PREREQUISITE POLICY MEASURES

NSW Annual Evaluation and Review

2019–2020 water year

August 2021

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Abbreviations

Abbreviation	Description
CEWH	Commonwealth Environmental Water Holder
CEWO	Commonwealth Environmental Water Office
DPIE – EES	Department of Planning Industry and Environment – Environment, Energy and Science
DPIE – Water	Department of Planning Industry and Environment – Water
EWAG	Environmental Water Advisory Group
HEW	Held Environmental Water
LOWER BAAKA	Lower Darling Regulated River
MAA	Murray Additional Allowance
MDBA	Murray–Darling Basin Authority
PEW	Planned Environmental Water
PPM	Prerequisite Policy Measure
RMIF	River Murray Increased Flow
SCBEWC	Southern Connected Basin Environmental Watering Committee
TLM	The Living Murray

Contents

Executive summary

This report is the first annual review of prerequisite policy measures (PPMs) implementation in NSW. It examines the PPM environmental watering actions within NSW jurisdiction during the 2019–20 water year.

Significant advancements were achieved in the ongoing implementation of PPMs in NSW during 2019–20, including:

- the establishment of the NSW PPMs Working Group, with membership from key NSW and Commonwealth agencies
- effective collaboration and cooperation between environmental water holders, river operators and the regulator to enable PPMs environmental watering actions to proceed in a year characterised by ongoing drought and limited water availability
- significant progress towards a more refined, less conservative approach to the recognition of environmental water re-use (return flows) and accounting for losses in the delivery of environmental water via PPMs.

There are also some areas that could be improved:

- records management and documentation of key decisions related to PPMs actions and accounting, to support accountability and transparency
- use of consistent terminology, event names and water data between agencies, to enhance collaboration, communication and review
- timely completion of agreed tasks
- communication with key stakeholders.

There were two PPMs environmental watering actions within NSW jurisdiction during 2019–20: the Edward–Wakool and the Millewa Forest actions. These actions are both in the NSW Murray system. Environmental water holders reported the environmental objectives for the PPMs environmental watering actions were achieved. No PPMs environmental watering actions occurred in the Murrumbidgee or the Lower Baaka/Lower Darling during 2019–20.

Summary of recommendations

[*Follow the link on the R. numbers below for more detail of review recommendations*]

R.1 Include clear advice in procedures manuals on how to evaluate whether PPMs environmental watering actions provide for the efficient and effective use of HEW.

R.2 Review the Edward–Wakool seasonal loss accounting treatment.

R.3 Agencies to adhere to the agreed roles and responsibilities as set out in the procedures manuals.

R.4 Review and streamline PPMs environmental watering actions record-keeping, data management and information exchange between agencies.

R.5 Adoption of Aboriginal dual place names for PPMs environmental watering actions, communication and reporting.

R.6 Annual Environmental Releases River Operations Report to include information about identified risks and mitigation measures.

R.7 Clarify agency consultation requirements.

R.8 Agencies to adopt consistent PPMs actions naming, numbers, volumes, etc.

R.9 Provide Assumed Use Statements where accurate measurement is not possible.

R.10 Clearly communicate in a timely manner the details of each new and ongoing PPMs environmental watering action and supporting measures.

1. Introduction

Prerequisite policy measures (PPMs) are legislative and operational rule changes introduced as part of the Basin Plan. The changes are designed to enhance the effective and efficient use of held environmental water (HEW) in the Murray–Darling Basin southern connected system.

The Murray–Darling Basin Authority (MDBA) assessed PPMs as being in effect in NSW from 1 July 2019. The PPMs assessment reports for all Basin states are available on the MDBA's website.

In NSW, PPMs are being implemented in the NSW Murray and Lower Baaka/Lower Darling and the Murrumbidgee regulated rivers. The NSW Government has adopted an adaptive management approach, to support continuous improvement in PPM implementation and environmental water delivery in these river systems. More detailed information on the background and implementation of PPMs in NSW is available at the Environmental Water Hub on the department's website.

This report presents the findings and recommendations from the annual evaluation and review ('the annual review') of the implementation of PPMs in NSW during the 2019–20 water year, from 1 July 2019 to 30 June 2020. The annual review is a key component of the NSW Government's commitment to the ongoing implementation of PPMs.

The review was conducted by DPIE – Water, with input from DPIE – Environment, Energy and Science (DPIE – EES), WaterNSW, the Commonwealth Environmental Water Office (CEWO) and the MDBA.

The purpose of the annual review is to:

- support continuous improvement of PPMs processes to improve environmental water management
- provide transparency about the use of PPMs in 2019–20.

