was previously identified as persistent, went dry in 2017–18, increasing the population extinction risk for native aquatic fauna, including golden perch.
Native vegetation	• The CEWO has funded a short-term intervention monitoring (STIM) project on vegetation condition at Narran Lakes from early 2020 to December 2021. The first vegetation monitoring survey was undertaken by staff from the University of New England (UNE) in early March 2020 in collaboration with staff from the CEWO, NSW National Parks and Wildlife Service (NPWS), NSW DPIE along with local indigenous

[1] MDBA 2016
[2] (CEWO 2019, Mynott and Balcombe 2019, Dunne 2019, Senior 2019).
[3] (Benson 2004, QDES 2018, SoNSW and NSW DPIE 2019, Mynott and Balcombe 2019, QDES and CEWO unpublished)
[4] (QDSITI and QDNRM 2017, UNE unpublished)
[5] (CEWO 2020, BOM 2020)
[6] (CEWO 2020)

Theme	Lesson learned
	representatives from the Narran Lakes Nature Reserve Joint Management Committee (JMC). • Preliminary results suggest that vegetation of all community types suffered as a result of drought in recent years, with river red gum appearing to be the most obvious tree species affected. Large swathes of dieback was evident in lignum, especially in areas that had not received runoff from recent rains. Ground cover was also very low throughout. Floodplain vegetation appeared to respond to rains received in mid-February 2020, including lignum resprouting on the edges of the floodplain and low-lying areas. Despite large areas of lignum dieback, lignum may still offer suitable habitat for waterbird nesting following lake inundation from flood water delivery.
Waterbirds	• Regular waterbird surveys undertaken by state agencies since significant flows arrived in the Lower Balonne in early 2020 has detected thirty species so far including freckled duck, plumed duck, pelicans and darters. Straw-necked ibis were also detected but no breeding evident. Further rainfall in 2019-20 and 2020-21 may support waterbird breeding outcomes.
Connectivity	• The Murray-Darling Basin Authority has been using satellite data to track the 2020 flows in the Lower Balonne. The Bureau of Meteorology also completed a 'Water in Focus' report on the Lower Balonne, finding that the summer of 2019-20 saw the Condamine-Balonne river system go from severe drought to floods. These flows replenished water supplies and enabled the first significant flow into the internationally significant Narran Wetlands in eight years. A small volume of water also made it down the Culgoa River channel to the Darling River during March and April 2020.

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