2017-18 Annual Environmental Watering Plan

FOR THE SOUTH AUSTRALIAN RIVER MURRAY

In 2017-18 the River Murray annual environmental watering plan was incorporated into South Australia's River Murray annual operating plan 2017-18. This document is an extract of that operating plan and serves as the 2017-18 annual environmental watering plan for the SA River Murray.

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CONTENTS

LIST OF FIGURES

LIST OF TABLES

Murray-Darling Basin

DELIVERY OF WATER FOR ENVIRONMENTAL OUTCOMES

9: DELIVERY OF WATER FOR ENVIRONMENTAL OUTCOMES

Environmental watering provides water to priority environmental assets for ecological benefit and contribution to a healthy, working river. Environmental watering ensures that important values of the South Australian River Murray, its wetlands and floodplains, Lakes Alexandrina and Albert and the Coorong are maintained and that environmental objectives are achieved.

Environmental watering in South Australia, in conjunction with unregulated flow, aims to meet the environmental water requirements of all key environmental assets and functions. Environmental water requirements include the timing, frequency, magnitude and duration of preferred flows for a range of biota.

Consultation

A wide range of stakeholders and community groups were consulted on annual environmental water priorities for the LLCMM, South Australian River Murray Channel and Chowilla Floodplain, which included presentations on the proposed watering priorities for 2017-18. The groups consulted include the LLCMM Community Advisory Panel, LLCMM Scientific Advisory Group, Chowilla Community Reference Group and Chowilla Coordinating Committee. Modelling outputs, ecological data and trends, learnings from previous watering actions and local considerations were incorporated into proposals.

Indigenous communities have a complex relationship with water, which goes beyond simply using it for consumptive purposes. During the development of annual environmental water priorities, consultation has been initiated with Traditional owner groups along the South Australian River Murray. The Ngarrindjeri Regional Authority were consulted on the LLCMM and SA River Murray Channel environmental watering proposals, and the First Peoples of the River Murray and Mallee Region were consulted on the Chowilla proposal. A statement prepared by the Ngarrindjeri Regional Authority is provided in **Appendix 3**.

Scenarios Used to Prepare Annual Environmental Watering Priorities 2017-18

The annual environmental watering priorities (the Priorities) for the South Australian River Murray for 2017-18 have been developed in accordance with Basin Plan requirements and are consistent with the Long-Term Environmental Watering Plan for the South Australian River Murray Water Resource Plan area. Six water resource availability scenarios were used to develop the proposed watering actions for 2017-18. These were developed using the MDBA's Annual Operating Probability (AOP) provided in February 2017: 95% very dry, 90% (dry), 75% (moderate), 50% (near average), 25% (wet) and 10% (very wet) refer to **Figure 3**. These percentages refer to the likelihood of the water resource availability occurring based on historical records and align closely to AEPs used elsewhere in the SA Operating Plan. These scenarios include a very wet scenario, which is not referred to elsewhere in this plan. This is because the planning commenced in February when water resource conditions were wetter and this scenario was a possibility. **Figure 3** also includes the actual flow to South Australia (QSA) during 2016-17 as a comparison.

DELIVERY OF WATER FOR ENVIRONMENTAL OUTCOMES

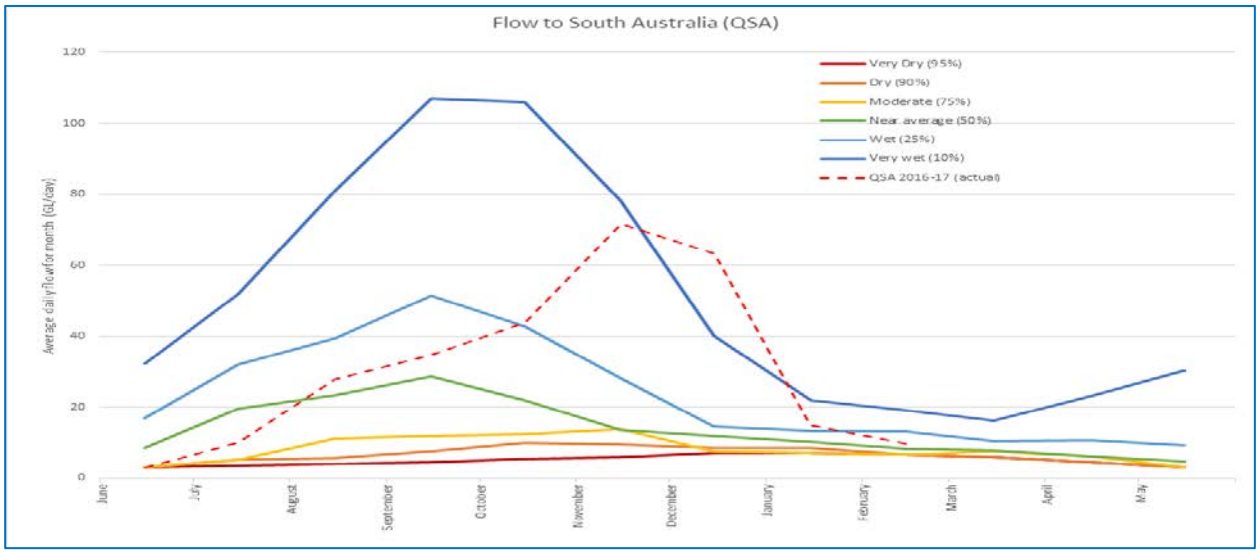

Figure 3: Annual operating probabilities provided by MDBA in February 2017 for the purpose of informing environmental water planning for 2017-18