Please note, the annual review is not designed to make an assessment of any environmental benefit or otherwise, resulting from the PPMs watering actions, nor a description of those benefits. This is a matter for separate consideration by the environmental water holders and their respective agencies with the relevant expertise in this field.

This annual review report focuses on PPMs environmental watering actions under NSW jurisdiction. Although there were some multi-jurisdictional PPM environmental watering actions during 2019–20, assessment of these is beyond the scope of this review.

This annual review report will be submitted to the MDBA as part of NSW's requirement under the Draft Basin-wide Environmental Water Protection Strategy and Implementation Plan.

2. Requirements for the annual review

The matters for consideration in the annual review are set out in Section 5.2 of the *Prerequisite Policy Measures: Procedures Manual for the NSW Murray and Lower Darling Regulated Rivers*[1] and the *Prerequisite Policy Measures: Procedures Manual for the Murrumbidgee Regulated River*[2] ('the procedures manuals'). This review was conducted in accordance with these requirements, including consideration of reports provided by the river operator and environmental water manager.

[1] https://www.industry.nsw.gov.au/__data/assets/pdf_file/0007/234367/ppms-procedures-manual-nsw-murray-lower-darling.pdf
[2] https://www.industry.nsw.gov.au/__data/assets/pdf_file/0008/234368/ppms-procedures-manual-murrumbidgee.pdf

Table 1 outlines those matters (from the procedures manuals) that the annual review is required to consider and the relevant section of this report that addresses those requirements.

Table 1. Matters for consideration in the annual review and section of this report where these are addressed

Matters for consideration	Section of this report
Whether the current PPM actions and the associated supporting measures provide for the effective and efficient use of held environmental water	Section 4.1
Whether there are sufficient mitigation measures in place and whether they have been effective	Section 4.2
Any issues relating to PPMs raised through consultation with stakeholders in the valley	Section 4.3
Whether general operational procedures were followed for the delivery of HEW via PPMs.	Section 4.4
Whether the actions and associated supporting measures should be expanded, modified, or remain unchanged	Section 4.5
Any proposals for variations or new actions and/or supporting measures that may be brought forward by the river operator or the environmental water holder	Section 4.5
The results and recommendations of the reporting elements provided by the river operator and environmental water manager	Appendix B: Annual Environmental Release River Operations Report Appendix C:
Reporting on the implementation of improvements from previous review, including consideration of recommendations provided by the PPM Working Group	Not applicable - this is the first annual review

3. PPMs actions undertaken in NSW in 2019–20

The prevailing dry climatic conditions, limited system inflows and very low general security allocations restricted the opportunities for environmental watering actions using PPMs during 2019–20. Water supplies were prioritised for system operations and high priority needs for much of the water year. This was particularly the case in the Lower Baaka/Lower Darling, which was in the maximum Stage 4 drought criticality with remaining supplies in the Menindee Lakes System reserved for critical human needs until the gradual improvement in resource conditions commenced in April 2020.

Two PPMs environmental watering actions were undertaken under NSW jurisdiction in 2019–20. Both were in the NSW Murray Regulated River system:

1. Edward–Wakool River
2. NSW Millewa Forest.

The locations of these actions are shown in Figure 1.

