

2017-18 Annual Environmental Watering Priorities for the South Australian River Murray Water Resource Plan Area

The information contained in this document is prepared for the purpose of complying with South Australia's obligations in respect of annual environmental watering priorities for the South Australian River Murray Water Resource Plan Area, as set out in Chapter 8 of the Murray-Darling Basin Authority Basin Plan (Environmental Watering Plan).

1. Introduction

This document has been prepared to fulfil obligations related to the preparation of annual environmental watering priorities (the priorities) as specified in the Basin Plan Chapter 8 Division 4. Chapter 8 (Environmental Watering Plan) of the Basin Plan requires Basin States to identify the priorities for the following year and submit these to the Murray-Darling Basin Authority (MDBA) by 31 May.

The principles and method described in Chapter 8 Part 6 of the Basin Plan have been applied in developing the priorities. These priorities will be incorporated as a chapter of the 2017-18 Annual Operating Plan for the South Australian River Murray. This chapter will provide further technical information that underpins the priorities, including a multi-site proposal for South Australia. The plan will be published later in 2017.

2. Identification of priorities

Approach

The priorities for the Water Resource Planning (WRP) Area for 2017-18 have been developed in accordance with the Basin Plan requirements. The priorities for 2017-18 are consistent with the long term environmental watering plan (LTEWP) for this WRP area¹, which was completed and published in November 2015 (Department of Environment Water and Natural Resources, 2015). The LTWP includes a list of Priority Environmental Assets and their ecological objectives, targets and environmental water requirements (EWRs), and demonstrates alignment between these and the expected environmental outcomes of the Basin Wide Environmental Watering Strategy (BWEWS) (Murray-Darling Basin Authority, 2014a).

A scenario-based approach was used to develop proposed priority watering actions for 2017-18. Six resource availability scenarios were utilised as advised by the MDBA and based on the MDBA annual operating probabilities (AOP) provided in February 2017 (**Figure 1**): 95% (worst case/very dry), 90% (dry), 75% (moderate), 50% (near average), 25% (wet) and 10% (very wet). These percentages refer

¹ The Coorong is considered by the Basin Plan to be part of the SA Murray Region WRP area, however it is addressed in the priorities for the SA River Murray WRP Area (i.e. this document) as the ecological outcomes of in the Coorong are primarily driven by surface water inputs from the River Murray. This is consistent with the approach taken for the LTWP.

to the likelihood of exceeding different water resource availability based on the analysis of historical inflows, current storage volumes, and operational considerations for the upcoming year. A volume of held environmental water (HEW) potentially available for delivery to South Australia in 2017-18 under each of the resource availability scenarios was assumed for planning purposes (refer 'Assumptions').