Annual Environmental Watering Priorities 2017-18

The Priorities are presented in **Tables 9–13** (**Table 9** 95% AOP, **Table 10** 90% AOP, **Table 11** 75% AOP, **Table 12** 50% AOP and **Table 13** 25% to 10% AOP).

The priority environmental assets for environmental water delivery in 2017-18 include:

- Lower Lakes, Coorong and Murray Mouth (LLCMM);
- River Murray channel and floodplain;
- Weir pool manipulation; and
- Chowilla Floodplain.

The priority under all water resource scenarios is to:

- increase water delivery in spring and early summer to enhance flows or extend flow duration; and
- deliver water to maintain flows to the Coorong and Murray Mouth throughout the entire year.

Where possible, the priority is to:

- enhance flows to build-on floodplain and wetland improvements that resulted from the 2016 River Murray high flow event, and
- sustain high flows into early summer to support ecological outcomes in the LLCMM.

Operating and testing infrastructure such as the Chowilla Regulator and weirs will also build-on the benefits of the 2016 River Murray high flow event. These operations will be flexible and responsive to the prevailing river conditions. These actions are adaptable and will be managed to further enhance the benefits of water delivered for system scale floodplain, channel and LLCMM outcomes.

A range of wetland watering actions are also proposed including drying a number of pool-connected wetlands and pumping water to priority temporary sites. Wetland watering actions will be undertaken by DEWNR and several non-government organisations including Nature Foundation of South Australia, Renmark Irrigation Trust, Ngarrindjeri Regional Authority, Banrock Station and Australian Landscape Trust.

DELIVERY OF WATER FOR ENVIRONMENTAL OUTCOMES

Table 9: 95% AOP (very dry scenario) Environmental Watering Priorities for SA in 2017-18

95% AOP Priorities				
Asset	**Priority Action**	**Timing and Duration**	**Objectives**	**~Volume (GL)**
LLCMM	a) Deliver water in Spring – Summer	Sep-Dec 120 days	• Provide barrage outflows for fish migration, connectivity and localised estuarine conditions • Maintain lake levels >0.8 m AHD October to December • Improve fringing and submerged aquatic vegetation health • Provide for Southern Bell frog and small threatened fish recruitment	563 (for a, b, c)
	b) Deliver low level base flow	Jan-Jun 180 days	• Provide continuous fishway/barrage releases and localised estuarine conditions • Provide continuous connectivity between river and estuary • Maintain lake levels >0.4-0.5 m AHD all year	
	c) Deliver Winter pulse through barrages and Murray Mouth	Jun 14 days	• Provide freshwater signal through Goolwa Barrages to Southern Ocean • Provide for upstream migration of adult lamprey • Minimise accumulation of sediment in Murray Mouth	40 (included in 563 above)
Channel and Floodplain	Boost QSA to deliver 10 GL/day with +/- 2 GL/day variability	Sep-Mar 60 days	• Maintain diurnally-mixed water column for diverse phytoplankton; support foraging generalists • Maintain water quality to support aquatic biota; promote bacterial rather than algal dominance • Support diverse phytoplankton community and bacterial dominance of biofilms	195
	Boost QSA to deliver 15 GL/day	Sep-Mar 60 days	• As for above action • Create variation in hydraulic diversity and increase habitat complexity	525
Weir pool manipulation	No action proposed	Not applicable	• Not applicable	0
Chowilla	Pulse flow through Chowilla anabranch via Pipeclay and Slaney Creek weirs	Oct-Feb 140 days	• Mobilise carbon and nutrients to support aquatic food webs via increased flux of resources trophic levels (fish water birds) • Reinstate components of natural variability in hydraulic conditions • Reinstate variability in water level to improve nutritional value of biofilms as an aquatic food resource • Improve in-stream habitat availability and hydraulic conditions to support spawning success and larval survival of Murray cod • Enable further testing and optimisation of fishways on Pipeclay and Slaney weirs • Improve soil moisture availability in riparian zone to improve condition of established trees along permanent creeks	0

DELIVERY OF WATER FOR ENVIRONMENTAL OUTCOMES

Table 10:90% AOP (dry scenario) Environmental Watering Priorities for SA in 2017-18