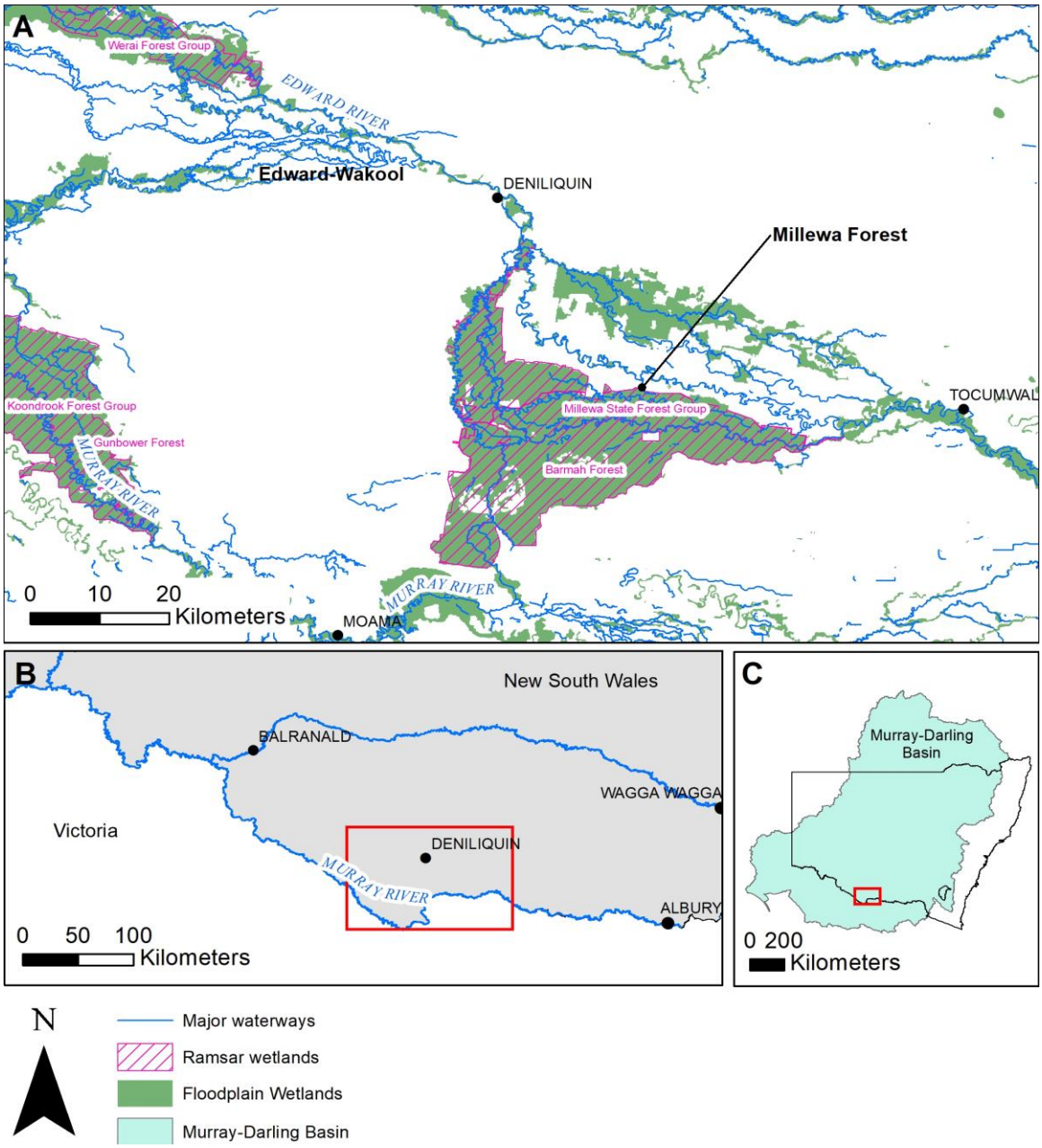


Figure 1. Locations of NSW 2019–20 PPMs environmental watering actions

Two other environmental watering actions involved water from NSW held environmental water licences in the Murray regulated river system during 2019–20: the multi-site Hume to South Australia[3] and the Koondrook–Perricoota to Thule[4] watering events. The Hume to South Australia event involved contributions from Victoria and South Australia so are outside the scope of this NSW review. Any outflow (if any) into Thule Creek from the Koondrook–Perricoota event was not recognised as return flows under PPMs. It should be noted that some environmental water returning to the River Murray from the multi-site event was used in both the Koondrook–Perricoota and the NSW Millewa Forest watering events.

The Edward–Wakool River environmental watering delivered baseflows in winter and spring, using environmental water held by the Commonwealth Environmental Water Holder (CEWH), with a small volume of environmental water held by NSW.

[3] DPIE-EES environmental water event number 2019/20-01
[4] DPIE-EES environmental water event number 2019/20-12

The Millewa Forest watering event was a spring fresh that watered the NSW section of the Barmah-Millewa Forest only. It was delivered using environmental water held under CEWH licences and from planned environmental water (PEW) Murray Additional Allowance (MAA) and River Murray Increased Flows (RMIF) accounts.

Table 2 summarises the details for the Edward–Wakool and Millewa Forest PPM watering actions. DPIE – EES reported as part of its submission to this review that the environmental objectives of all 2019–20 PPM watering actions were achieved.

No PPM environmental watering actions were conducted in the Murrumbidgee regulated river or the Lower Baaka regulated river in 2019–20.