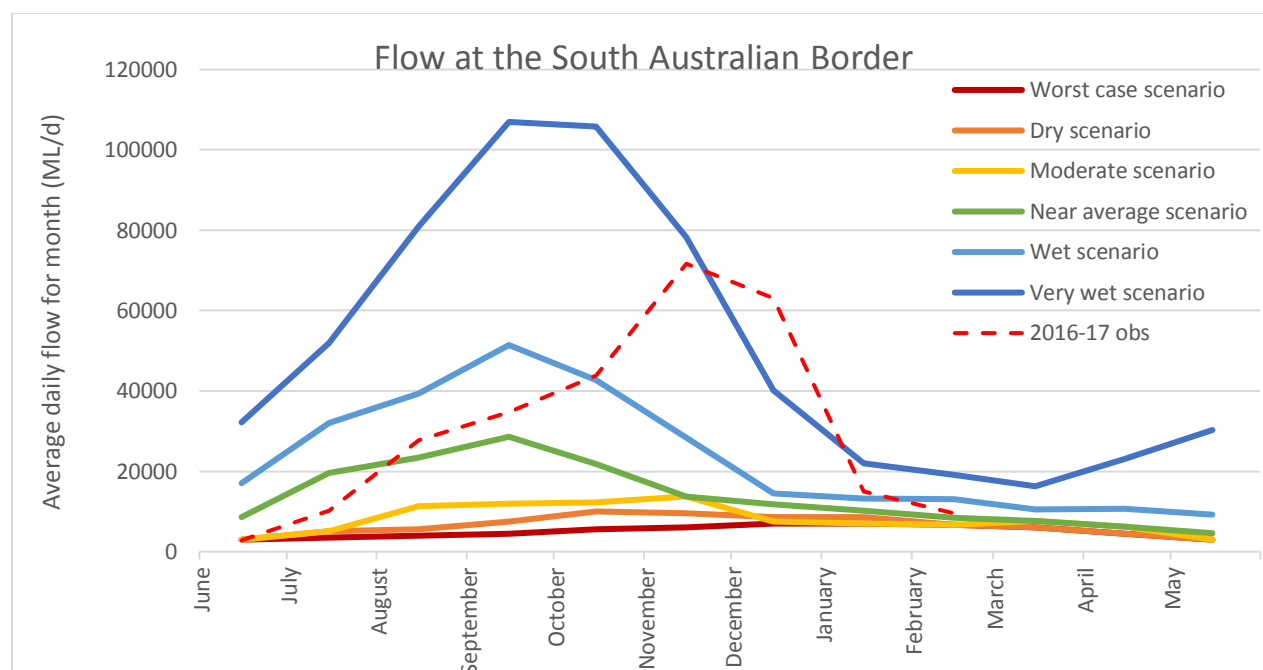


Figure 1. Annual operating probabilities provided by MDBA in February 2017 for the purpose of informing environmental water planning for 2017-18

The resource availability scenarios and assumed Held Environmental Water (HEW) availability were used by to develop environmental watering proposals for each site/asset. The preparation of the proposed priorities for the SA River Murray has involved detailed planning and consultation. The priorities are consistent with the SA River Murray Long Term Environmental Watering Plan (LTEWP) and have been developed with input from water and land managers, river operators, scientists, community, and indigenous groups.

Annual Priorities

Priority watering actions have been identified for the three Priority Environmental Assets defined in the South Australian River Murray LTEWP. These assets are the River Murray floodplain, River Murray channel, and the Lower Lakes, Coorong and Murray Mouth (LLCMM). In addition, priority actions have been identified for a range of infrastructure operations (i.e. Chowilla, weir pool manipulation and wetland management) that significantly contribute to outcomes within the Priority Environmental Assets. A detailed summary of the watering actions proposed under each resource availability scenario is provided in Appendix 1.

Increased water delivery in spring and early summer to enhance flows or extend flow durations is a priority for assets under all scenarios. Sustained low level delivery throughout the remainder of the year is also a priority for maintaining flows into the Coorong and through the Murray Mouth. Where

possible, it is proposed to enhance flows to consolidate the improvements in floodplain and wetlands that resulted from the high flows of 2016, and to sustain high flows into early summer to support outcomes in the LLCMM. Operation and testing of infrastructure such as the Chowilla Regulator and weirs will also consolidate the benefits of the 2016 River Murray high flow event and will be flexible and responsive to the prevailing river conditions. These actions are scalable 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 priority temporary sites. Wetland watering actions will be undertaken by DEWNR in conjunction with several non-government organisations (NGOs) including Nature Foundation of South Australia (NFA), Renmark Irrigation Trust (RIT), Ngarrindjeri Regional Authority (NRA), Banrock Station and Australian Landscape Trust (ALT).

Assumptions

Held Environmental Water Availability

The work required to inform the development of the priorities was undertaken between February and April 2017. For the purposes of planning and prioritisation, an estimate of potential HEW availability under each resource scenario was made based on environmental water delivery in recent years and advice from water holders (**Table 1**). Potential HEW availability is taken into account during planning so that the proposed actions and associated outcomes are scaled accordingly.

Table 1. Estimate of held environmental water available under each resource availability scenario

Scenario	Estimate of HEW available (GL)
Very dry (95%)	600-700 GL
Dry scenario (90%)	650-950 GL
Moderate (75%)	680-1420 GL
Near average (50%)	790-1540 GL
Wet (25%)	970-1580 GL
Very wet (10%)	1130-1520 GL

HEW is available from the following sources – the CEWH, MDBA -The Living Murray (TLM), the Victorian Environmental Water Holder (VEWH), the South Australian Minister for Water and the River Murray and non-government organisations. For each water holder, information relating to volumes of registered entitlements and Long-Term Average Annual Yield (LTAAY) is presented below.

Commonwealth Environmental Water

Total Commonwealth environmental water holdings within the Southern Connected Basin are approximately 1,903 GL (at 2 May 2017) with varying levels of security and a LTAAY of 1,434 GL (at 2 May 2017). Of this volume, approximately 152.5 GL registered entitlement (137.2 GL LTAAY) is held in South Australia and forms part of South Australia's entitlement. Some carry-over (290.7 GL) from 2016-17 will be available.