90% AOP Priorities				
Asset	**Priority Action**	**Timing and Duration**	**Objectives**	**~Volume (GL)**
LLCMM	a) Deliver water in Spring-Summer	Sep-Dec 120 days	• Provide barrage outflows for fish migration, connectivity and localised estuarine conditions • Maintain lake levels >0.8 m AHD October to December • Improve fringing and submerged aquatic vegetation health • Provide for Southern Bell frog and small threatened fish recruitment	563 (for a, b, c)
	b) Deliver low level base flow	Jan-Jun 180 days	• Provide continuous fishway/barrage releases and localised estuarine conditions • Provide continuous connectivity between river and estuary • Maintain Lower Lake levels >0.4-0.5 m AHD all year	
	c) Deliver Winter pulse through barrages and Murray Mouth	Jun 14 days	• Provide freshwater signal through Goolwa Barrages to Southern Ocean • Provide for upstream migration of adult lamprey • Minimise accumulation of sediment in Murray Mouth	40 (included in 563 above)
Channel and Floodplain	Boost QSA to deliver 15 GL/day flow pulse Boost QSA to deliver 15 GL/day flow pulse	Oct-Dec 60 days Oct-Jan 90 days	• Maintain diurnally-mixed water column for diverse phytoplankton; support foraging generalists • Maintain water quality to support aquatic biota; Promote bacterial rather than algal dominance; improve food for consumers	350 555
Weir pool manipulation	Raise Weir 2 by 0.50 m	Aug-Sep ≥ 30 days	• Encourage biofilm communities • Inundate River Red Gum and Black Box	8
	Raise Weir 5 by 0.45 m	Aug-Sep ≥ 30 days	• Encourage biofilm communities • Inundate River Red Gum and Black Box	6
Chowilla	Pulse flow through Chowilla anabranch via Pipeclay and Slaney Creek weirs	Oct-Feb 140 days	• Mobilise carbon and nutrients to support aquatic food webs via increased flux of resources trophic levels (fish water birds) • Reinstate components of natural variability in hydraulic conditions • Reinstate variability in water level to improve nutritional value of biofilms as an aquatic food resource • Improve in-stream habitat availability and hydraulic conditions to support spawning success and larval survival of Murray cod • Enable further testing and optimisation of fishways on Pipeclay and Slaney weirs • Improve soil moisture availability in riparian zone to improve condition of established trees along permanent creeks	0

DELIVERY OF WATER FOR ENVIRONMENTAL OUTCOMES

Table 11:75% AOP (moderate scenario) Environmental Watering Priorities for SA in 2017-18

75% AOP Priorities				
Asset	**Priority Action**	**Timing and Duration**	**Objectives**	**~Volume (GL)**
LLCMM	a) Deliver water in Spring-Summer	Sep-Dec 120 days	• Provide barrage outflows for fish migration, connectivity and localised estuarine conditions • Maintain lake levels >0.8 m AHD October to December • Improve fringing and submerged aquatic vegetation health • Provide for Southern Bell frog and small threatened fish recruitment	826 (total a-e)
	b) Deliver low level base flow	Jan-Jun 180 days	• Provide continuous fishway/barrage releases and localised estuarine conditions • Provide continuous connectivity between river and estuary • Maintain Lower Lake levels >0.4-0.5 m AHD all year	
	c) Deliver Winter pulse through barrages and Murray Mouth	Jun 14 days	• Provide freshwater signal through Goolwa Barrages to Southern Ocean • Provide for upstream migration of adult lamprey • Minimise accumulation of sediment in Murray Mouth	40 (included in 826 above)
	d) Increase barrage releases	Oct-Jan 120 days	• Increase estuarine conditions further into North Lagoon • Provide for fish migration, connectivity • Improve benthic macroinvertebrate, migratory birds and attractant flows for migration of fish	
	e) Increase low level base flow	Jan-Jun 180 days	• Provide fish passage and localised estuarine conditions	
Channel and Floodplain	Boost QSA to deliver 15 GL/day including within event variation generating short-term increases to 20 GL/day Boost QSA to deliver 20 GL/day	mid-Oct to mid-Jan 90 days mid-Oct to mid-Jan 60 days	• Maintain diurnally-mixed water column for diverse phytoplankton; support foraging generalists • Maintain water quality to support aquatic biota; Promote bacterial rather than algal dominance; improve food for consumers	405 710
Weir pool manipulation	Lower Weirs 2, 5 and 6 by 0.10-0.15 m	Jul 30 days	• Improve bank stability and sedimentation; increase hydraulic complexity	0
	Raise Weir 2 by 0.50 m	Aug-Oct ≥ 30 days	• Inundate River Red Gum and Black Box • Encourage biofilm communities • Increase bank habitat	7
	Raise Weir 5 by 0.45 m	Aug-Oct ≥30 days	• Inundate River Red Gum and Black Box • Encourage biofilm communities • Increase bank habitat	13
	Lower Weirs 2, 5 and 6 by 0.10-0.30 m	May-Jul 2018 30 days	• Encourage biofilm communities; • Increase hydraulic complexity • Flush salt	TBC