Table 2. Summary details for the 2019–20 PPM actions

Details	Name of environmental watering action	
	Edward–Wakool	Millewa Forest
DPIE – EES environmental water event number	2019/20–02	2019/20–03
Targeted valley	Murray – Edward–Wakool system	Murray – NSW use only; Millewa Forest regulators
Type of PPM event	Diversion of operational water[5]	Return flows
Flow type[6]	Baseflow 2	Large fresh 2
Delivery start date	1 July 2019	1 November 2019
Delivery end date	21 Dec 2019[7]	29 November 2019
Interim or agreed action	Interim	Interim
Environmental site/s watered	Edward–Wakool system	Millewa Forest
Total volume of water delivered to support environmental watering	43,225 ML[8]	40,000 ML[9]
Volume of held environmental water debited	12,106 ML (CEWH)[10]	8,110 ML (CEWH)[11]

[5] At the PPM Working Group meeting #1, it was agreed that this event would use operational water only (INT19/137848).
[6] The Murray-Lower Darling Long-Term Water Plan Part B defines 'Baseflow 2' and 'Large Fresh 2' and describes the ecological objectives, flow rates, timing, duration and frequency for these flow categories. See https://www.environment.nsw.gov.au/-/media/OEH/Corporate-Site/Documents/Water/Water-for-the-environment/long-term-water-plans/murray-lower-darling-long-term-water-plan-part-b-planning-units-200081.pdf
[7] This is the last debit date. Water orders ceased at the end of November 2019.
[8] Consists of 12,106 ML HEW debit, 24,707 ML from multisite Murray watering and 6,412 ML operational water recognised at the end of the system.
[9] Total volume delivered through the Millewa Forest regulators contributing to the environmental watering action.
[10] In addition, 44.5 ML of DPIE-EES adaptive environmental water was delivered through Murray Irrigation Ltd, for which PPMs was not applied.
[11] In addition, 3,890 ML debited from MAA and 12,000 ML debited from RMIF accounts.

3.1 Other related water actions undertaken by NSW in the southern Basin

The department also implemented two Section 324 temporary water restrictions[12] in the southern Basin during the 2019–20 water year. These affected unregulated river access licences in the Tuppal Creek and Thule Creek systems, and in the Buccaneit and Cunninyeuk creek systems from 15 September 2020 to 30 June 2021.

These temporary water restrictions were made to ensure environmental water delivered in these unregulated creeks was not extracted by licence holders. More information can be found on the department website:

- Buccaneit and Cunninyeuk Creeks
- Tuppal Creek
- Thule Creek.

4. Findings and recommendations

This section presents the findings of the department's review of PPM watering actions for the 2019–20 water year. The content and structure of this section was guided by the procedures manuals, which outline the requirements for the annual review (as described in Section 2 of this report). It also draws on the annual reports provided by the river operator and environmental water manager.

The department consulted with the NSW PPMs Working Group regarding the findings and recommendations prior to finalising this report.

4.1 Providing for effective and efficient use of held environmental water

Assessing whether PPM actions and their supporting measures provided for effective and efficient use of held environmental water with the small number of watering events in the first year of PPM operation was challenging.

The procedures manuals require an assessment of whether the PPMs actions provided for the effective and efficient use of HEW; however, the manuals do not define 'efficient and effective'.

The MDBA's 2020 Draft Basin-wide Environmental Water Protection Strategy and Implementation Plan maintains environmental water protections must be:

- efficient – environmental water protections must be comprehensive, consistent, secure, enduring and transparent
- effective – providing simple, operable and cost-effective protection.

Findings

While an assessment of the environmental benefit from watering actions is beyond the scope of this report, it should be noted that DPIE – EES reported in its *Annual Environmental Watering Statement* (Appendix C)[13] as part of this annual PPM review that the environmental objectives of the two watering actions were achieved. In the Edward–Wakool River system, Murray Cod abundance has increased in recent years and environmental flows provide opportunities for fish to

[12] Section 324 of the Water Management Act 2000 (the Act) allows the Minister or a delegate to direct, by order, that temporary water restrictions within a water source(s) have effect for a specified period, if these restrictions are determined to be in the public interest.
[13] Appendix C: DPIE-EES Environmental Watering Statement

disperse and colonise new habitats, access food resources and use suitable spawning habitats. The Millewa Forest is a Living Murray icon site and Ramsar wetland. The Millewa Forest watering action provided benefits for the red gum forest, marshlands, native fish, waterbirds, and ecosystem function (Appendix C).

Measurement of take and return is not considered accurate at both the Edward–Wakool and Millewa Forest sites. Therefore, in accordance with the procedures manuals, assumed use methods were required for both 2019–20 PPM watering actions.

Edward–Wakool

In previous similar events in the Edward–Wakool, no additional assumed use was applied to flows in the Wakool system and no return flows were recognised from the system. In these previous watering events, the environmental water holders were debited the full volume of environmental water entering the Wakool system.

The department, environmental water holders and the river operators worked together to consider a range of accounting options for the watering action in the Edward–Wakool system and recommended a seasonal loss accounting treatment be adopted. As environmental water holders were looking to use only operational water, the approach focused on improved environmental water accounting arrangements for the diversion and use of operational water only.