The Living Murray Environmental Water

TLM holdings are approximately 480 GL Long-Term Cap Equivalent (LTCE), of which approximately 45 GL is held in South Australia and forms part of South Australia's Entitlement Flow. TLM expects to carry-over approximately 127 GL into 2017-18. Up to 400 GL of River Murray Increased Flows from the Snowy Agreement may also be available.

Victorian Environmental Water Holder

The Victorian Environmental Water Holder (VEWH) manages environmental water holdings in the Murray, Goulburn and Campaspe rivers. Under some circumstances, the VEWH may trade HEW to South Australia, generally as a result of return flows from upstream environmental watering actions.

South Australian Minister for Water and the River Murray

Apart from TLM holdings, the South Australian Minister for Water and the River Murray holds approximately 44 GL of water access entitlements in South Australia that are committed to environmental purposes and form part of South Australia's Entitlement Flow.

Of this total volume, approximately 33.4 GL belongs to Class 9 (Wetlands) water access entitlement class described in the Water Allocation Plan for the River Murray Prescribed Watercourse (WAP) (SA Murray-Darling Basin Natural Resources Management Board, 2002). This water is for the management of pool-connected wetlands within the WRP Area so there is limited flexibility in the location of use.

Approximately 6.5 GL has been committed for environmental use through the *Implementation Plan for Augmentation of the Adelaide Desalinisation Plant* and the location of its use is flexible (within the South Australian portion of the Murray-Darling Basin). Additional amounts (up to 120 GL over a 10 year rolling period of eligible years) may also be purchased throughout the year.

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

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

Non-Government Organisations

NFSA holds 0.074 GL of Class 3A Water Access Entitlement on licence that is irrigation water purchased for environmental use.

The Murray Darling Association holds 0.018 GL of Class 3A Water Access Entitlement but has no plans for environmental watering in 2017-18.

For 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.

Planned Environmental Water Availability

Unallocated class 9 water

The River Murray Water Allocation Plan establishes 200 GL of Class 9 (Wetlands) water with approximately 40 GL held on a licence (see above). The remaining 160 GL of Class 9 water can be considered planned environmental water. This volume essentially evaporative loss and is 'used' as it

replaces the evaporative losses from unmanaged, pool-connected wetlands during normal river operations. This water cannot be actively managed and is not available for other uses.

Unregulated flows

Under the WAP, no provisions exist for the allocation and use of unregulated flows for non-environmental consumptive purposes in South Australia. Therefore, when an unregulated flow event occurs, it is protected from being taken for consumptive uses within South Australia. Unregulated flows generally occur in response to high rainfall events upstream from South Australia. The MDBA Southern Connected Basin Environmental Water Committee (SCBEWC) has delegated authority from the Basin Officials Committee (BOC) to authorise use of River Murray Unregulated Flow (RMUF) for environmental purposes in the River Murray.

Under the different scenarios presented in **Figure 1**, unregulated flow provides the increase in volume of water above South Australia's Entitlement Flow. Unregulated flows can only be planned for in a general way and therefore are not considered planned environmental water, although they are critical for the health of South Australia's environmental assets.

3. Co-operative Watering Arrangements

Between WRP areas

For several years, holders and managers of environmental water have worked together to plan and coordinate annual multi-site environmental watering trials (Trials). The Trials attempt 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.

The Trials have tested a range of actions including new accounting methods, addition of environmental water to unregulated flows, use of loss factors and coordination of environmental releases with natural flow peaks. Each Trial builds on lessons learned from the previous year and enhances understanding of the key elements for successful outcomes. In 2017-18, these actions will be further documented for codification into the existing Framework for managing Basin river flows.

The SCBEWC and Water Liaison Working Group (WLWG) contribute to the development of the multi-site event strategy each year. Real-time Operational Advisory Groups hold regular teleconferences to ensure coordination and communication during the event and rapid response to any issues that may arise, such as black water events. Membership of these groups includes holders of held environmental water as well as managers of planned environmental water, managers of environmental assets and River operators. South Australia has representatives on these cross-jurisdictional committees and is participating in the planning for the large scale environmental watering event for 2017-18.

Within the River Murray Water Resource Planning (WRP) area

Existing mechanisms to assist with coordinating environmental watering within the WRP area are described in Section 4.2.1 of the LTEWP (Department of Environment Water and Natural Resources, 2015).