DELIVERY OF WATER FOR ENVIRONMENTAL OUTCOMES

Table 11: 75% AOP (moderate scenario) Environmental Watering Priorities for SA in 2017-18 (continued)

75% AOP Priorities				
Asset	**Priority Action**	**Timing and Duration**	**Objectives**	**~Volume (GL)**
Chowilla	Pulse flow through Chowilla anabranch via Pipeclay and Slaney Creek weirs	Oct-Feb 140 days	• Mobilise carbon and nutrients to support aquatic food webs via increased flux of resources trophic levels (fish water birds) • Reinstate components of natural variability in hydraulic conditions • Reinstate variability in water level to improve nutritional value of biofilms as an aquatic food resource • Improve in-stream habitat availability and hydraulic conditions to support spawning success and larval survival of Murray cod • Enable further testing and optimisation of fishways on Pipeclay and Slaney weirs • Improve soil moisture availability in riparian zone to improve condition of established trees along permanent creeks	0

DELIVERY OF WATER FOR ENVIRONMENTAL OUTCOMES

Table 12:50% AOP (near average scenario) Environmental Watering Priorities for SA in 2017-18

50% AOP Priorities				
Asset	**Priority Action**	**Timing and Duration**	**Objectives**	**~Volume (GL)**
LLCMM	a) Deliver water in Spring-Summer	Sep-Dec 120 days	• Provide barrage outflows for fish migration, connectivity and localised estuarine conditions • Maintain lake levels >0.8 m AHD October to December • Improve fringing and submerged aquatic vegetation health • Provide for Southern Bell frog and small threatened fish recruitment	1 073 (total a-e)
	b) Deliver low level base flow	Jan-Jun 180 days	• Provide continuous fishway/barrage releases and localised estuarine conditions • Provide continuous connectivity between river and estuary • Maintain Lower Lake levels >0.4-0.5 m AHD all year	
	c) Deliver Winter pulse through barrages and Murray Mouth	Jun 14 days	• Provide freshwater signal through Goolwa Barrages to Southern Ocean • Provide for upstream migration of adult lamprey • Minimise accumulation of sediment in Murray Mouth	40 (included in 1 073 above)
	d) Increase barrage releases	Sep-Jan 150 days	• Increase estuarine conditions further into North Lagoon • Provide for fish migration, connectivity • Improve benthic macroinvertebrate, migratory birds and attractant flows for migration of fish • Improve salinity levels in North Lagoon • Influence water levels in South Lagoon for Ruppia Tuberosa growth and seed-set	
	e) Increase low level base flow	Jan-Jun 180 days	• Provide fish passage and localised estuarine conditions • Provide estuarine conditions below barrages	
Channel and Floodplain	Boost QSA to deliver 15 GL/day with increases to 20 GL/day	Oct to Jan 90 days	• Maintain diurnally-mixed water column for diverse phytoplankton; Maintain water quality to support aquatic biota; support foraging generalists • Adequate flushing of salt to ocean; Establish and maintain groundwater/soil moisture; Promote bacterial rather than algal dominance; improve food for consumers; Diverse flood-dependant plant community; Support golden perch and silver perch populations	210
	Boost QSA to deliver 30 GL/day with +/- 5 GL/day variability	Oct to Jan 60 days	• Contribute to temporary wetland connectivity; River Red Gum recruitment; understorey vegetation; Murray cod recruitment; catfish recruitment	295
Weir pool manipulation	Lower Weirs 2, 5 and /or 6 by 0.10-0.15 m	Aug-Nov 30 days	• Increase hydraulic complexity • Flush salt • Improve water quality	0
	Raise Weir 2 by 0.50 m	Aug-Oct ≥ 30 days	• Maintain ecological health and resilience	7
	Raise Weir 5 by 0.45 m	Aug-Oct ≥ 30 days	• Maintain ecological health and resilience	13
	Lower Weirs 2, 5 and 6 by 0.10-0.30 m	May-Jul 2018 30 days	• Encourage biofilm communities; • Increase hydraulic complexity • Flush salt	TBC

Table 12: 50% AOP (near average scenario) Environmental Watering Priorities for SA in 2017-18 continued