The adopted approach applies a seasonal loss rate to all environmental water inflows that exceed the seasonal loss threshold. The environmental water holders would also be charged for the balance of any flow required on top of operational requirement to meet the loss threshold. The loss threshold can be considered as the identified inflow (to the system) below which there is a possibility of no outflows from the Wakool system, and also as a proxy for greater River Murray System conditions.

This approach was subsequently endorsed by the PPMs Working Group at its first meeting in September 2019, noting it as being an interim method but a useful step towards a more accurate accounting treatment in this system (Appendix A)[14]. The Working Group later agreed to apply the same treatment to the 2020–21 Edward–Wakool watering actions.

Using the seasonal loss accounting method, the environmental water holders were debited a total of 12,106 ML rather than the full volume of environmental water delivered to the system (i.e. 43,225 ML).

During this review DPIE – EES commented that the seasonal loss rates of 70% for spring and 80% for summer adopted in the Edward–Wakool still seem very conservative. More discussion and/or analysis would be helpful to further refine the accounting treatment for the Edward–Wakool. This analysis should include consideration of the operational practicalities around the recognition of return flows and alignment of actual losses to water debited in the Edward–Wakool (Appendix A).

Millewa Forest

In the lead-up to the 2019–20 Millewa Forest watering action, the department worked with other agencies including the Southern Connected Basin Environmental Watering Committee (SCBEWC) to identify a suitable accounting treatment to recognise return flows from the forest. Internal department correspondence from October 2019 (Appendix A) offers more detail on the factors considered in determining a suitable (less conservative) accounting treatment, without putting other water users at risk. A loss rate of 60% was adopted. The WaterNSW *Annual Environmental Releases River Operations Report* confirms the 60% loss rate was applied (Appendix B).[15] Results from this event and other available data, including modelling analysis, may lead to improvements in the loss treatments for future Millewa Forest (only) events.

[14] Documentation of 2019-20 accounting methods
[15] Appendix B: WaterNSW Annual Environmental Releases River Operations Report.

WaterNSW commented that it is important to understand the full volumes used in watering actions to achieve the desired environmental outcomes, not simply the volume debited from water access licence accounts. For example, of the 43,225 ML delivered during the Edward–Wakool watering action, 12,106 ML was debited from held environmental water accounts based on the agreed accounting under PPMs. Of the remainder, 24,707 ML was delivered as part of the Murray multi-site watering event (already debited) and 6,412 ML was delivered to achieve the desired hydrograph but recognised as operational water at the end of the system (Table 2).

Whilst the Edward Wakool and Millewa Forest environmental flow events were considered interim actions under the procedures manual, there was effective collaboration between environmental water holders, river operators and the department to ensure workable, transparent arrangements for delivery, accounting and protection of held environmental water were in place for these watering actions.

Adoption of the same accounting treatment for the Edward–Wakool environmental watering actions in 2020–21 demonstrates there was, at least in the short term, a degree of consistent, operable and cost-effective protection of HEW in the 2019–20 watering actions.

The delivery and accounting arrangements adopted for the Edward–Wakool and Millewa Forest watering actions in 2019–20 will provide a basis for further refinement of accounting arrangements for similar environmental watering actions in the future.

When conducting this annual review, it was difficult to reconcile watering action details reported by the different agencies because they each used different names and terms and recorded slightly different volumes and locations. Whilst these discrepancies were subsequently clarified by the agencies involved, it did delay the review process and made it difficult to determine whether the assumed use methods were effectively applied. The provision of Assumed Use Statements for the two 2019–20 watering actions (as required under the procedures manual s2.3.3) would have improved transparency and assisted the review process.

At least some of the confusion in the recording and reporting of PPM events is likely due to this being the first year of PPMs and the number of agencies involved working with their own discrete databases. Noting the requirement for agencies' own internal data management systems, there is an opportunity to collate and refine the management and/or presentation of environmental watering data and information to make it more open, transparent and easier to find for partner agency staff and stakeholders.

Coupled with this, is an opportunity for agencies to adopt Aboriginal dual place names in communication material relating to PPMs and environmental watering actions generally, including event naming. This would align with the department's Aboriginal Dual Names Policy and the practice already being adopted by environmental water holders (such as for the 2020–21 Lower Baaka Spring Flow event[16]).

Recommendations

R.1 Amend the procedures manuals to include definitions for 'efficient' and 'effective' use of HEW and provide clearer advice on how to evaluate whether PPMs and supporting actions contributed to these requirements. This may include reference to an existing document that adequately describes 'efficient' and 'effective' in relation to the use of HEW.