For 2017-18, DEWNR will develop a multi-site plan for the use of environmental water within the WRP Area. The South Australian multi-site watering action will seek to align site-specific watering actions that have been identified in this document and maximise the effectiveness of environmental water delivery and ecological outcomes throughout the system. This multi-site is supported by South Australian policy which prevents return flows from environmental watering actions, such as the operation and testing of the Chowilla regulator and weir raisings, from being re-allocated for consumptive take, and so this water will flow down the river and be delivered to the CLLMM for ecological benefit.

The SA multi-site watering action will be provided to the MDBA, water holders and relevant environmental managers when complete (estimated 30 June 2017), and included in the SA River Murray annual operating plan (to be published later in 2017).

References

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Department of the Environment. (2016). *Water holdings*. Retrieved from Commonwealth Environmental Water Office: <http://www.environment.gov.au/water/cewo/portfolio-mgt/holdings-catchment>

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Murray-Darling Basin Authority. (2014b). *2014–15 The Living Murray Annual Environmental Watering Plan*. Canberra: Commonwealth of Australia.

O'Connor, J., Steggles, T., Higham, J., & Rumbelow, A. (2015). *Ecological objectives, targets, and environmental water requirements for the Coorong, Lower Lakes and Murray Mouth*. Adelaide: Department of Environment Water and Natural Resources.

SA Murray-Darling Basin Natural Resources Management Board. (2002). *Water Allocation Plan for the River Murray Prescribed Watercourse (as amended January 2011)*. Murray Bridge: SA Murray-Darling Basin Natural Resources Management Board.

Appendix 1. Summary of environmental watering actions proposed for 2017-18 by environmental asset/site managers

Very dry (95% AOP) Scenario

Site	Action	Details	Objectives	Volume (GL)
LLCMM	(a) Spring-Summer delivery	4 months – Sept - Dec	<ul style="list-style-type: none"> Provide barrage outflows for fish migration, connectivity & localised estuarine conditions Maintain lake levels >0.8 m AHD October to December Improve fringing & submerged aquatic vegetation health Provide for Southern Bell frog & small threatened fish recruitment 	563 for a,b,c
	(b) Low level base flow	6 months - Jan - June	<ul style="list-style-type: none"> Provide continuous fishway/barrage releases & localised estuarine conditions Provide continuous connectivity between river & estuary Maintain lake levels >0.4-0.5m AHD all year 	
	(c) Winter pulse through barrages/Murray Mouth	2 weeks - June	<ul style="list-style-type: none"> Provide freshwater signal through Goolwa barrages to ocean Provide for upstream migration of adult lamprey Minimise accumulation of sediment in Murray Mouth 	40
Channel and Floodplain	10,000 ML/day with +/- 2,000 ML/day variability	60 days – Sept - Mar	<ul style="list-style-type: none"> 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
	Partial delivery 15,000 ML/day	60 days – Sept - Mar	<ul style="list-style-type: none"> As for above action Create variation in hydraulic diversity and increase habitat complexity 	525
Weir Pool Manipulation	No action proposed	-	-	-
Chowilla	Pulse flows through Chowilla anabranch via Pipeclay & Slaney Creek weirs	20 weeks – Oct - Feb	<ul style="list-style-type: none"> 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 	N/A

Dry (90% AOP) Scenario

Site	Action	Details	Objectives	Volume (GL)
LLCMM	(a) Spring-Summer delivery	4 months – Sept - Dec	<ul style="list-style-type: none"> ○ Provide barrage outflows for fish migration, connectivity & localised estuarine conditions ○ Maintain lake levels >0.8 m AHD October to December ○ Improve fringing & submerged aquatic vegetation health ○ Provide for Southern Bell frog & small threatened fish recruitment 	563 for a,b,c
	(b) Low level base flow	6 months – Jan - June	<ul style="list-style-type: none"> ○ Provide continuous fishway/barrage releases & localised estuarine conditions ○ Provide continuous connectivity between river & estuary ○ Maintain lake levels >0.4-0.5m AHD all year 	
	(c) Winter pulse through barrages/Murray Mouth	2 weeks - June	<ul style="list-style-type: none"> ○ Provide freshwater signal through Goolwa barrages to ocean ○ Provide for upstream migration of adult lamprey ○ Minimise accumulation of sediment in Murray Mouth 	40
Channel and Floodplain	Partial delivery 15,000 flow pulse	60 days – Oct - Dec	<ul style="list-style-type: none"> ○ 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
	15,000 flow pulse	90 days – Oct - Jan		555
Weir Pool Manipulation	Weir 2 pool raised 50 cm	30 days – from Aug/Sept	<ul style="list-style-type: none"> ○ Encourage biofilm communities ○ Inundate River Red Gum and Black Box 	8
	Weir 5 pool raised 45 cm	30 days – from Aug/ Sept	<ul style="list-style-type: none"> ○ Encourage biofilm communities ○ Inundate River Red Gum and Black Box 	6
Chowilla	Pulse flows through Chowilla anabranch via Pipeclay & Slaney Creek weirs	20 weeks – Oct - Feb	<ul style="list-style-type: none"> ○ As for very dry scenario above 	N/A