50% AOP Priorities				
Asset	**Priority Action**	**Timing and Duration**	**Objectives**	**~Volume (GL)**
Chowilla	Pulse flow	Jul-Dec 147 days	• Wetland vegetation including River Red Gum, Black Box, Cooba; fish; water birds; amphibians; invertebrates; fauna outcomes	0
	Operate Chowilla Regulator to generate maximum floodplain inundation. Raise Lock 6 to 19.87 m AHD Raise Chowilla Regulator to a maximum of 19.80 m AHD, an increase of 3.4 m.	Jul-Dec	• Improve soil moisture availability to within ranges conducive to active tree growth to reduce potential loss of tree condition, and support progressive improvement of long-lived vegetation • Generate an increase in the proportion of trees for which condition scores are above the Ecological Target – specifically targeting re-watering mid-level elevation Black Box to consolidate benefits from 2016 managed inundation and unregulated flow event • Instate connectivity to mid-elevation floodplain and all key wetlands • Contribute to the long-term sustainability of floodplain tree community by support ongoing growth of seedlings and saplings of River Red Gum, Black Box and Cooba that have established in response to flooding and environmental watering in recent years • Improve condition of Lignum in inundated areas • Provide breeding habitat for waterbirds, amphibians and invertebrates • Create conditions conducive to germination and growth of flood dependent and flood responsive vegetation • Mobilise carbon and nutrients to support aquatic food webs via increased flux of resources through microbial and invertebrate pathways to higher trophic levels (fish water birds) • Improve condition of floodplain habitat for dependent species including reptiles, woodland birds and mammals • Establish a flow regime with distinct variability in components of the flood pulse • Test Chowilla Regulator and ancillary structures to higher operating levels	192-342

DELIVERY OF WATER FOR ENVIRONMENTAL OUTCOMES

Table 13: 25% AOP (wet scenario) to 10% (very wet scenario) Environmental Watering Priorities for SA in 2017-18

25% to 10% AOP Priorities				
Asset	**Priority Action**	**Timing and Duration**	**Objectives**	**~Volume (GL)**
LLCMM	a) Deliver water in Spring-Summer	Sep-Dec 120 days	• Provide barrage outflows for fish migration, connectivity and localised estuarine conditions • Maintain lake levels >0.8 m AHD October to December • Improve fringing and submerged aquatic vegetation health • Provide for Southern Bell frog and small threatened fish recruitment	1 385 (total a-h)
	b) Deliver low level base flow	Jan-Jun 180 days	• Provide continuous fishway/barrage releases and localised estuarine conditions • Provide continuous connectivity between river and estuary • Maintain Lower Lake levels >0.4-0.5 m AHD all year	
	c) Deliver Winter pulse through barrages and Murray Mouth	Jun 14 days	• Provide freshwater signal through Goolwa Barrages to Southern Ocean • Provide for upstream migration of adult lamprey • Minimise accumulation of sediment in Murray Mouth	40 (included in 1 385 above)
	d) Increase barrage releases	Sep-Jan 150 days	• Increase estuarine conditions further into North Lagoon • Provide for fish migration, connectivity • Improve benthic macroinvertebrate, migratory birds and attractant flows for migration of fish • Improve salinity levels in North Lagoon • Influence water levels in South Lagoon for Ruppia Tuberosa growth and seed-set	
	e) Increase low level base flow	Jan-Jun 180 days	• Provide fish passage and localised estuarine conditions • Provide estuarine conditions below barrages	
	f) On the back of unregulated flow, maintain barrage releases at 30 GL/day	Sep- Jan 120 days	• Improve salinity levels in Coorong • Influence water levels in South Lagoon for Ruppia tuberosa • Estuarine fish growth and recruitment • Food for waterbirds • Open Murray Mouth and salt export • Minimise sand accumulation	
	g) On the back of unregulated flow, maintain barrage releases at 10 GL/day	Feb 28 days	• Influence water levels in South Lagoon for Ruppia tuberosa • Coorong outcomes	
	h) Add to back of unregulated flow	Nov-Feb Up to 120 days	• Slow recession of peak	
Channel and Floodplain	Boost QSA to deliver 40 GL/day with +/- 5 GL/day variability Boost QSA to deliver 60 GL/day with +/- 5 GL/day variability	Sep-Nov 90 days Sep-Dec 30 days	• Maintain diurnally-mixed water column for diverse phytoplankton; Maintain water quality to support aquatic biota; support foraging generalists • Adequate flushing of salt to ocean; Establish and maintain groundwater/soil moisture; Promote bacterial rather than algal dominance; improve food for consumers; Diverse flood-dependant plant community; Support golden perch and silver perch populations • Moderate positive contribution to temporary wetland connectivity; River Red Gum recruitment; understorey vegetation; Murray cod recruitment; catfish recruitment	405

DELIVERY OF WATER FOR ENVIRONMENTAL OUTCOMES

Table 13: 25% AOP (wet scenario) to 10% (very wet scenario) Environmental Watering Priorities for SA in 2017-18 continued