R.2 Review the Edward–Wakool seasonal loss accounting treatment using data from the 2019–20 and 2020–21 watering actions.

[16] https://www.environment.gov.au/water/cewo/catchment/baaka-spring-flow-2020#:~:text=Water%20for%20the%20environment%20is,years%20of%20very%20dry%20conditions

R.3 Agencies adhere to the agreed roles and responsibilities as set out in Table 2 of the procedures manuals, including timely provision of annual reporting requirements and assumed use statements where applicable.

R.4 Review and streamline where possible PPM watering actions record-keeping, data management and information exchange between agencies.

R.5 Adoption (where appropriate) of Aboriginal dual place names in watering action naming and PPMs communication and reporting.

4.2 Risk mitigation measures

The potential risks and mitigation measures associated with the operation of PPMs are listed in Table 7 in the procedures manuals.

The procedures manuals indicate that WaterNSW, in collaboration with DPIE – EES, is responsible for undertaking risk assessments of proposed actions and recommended mitigation strategies prior to approval or rejection of water orders.

Findings

The department assumes WaterNSW completed a risk assessment for the PPM actions as part of its normal operational procedures for any water delivery. However, the department has not had access to documentation about risk assessment or mitigation strategies specific to the 2019–20 PPM watering actions. It was therefore difficult to assess whether the mitigation measures were sufficient.

Agreement between agencies to adopt the seasonal loss treatment for the Edward–Wakool and the 60% loss rate for the Millewa Forest watering actions suggests adequate mitigation of possible third-party impacts.

The department's template for the 2019–20 *Annual Environmental Releases River Operations Report* did not specifically request information from WaterNSW about risk assessment or mitigation measures for the 2019–20 PPM events. A specific request for this information in future years would be helpful.

Given that PPM Working Group members were generally satisfied with delivery and accounting treatments used, it could be considered that the 2019–20 PPM watering actions were successfully implemented. This implies that any risks identified by WaterNSW or DPIE – EES were adequately managed.

Records of any risk assessment performed by WaterNSW and DPIE – EES would help to ensure transparency and provide for better review and continuous improvement.

Recommendations

R.6 Revise the template for the Annual Environmental Releases River Operations Report to include a section explicitly requesting information about identified risks and mitigation measures for each PPM watering action.

4.3 Stakeholder and agency consultation

The procedures manuals highlight the importance of consultation during PPM implementation and the annual review. Section 3.3 of the procedures manuals list the minimum consultation requirements associated with the operation of the trial and agreed actions within NSW (Appendix D of this report).

Findings

As discussed in section 3, there was extensive consultation and collaboration between the department, environmental water holders and the river operators in the development and agreement of suitable delivery and accounting arrangements leading up to the Edward–Wakool and Millewa Forest watering actions. However, the department did not directly consult with licensed water users or their representative groups (as required under the procedures manuals) regarding the implementation of these two PPM watering actions in 2019–20.

WaterNSW reported that it consulted with the Murray-Lower Darling Environmental Water Advisory Group (EWAG), the Edward–Wakool System Operations Advisory Group and the Barmah–Millewa Operations Advisory Group regarding the environmental watering actions, although the timing and nature of this consultation is not clear (Appendix B). It is also not clear what issues, if any, relating to the PPM watering actions were raised by these groups.

DPIE – EES consulted WaterNSW regarding the proposed environmental watering actions before placing water orders. DPIE – EES also reported consultation with the Murray–Lower Darling EWAG in February 2020. This consultation was generally about the Edward–Wakool and the multi-site Hume to SA environmental watering events and PPMs were not specifically discussed (Appendix C).

The department consulted with WaterNSW, DPIE – EES, the MDBA and CEWO as part of this annual review process.

The procedures manuals also require consultation with the SCBEWC when conducting the annual review. It was the view of SCBWEC members who are also members of the PPM Working Group that consultation through the working group was sufficient.

The department is not aware of any issues raised by water users relating to the two PPM watering actions in 2019–20. Similarly, as no compliance issues relating to the two PPM watering actions were raised or reported, the Natural Resources Access Regulator (NRAR) was not consulted during this annual review process.

The annual review has highlighted the need for further clarification of the consultation responsibilities of respective agencies with regards to PPMs, particularly around annual reporting. For example, the procedures manuals require WaterNSW to consult with water users prior to submitting its Annual Environmental Release River Operations Report and for DPIE – EES to consult with other environmental water managers and stakeholders when preparing its Annual Environmental Watering Statement. While it is evident agency consultation with these groups did occur, the provision of more detail of the extent and results of this consultation in agencies' annual PPM reports would be helpful.