Moderate (75% AOP) Scenario

Site	Action	Details	Objectives	Volume (GL)
LLCMM	a,b,c, as above			Total a-e 826
	(d) Increased barrage outflows	Oct - Dec/Jan	<ul style="list-style-type: none"> ○ 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 in low level base flows	Jan - June	<ul style="list-style-type: none"> ○ Provide fish passage and localised estuarine conditions 	
Channel and Floodplain	15,000 ML/day incl. within event variation generating short-term increases to 20,000 ML/day	90 days - Mid Oct- Mid Jan	<ul style="list-style-type: none"> ○ 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
	Partial delivery 20,000 ML/day	60 days – Mid Oct - Mid Jan		710
Weir Pool Manipulation	Lower 1 or more weir pools 2, 5 and 6 by 10-15 cm	30 days – June - Jul	<ul style="list-style-type: none"> ○ Improve bank stability and sedimentation; increase hydraulic complexity 	
	Weir 2 pool raised 50 cm	30 days – Aug - Oct	<ul style="list-style-type: none"> ○ Inundate River Red Gum and Black Box ○ Encourage biofilm communities ○ Increase bank habitat 	7
	Weir 5 pool raised 45 cm	30 days – Aug - Oct	<ul style="list-style-type: none"> ○ Inundate River Red Gum and Black Box ○ Encourage biofilm communities ○ Increase bank habitat 	13
Chowilla	Pulse flows through Chowilla anabranch via Pipeclay & Slaney Creek weirs	20 weeks – Oct - Feb	<ul style="list-style-type: none"> ○ As for very dry and dry scenarios 	N/A
	Operate Chowilla regulator to generate a mid-floodplain inundation and Lock 6 is raised	20 weeks - Oct - Feb	<ul style="list-style-type: none"> ○ Maintain soil moisture availability within ranges conducive to active tree growth to support ongoing progressive improvements in condition of long-lived vegetation ○ Generate an increase in proportion of trees for which condition scores are above the Ecological Target ○ Instate lateral connectivity between permanent creeks and (i) the mid-elevation floodplain and (ii) all key wetlands ○ Contribute to ensuring the long-term sustainability of floodplain tree community by supporting ongoing growth of seedlings and saplings of 	156

			<p>River Red Gum, Black Box and Cooba that have established in response to flooding and environmental watering recent years</p> <ul style="list-style-type: none"> ○ Improve condition of Lignum in inundated areas ○ Provide breeding and feeding 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) 	
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Near Average (50% AOP) Scenario

Site	Action	Details	Objectives	Volume (GL)
LLCMM	a-e as above		<ul style="list-style-type: none"> ○ As above 	Total a-g 1073
	(f) Increase barrage outflows	4 months – Sept - Dec plus Jan	<ul style="list-style-type: none"> ○ Improve salinity levels in North Lagoon ○ Influence water levels in South Lagoon for Ruppia Tuberosa growth and seed-set 	
	(g) Increase in low level base flows	6 months – Jan - June	<ul style="list-style-type: none"> ○ Provide fish passage ○ Provide estuarine conditions below barrages 	
Channel and Floodplain	15,000 flow pulse with increases to 20,000 ML/day	90 days - Oct - Jan	<ul style="list-style-type: none"> ○ 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
	30,000 ML/day with +/- 5,000 ML/day variability	60 days – Oct - Jan	<ul style="list-style-type: none"> ○ Contribute to temporary wetland connectivity; River Red Gum recruitment; understorey vegetation; Murray cod recruitment; catfish recruitment 	295
Weir Pool Manipulation	Lower 1 or more weir pools 2,3,5 and 6 from 10-15 cm	30days – Aug - Nov	<ul style="list-style-type: none"> ○ Increase hydraulic complexity ○ Flush salt ○ Improve water quality 	
	Weir 5 pool raised 45 cm	30 days – Aug - Oct	<ul style="list-style-type: none"> ○ Maintain ecological health and resilience 	13
	Weir 2 pool raised 50 cm	30 days – Aug - Oct	<ul style="list-style-type: none"> ○ Maintain ecological health and resilience 	7
Chowilla	Pulse flows	147 days - July - Dec	<ul style="list-style-type: none"> ○ Wetland vegetation including River Red Gum, Black Box, Cooba; fish; water birds; amphibians; invertebrates; fauna outcomes 	
	Operate Chowilla Regulator to generate a maximum floodplain inundation Lock 6 is raised to 19.87 mAHd;	Jul - Dec	<ul style="list-style-type: none"> ○ Improve soil moisture availability to within ranges conducive to active tree growth to reduce potential for loss of tree condition, and support progressive improvement of long-lived vegetation 	192-342