25% to 10% AOP Priorities				
Asset	**Priority Action**	**Timing and Duration**	**Objectives**	**~Volume (GL)**
Weir pool manipulation	Lower Weir 2, 5 and 6 by 0.10-0.30 m before and after spring raising event	Before Sep and after early Dec	• Change hydraulic complexity	5.5
	Raise Weir 2 to point of weir removal (open river conditions)	Sep-Dec ≥ 30 days	• Improve River Red Gum and Black Box condition	7
	Raise Weir 4 by 0.60 m	Aug-Nov 45 days	• Test infrastructure • Flush salt	13
	Raise Weir 5 to point of weir removal (open river conditions)	Sep-Dec ≥ 30 days	• Improve River Red Gum and Black Box condition	13
Chowilla	Pulse flow	Oct-Feb 120 days	• Wetland vegetation including River Red Gum, Black Box, Cooba; fish; water birds; amphibians; invertebrates; fauna outcomes	0
	Operate Chowilla Regulator to generate a maximum floodplain inundation. Raise Lock 6 to 19.87 m AHD Raise Chowilla Regulator to a maximum of 19.87 m AHD (increase of 3.47 m)	Jul-Dec 157 days	• Improve soil moisture availability to within ranges conducive to active tree growth to reduce potential loss of tree condition, and support progressive improvement of long-lived vegetation • Generate an increase in the proportion of trees for which condition scores are above the Ecological Target – specifically targeting re-watering mid-level elevation Black Box to consolidate benefits from 2016 managed inundation and unregulated flow event • Instate connectivity to mid-elevation floodplain and all key wetlands • Contribute to the long-term sustainability of floodplain tree community by support ongoing growth of seedlings and saplings of River Red Gum, Black Box and Cooba that have established in response to flooding and environmental watering in recent years • Improve condition of Lignum in inundated areas • Provide breeding habitat for waterbirds, amphibians and invertebrates • Create conditions conducive to germination and growth of flood dependent and flood responsive vegetation • Mobilise carbon and nutrients to support aquatic food webs via increased flux of resources through microbial and invertebrate pathways to higher trophic levels (fish water birds) • Improve condition of floodplain habitat for dependent species including reptiles, woodland birds and mammals • Establish a flow regime with distinct variability in components of the flood pulse • Test Chowilla Regulator and ancillary structures to higher operating levels	120

DELIVERY OF WATER FOR ENVIRONMENTAL OUTCOMES

Environmental Water Availability

Environmental water will be available from the following sources:

1. Commonwealth Environmental Water Holder (CEWH);
2. MDBA – The Living Murray (TLM);
3. Victorian Environmental Water Holder;
4. South Australian Government; and
5. non-government organisations.

Commonwealth Environmental Water Holder

CEWH water holdings within the Southern Connected Basin are approximately 1 903 GL (at 2 May 2017), with varying levels of security and long-term average annual yield of 1 434 GL. Of this volume, approximately 153 GL is held on South Australian licences and forms part of South Australia's Entitlement Flow. CEWH expects approximately 291 GL of (interstate) carryover to be available in 2017-18.

MDBA - The Living Murray Environmental Water

TLM water holdings are equivalent to approximately 486 GL, of which approximately 45 GL is held on South Australian licences and forms part of South Australia's Entitlement Flow. TLM expects approximately 127 GL of (interstate) carryover to be available in 2017-18. Increased flows from the Snowy Agreement may also be available if there is agreement to call on some of this water.

Victorian Environmental Water Holder

The Victorian Environmental Water Holder manages environmental water available in the Murray, Goulburn and Campaspe Rivers. The Victorian Environmental Water Holder may trade environmental water to South Australia, generally as a result of return flows from upstream environmental watering actions.

South Australian Environmental Water

The South Australian Minister for Water and the River Murray holds approximately 43.8 GL of water access entitlements in South Australia. This water is committed to environmental purposes and forms part of South Australia's Entitlement Flow. This water is held on Class 9 and 3a licences.

Of the 43.8 GL, approximately 33.4 GL is on Class 9 (Wetlands) Water Access Entitlement. This water is tied to the management of specific pool-connected River Murray wetlands. It is the estimated annual evaporative loss from managed wetlands that are connected to the South Australian River Murray at normal operating pool level.

Of the 43.8 GL, approximately 10.4 GL is on Class 3a Water Access Entitlements. A total of 6.5 GL of this water is committed for environmental use through the *Implementation Plan for Augmentation of the Adelaide Desalinisation Plant.* The location of its use is flexible within the South Australian portion of the Murray-Darling Basin. Under the *Implementation Plan*, in addition to the 6.5 GL, up to 120 GL over a 10 year rolling period (of eligible years) may be provided to the environment.

Small volumes are also held by the South Australian Minister for Water and the River Murray on interstate licenses (less than 2 GL).

Decisions on the use of environmental water held by the South Australian Minister for Water and the River Murray are made within DEWNR and will be consistent with the Priorities.

DELIVERY OF WATER FOR ENVIRONMENTAL OUTCOMES

Non-Government Organisations

Nature Foundation South Australia holds a water licence with Class 3a Water Access Entitlements of 0.075 GL.