DPIE – EES also noted the lack of clarity about requirements for NSW agency consultation with interstate water agencies for multi-jurisdictional PPM watering actions and/or environmental water delivered across State borders.

Recommendations

R.7 Review the consultation requirements outlined in the procedures manuals to clarify agency responsibilities and stakeholder expectations.

4.4 Operational procedures for PPMs

The operational procedures for PPMs were generally followed for the Edward–Wakool and Millewa Forest watering actions.

Table 3 is a summary of the operational procedures followed for each action.

Table 3. Analysis of operational procedures followed during 2019–20 PPM watering events

Procedure	Edward–Wakool	Millewa Forest
Planning		
Environmental water holders work together to develop watering schedules	Y	Y
Environmental water holders develop annual environmental watering priorities and plans	Y	Y
Environmental water holders work with WaterNSW to develop a watering proposal, including target flow and location	Y	Y
Ordering and release of water		
DPIE – EES submits Water Order to WaterNSW	Y	Y
WaterNSW to consider operational risks and mitigation measures when considering water orders	Y[17]	Y
For approved Water Orders, WaterNSW is to operate the river accordingly	Y	Y
For Water Orders that are refused or rejected, WaterNSW is to document the supporting explanations in the Annual Environmental Release River Operations Report	N/A[18]	N/A
Environmental water manager is required to undertake appropriate communication actions to ensure that potentially affected landholders and the general community are aware of the proposed watering event	Y[19]	Y
WaterNSW to provide operational reporting on release of environmental water, including regular environmental water use accounting during events[20]	Y	Y
Accounting		
WaterNSW determines and debits volume of held environmental water as a result of environmental watering actions using PPMs	Y	Y
Where there is accurate measurement of take and return, net take of water is debited from account	N/A[21]	N/A
For sites where measurement is not considered accurate, an Assumed Use method is used to estimate delivery of held environmental water	Y	Y
WaterNSW will provide an Assumed Use Statement, with supporting information including loss rates, source of data use, assumptions and volumes to be debited	N[22]	N
Reporting		
WaterNSW will provide an Annual Environmental River Operations Report	Y	Y
DPIE – EES will provide an Annual Environmental Watering Statement	Y	Y

[17] Considered for both events as part of WaterNSW normal operations procedure.
[18] No orders refused or rejected.
[19] Affected landholders (if any) notified for both events as part of normal procedure.
[20] Water use debited for both events as per agreed water accounting treatments.
[21] Inaccurate measurement for both events – agreed loss treatments applied.
[22] Agreed format for Assumed Use Statements to be finalised.

Findings

The department, environmental water holders and the river operators cooperated during the planning of the Edward–Wakool and Millewa Forest watering actions, including agreement on delivery methods, flow rates and loss treatments to be applied.

The ordering, release and delivery of the PPM watering actions appear to have followed established practice, if not strictly as prescribed in the procedures manual. This could be explained by the need to align with other system requirements given the prevailing resource conditions and limited water availability at the time.

As described earlier, there were initially discrepancies between agencies in their reporting of water ordering volumes, event names, numbers, etc. Also, it appears water orders and other documentation did not clearly identify whether PPMs would be applied to the HEW portion of the watering action, although this may have been implied.

In its *Annual Environmental River Operations Report*, WaterNSW cited an issue with the current standard water order form and has recommended a transition to non-standard water ordering for all events (section 5, Appendix B), although no detail was provided as to what "non-standard" water ordering consists of. While this would seem to be a procedural matter between DPIE – EES and WaterNSW, any move to clarify and streamline the water ordering process and associated documentation would be an advantage and consistent with the NSW PPM implementation principles of adaptive management and continual improvement.

Some tightening of the detailed documentation around water ordering and within-event reporting and decision making by DPIE – EES and WaterNSW would be helpful. This includes consistent watering action names, numbers, and volumes between agencies. Where applicable, the HEW and PEW components to which PPMs will or will not apply should be clearly identified, and, for sites where measurement is not accurate, an Assumed Use Statement should be provided prior to the event commencing.

Recommendations

R.8 Water orders and other documentation including within-event reporting should use consistent naming, numbers, volumes, etc., and clearly identify the HEW licences/portion of the watering action to which PPMs apply.

R.9 For sites where measurement is not accurate, WaterNSW to provide Assumed Use Statements to the environmental water manager and a copy to the department (PPM team) prior to the watering action.

4.5 Proposals for new actions or supporting measures

As discussed earlier in this report, there were limited opportunities for new environmental water actions during 2019–20. However, with improving resource conditions in late 2019–20, several new watering actions (Table 4) were proposed by environmental water holders for the next water year (2020–21) and, along with developing the necessary accounting treatments, incorporated into the 2020–21 work plan for the PPM Working Group.