	Chowilla Regulator is raised up to a maximum of 19.8 mAHD (3.4 m rise)		<ul style="list-style-type: none"> ○ 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 ensuring 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 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 regulator and ancillary structures to higher operating levels 	
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Wet (25% AOP) Scenario – Very Wet Scenario (10% AOP)

Site	Action	Details	Objectives	Volume (GL)
LLCMM	a-g as above		○	a-i total of 1385
	(h) On the back of unregulated flow, maintain barrage outflows at 30,000 ML/d plus releases of 10,000 ML/d	4 months - Sept –Feb	<ul style="list-style-type: none"> ○ Improve salinity levels in Coorong ○ Influence water levels in South Lagoon for <i>Ruppia tuberosa</i> ○ Estuarine fish growth and recruitment ○ Food for waterbirds ○ Open Murray Mouth and salt export ○ Minimise sand accumulation 	
	(i) Winter pulse through barrages/Murray Mouth	1-2 weeks - Winter	○ Lamprey migration upstream	
	(j) Add to back of unregulated flow	Up to 4 months - Nov-Feb	○ Slow recession of peak	
Channel and Floodplain	40,000 ML/day with +/- 5,000 ML/day variability	90 days - Sept-Nov	<ul style="list-style-type: none"> ○ Per drier scenarios plus moderate positive contribution to temporary wetland connectivity; River Red Gum recruitment; understorey vegetation; Murray cod recruitment; catfish recruitment 	405
	60,000 ML/day with +/- 5,000 ML/day variability	30 days – Sept - Dec		
Weir Pool Manipulation	Weir pool 4 raised 60 cm	45 days - Aug - Nov	<ul style="list-style-type: none"> ○ Test infrastructure ○ Flush salt 	13
	Weir pool 2 raised to point of weir removal	30 days - Sept – Dec	○ Improve River Red Gum and Black Box condition	7
	Weir pool 5 raised to point of weir removal	30 days – Sept - Dec	○ Improve River Red Gum and Black Box condition	13
	Weir pool 5 lowered 10-20 cm prior to and post spring raising	Before Sept and after early Dec	○ Change hydraulic complexity	5.5
Chowilla	Pulse flows Operate Chowilla regulator around natural high flows to generate a max-floodplain inundation. Lock 6 is raised up to 19.87 m AHD; CR is raised up to a maximum of 19.87 m AHD (3.47 m rise) <i>either before or following a flow peak (or both)</i>	4 months - Oct - Feb 157 days - July - Dec	<ul style="list-style-type: none"> ○ As for Very dry scenario ○ As for Near average scenario 	120



Appendix 2. Temporary wetlands requiring environmental water

Wetland Name	Watering Objectives	Approximate volumes (ML)
Tolderol	<ul style="list-style-type: none"> • Provide water levels and suitable habitat for Migratory Birds • Provide suitable breeding habitat for frogs; in particular Southern Bell Frogs 	400-800
Gerard basin and floodplain	<ul style="list-style-type: none"> • Support a range of floodplain vegetation communities including River Red Gum, Black Box, Cooba and Lignum • Provide frog breeding opportunities, particularly for the Southern Bell Frog 	1
Bookmark Creek	<ul style="list-style-type: none"> • Support a range of floodplain vegetation communities including fringing River Red Gum • Provide frog breeding opportunities, particularly for the Southern Bell Frog • Provide flowing habitat 	300-450
Disher Creek	<ul style="list-style-type: none"> • Support population of Murray Hardyhead • Waterbird habitat, including threatened & migratory species 	200
Berri Evaporation Basin	<ul style="list-style-type: none"> • Support population of Murray Hardyhead • Waterbird habitat, including threatened & migratory species 	900-1,330