The Murray-Darling Association, through its Murray-Darling Foundation, has established a *Water Bank* that receives donations for purchasing and holding water for future environmental activities. The *Water Bank* holds a water licence with Class 3a Water Access Entitlement of 0.018 GL. The Murray-Darling Association has no plans to use this water during 2017-18.

Banrock Station holds approximately 1.38 GL of Class 9 (Wetlands) water for the management of the pool-connected areas of Banrock Station Wetland Complex during 2017-18.

Unallocated Class 9 Water

There is 200 GL of Class 9 (wetlands) water with approximately 43.9 GL held on licence. The remaining approximately 156.1 GL is used to replace evaporation losses from unmanaged, pool-connected wetlands. This water is not actively managed and not available for other uses.

Unregulated Flow

Unregulated flow generally occurs in response to high rainfall events upstream of South Australia. Unregulated flow cannot be allocated to consumptive purposes. Therefore, when an unregulated flow event occurs, the additional water provides environmental benefits and is protected from other users. The MDBA's Southern Connected Basin Environmental Watering Committee has delegated authority from BOC to coordinate the use of unregulated flow for environmental purposes in the River Murray.

South Australia has historically used unregulated flow for a range of environmental watering actions, including:

- raising weir pool water levels above the normal operating range to improve in-and-out of channel biological and ecological processes;
- providing benefits to the Lower Lakes, Coorong and Murray Mouth;
- pumping water to non-pool level connected wetlands; and
- retaining water in large gravity fed sites.

Unregulated flow can only be planned for in a general way, as there is no certainty as to when and if it will occur. If it occurs, it will achieve environmental outcomes in South Australia.

DELIVERY OF WATER FOR ENVIRONMENTAL OUTCOMES

Cooperative Watering Arrangements

Between Water Resource Planning Areas (across the Basin)

This will be the seventh year holders and managers of environmental water have worked together to plan and coordinate annual Multi-site Environmental Watering Trials (Trials). The Trials aim to maximise the use of environmental water by re-using return flows as the water moves through the Southern Connected Basin. In 2013, BOC agreed that the long-term objective of the Trials is to work towards incorporating environmental delivery into normal River Murray operations. This is occurring by identifying and analysing issues and potential changes to current operational practices. To date, the Trials have tested a range of actions including:

- new accounting methods;
- addition of environmental water to unregulated flows;
- application of loss factors; and
- coordination of environmental releases with natural flow peaks.

Each Trial builds on lessons learned from the previous year and enhances the understanding of the key elements for success. In 2017-18, these actions will continue to be documented and codified within the existing framework for managing Basin river flows.

Cross-jurisdictional committees (SCBEWC and WLWG) contribute to the development of a strategy for the Trials each year. Real-time operations groups hold regular teleconferences to ensure:

- coordination and communication during the Trials; and
- a rapid response to any issues that may arise, such as black water events.

South Australia is represented in the cross-jurisdictional committees and is participating in planning for the Trials during 2017-18.

Within SA River Murray Water Resource Planning Area

DEWNR has developed a 2017-18 South Australian multi-site environmental watering plan for the use of environmental water. The South Australian multi-site environmental watering plan seeks to align site-specific watering actions to maximise effective environmental water delivery and ecological outcomes throughout the system. The return water from actions will remain in the river and be delivered to the LLCMM for additional ecological benefits.

APPENDIX 3

Supporting statement from Ngarrindjeri Regional Authority on Lower Lakes, Coorong and Murray Mouth 2017-18 Environmental Water Proposal

Ngarrindjeri Regional Authority – Guiding Principles for Healthy Flows ('Environmental Watering')
The *Ngarrindjeri Nation Yarluwar-Ruwe Plan* (2006) sets out the Ngarrindjeri Vision for a Healthy Yarluwar-Ruwe (Sea Country, People and Culture). The Ngarrindjeri Vision for Country explains the Ngarrindjeri concept of Ruwe/Ruwar (people, lands, waters, spirit and all living things are connected): 'The land and waters is a living body. We the Ngarrindjeri people are part of its existence' (Ngarrindjeri nation 2006:13). For healthy lands and waters Ngarrindjeri must be able to exercise their rights and responsibilities as handed down by Elders and Creation ancestors through speaking as and caring for their lands and waters (Yannarumi). If Ngarrindjeri responsibility is not exercised then Ngarrindjeri wellbeing is severely impacted. This responsibility and supporting Ngarrindjeri philosophy has been recognised by the South Australian Government in the *Ngarrindjeri Speaking as Country Deed* (2014).

Ngarrindjeri input into the state's annual environmental watering priorities is still at an early stage. It is hoped that into the future Ngarrindjeri will have increased capacity and opportunity to Speak as Country and to contribute in an equitable way to the health of Ngarrindjeri Yarluwar-Ruwe through processes such as the SA Government's annual water planning activities. Ngarrindjeri water planning is currently being refined and further developed as a result of the recent Ngarrindjeri Regional Authority/Commonwealth Environmental Water Holder water delivery agreement requirements.

Ngarrindjeri are part of the water. It is life, gives life and is living. The cultural and spiritual relevance for Ngarrindjeri of water as a source of life and as part of the living body is that it flows, within, around and, through Ngarrindjeri country. The exercise of Ngarrindjeri cultural rights and the fulfilment of Ngarrindjeri responsibilities include being interconnected with and being part of the living water. The flow of water forms part of the interconnectedness of Ngarrindjeri to our country and the failure of water to flow into our country impacts upon our exercise of rights and our fulfilment of responsibilities as custodians of the land, water and sky.

Ngarrindjeri consider that Ngarrindjeri have first right, a right attached to the exercise of our cultural rights, interests and responsibilities, that precede all other rights including but not limited to the legislative function of the M-DBA to allocate water for particular uses. The rights and interests of the Ngarrindjeri require that water flows into, through and from, our country from up river. This is a right *a priori* to all others.

Some Ngarrindjeri Principles for a Healthy Yarluwar-Ruwe

- The lands and water are a living body and Ngarrindjeri are part of this living body
- The waters of the seas, the waters of the Kurangk (Coorong) and the waters of the rivers and lakes are all spiritual waters
- Ngarrindjeri use the term Ruwe/Ruwar to describe the interconnectivity between lands, waters, spirit and all living things.
- Maintaining the health of Yarluwar Ruwe and the connectivity between <u>all</u> parts of the living body is a cultural responsibility and fundamental to Ngarrindjeri health and wellbeing.
- Ngarrindjeri Ruwe/Ruwar requires connectivity, flow and mixing to occur between all living things and the lands and waters, and the spirit world. This includes connectivity between the Lakes and Kurangk.

APPENDICES

- Freshwater flows down the Murray Darling system into the lands and waters of the Ngarrindjeri are seen by the Ngarrindjeri as the life blood of the living body of the Murrundi (River Murray). These waters bring life to the Coorong, Lakes and Murray mouth and therefore bring life to Ngarrindjeri.
- Flows coming together mix and produce life – fish breed in the lakes and Coorong and birds breed in the places where life is being produced. This includes migratory birds which are highly significant to Ngarrindjeri.
- Ngarrindjeri have special responsibilities for their ngartji (animals or plants – special friends or totems) To care for ngartji is to Care for Country and to Speak as Country.
- Ngarrindjeri have a long established history of fishing and gathering aquatic plants, shellfish and other things in what are now called South Australian waters. For Ngarrindjeri aquatic foods also have medicinal, ceremonial, spiritual and other cultural significances (including nursery habitats for many fish, birds and other animals).
- The Murray mouth is an important cultural and spiritual place for the Ngarrindjeri and fundamental for Ngarrindjeri wellbeing. The Murray mouth area is part of the Meeting of the Waters (registered site under the Aboriginal Heritage Act (SA) 1988), a place where the mixing of fresh and salt water is the Ngarrindjeri place of Creation, a place of birthing for Ngarrindjeri ngartjis. This area requires adequate fresh water flows from up river to flush out the Murray Mouth and ensure that the Ngarrindjeri are able to continue to exercise their cultural rights in this area.
- Ngarrindjeri assert an *a priori* right to water and the flows of water in, onto, and through Ngarrindjeri Yarluwar-Ruwe.

Annual Environmental Watering Proposal – Ngarrindjeri Position

Flow conditions should, as closely as possible, resemble those experienced by Ngarrindjeri Ancestors (eg before non-Indigenous occupation). Ngarrindjeri support maximum flow for the health of Murrundi (River), the Kurangk (Coorong), Lakes and Murray mouth. In specific regard to the 2016-17 environmental watering proposal:

- Ngarrindjeri support the broad actions and objectives under each of the scenarios (A-F) provided and;
- Ngarrindjeri prefer the timing of environmental water delivery for Actions A, C, D to occur in the October-December period.

It also must be reinforced that as a Human Right supported by international treaties, such as the United Nations Declaration of the Rights of Indigenous People and the Ramsar Convention, Ngarrindjeri require adequate resourcing from the South Australian Government to support Ngarrindjeri responsibilities to Speak as Country – including contributing to all aspects of annual environmental water planning impacting on the health of Ngarrindjeri Yarluwar-Ruwe.

References:

Ngarrindjeri Nation 2006 Ngarrindjeri Nation Yarluwar-Ruwe Plan: Caring for Ngarrindjeri sea country and culture, prepared by the Ngarrindjeri Tendi, Ngarrindjeri Heritage Committee and Ngarrindjeri Native Title Management Committee, Ngarrindjeri Land and Progress Association, Camp Coorong, Meningie, SA.

SACA (Speaking as Country Agreement) Murray Mouth 2014. Ngarrindjeri Regional Authority Incorporated for and behalf of the Ngarrindjeri people and The Minster for Sustainability, Environment and Conservation 27 December 2014.