It should be noted that these are water actions proposed at the time and some have since been modified and/or rescheduled to occur in 2021-22.

Table 4. Proposed PPM actions for 2020–21

River system	Proposed action	Volume/flow target	Timing
Lower Baaka	Directed releases from Menindee Lakes System (MLS) and return	26 GL (CEWH, TLM)	Sep 2020-Jan 2021

River system	Proposed action	Volume/flow target	Timing
	flows into the River Murray when MLS is under NSW control[23]		
Murray	Wakool System • accounting treatment as per 2019–20	To be confirmed	Winter/Spring 2020
Murray	Werai Forest • accounting treatment for directed releases from Hume resulting in overbank flows • accounting treatment for environmental return flows from the forest	To be confirmed	Spring 2020
Murrumbidgee	Accounting for return flows from Murrumbidgee into River Murray (Balranald to SA border)	Various	Various
Murrumbidgee	Lowbidgee weir pool filling • accounting treatment for environmental return flows	Various	Various
Murrumbidgee	Mid-Murrumbidgee wetlands • accounting treatment for environmental return flows from these wetlands to Balranald	Up to 24 GL/day at Wagga Wagga	Autumn/winter 2021
Murrumbidgee	Beavers Creek/Old Man Creek anabranch • Mid-Murrumbidgee wetlands reconnection action	>13 GL/day or ~5 GL standalone	Autumn/winter 2021
	• Native fish action	>13 GL/day or ~5 GL standalone	Spring 2020/Summer 2021

Findings

The process for bringing forward and prioritising new PPMs watering actions is not clear although this is expected to improve over time with increased surety of water supply and experience with PPMs.

Ongoing exchange of information between agencies is needed to ensure decision making and prioritisation around new and ongoing watering actions is clearly understood by all involved, particularly where new actions require significant lead time for analysis and refinement of accounting treatments and/or stakeholder consultation.

Recommendations

R.10 Clearly document and communicate in a timely manner to all agencies involved the details of each new and ongoing PPM environmental watering action and supporting measures, including watering priorities and agreed accounting treatments.

[23] Subject to NSW approval/agreement when MLS is under NSW control.

Appendix A: Documentation of 2019–20 accounting methods

This appendix presents the documentation describing the accounting methods for the 2019–20 Edward–Wakool and Millewa Forest watering events.

Environmental water accounting in the Edward–Wakool

The Edward–Wakool system (the system) is part of the NSW Murray Regulated River. To enable PPMs in the system, and in particular return flows, an environmental water accounting mechanism was required.

The hydrology of the Edward–Wakool system is complex and it is recognised there are many opportunities and options for environmental water delivery. An agreed environmental water accounting approach was needed that considered operational constraints and practicalities, potential impacts on all entitlement holders and accounting efficiencies. The agreed approach was consistent with the NSW PPM framework endorsed by the MDBA, including review and reporting as detailed in the Procedures Manual for the NSW Murray and Lower Darling.

Until this event, no assumed use had been applied to flows in the Wakool system and no return flows had been recognised. In previous watering events, the environmental water holders were debited all environmental water entering the Wakool system.

Broadly, there are two methods of delivering water into the Edward–Wakool system for achieving environmental outcomes, both of which need to be defined in terms of accounting:

1. Delivery of environmental water.
2. Diversion of operational water.

The environmental water holders used only operational water in the system water year (2019–20), hence the approach focused on improved environmental watering accounting arrangements for the diversion and use of operational water only.

The NSW PPM working group agreed to an interim approach. While the approach was recognised as conservative, it was still an improved accounting arrangement, noting that it applied to net use of operational water only and not directed releases, with no return flows.

Interim approach: seasonal loss rate

This approach applies a seasonal loss rate to all environmental water inflows that exceed the seasonal loss threshold (Table C.1). The environmental water holders would also be charged for the balance of any flow required on top of operational requirement to meet the loss threshold.

The loss threshold can be considered as the identified inflow (to the system) below which there is a possibility of no outflows from the Wakool system and also as a proxy for greater River Murray System conditions.

Table C.1. Seasonal loss rate and thresholds for environmental water accounting

Season	Month	Loss (%)	Threshold (ML/d)
Summer	1	80	
Summer	2	80	450
Autumn	3	65	450

Season	Month	Loss (%)	Threshold (ML/d)
Autumn	4	65	350
Autumn	5	65	350
Winter	6	55	350
Winter	7	55	250
Winter	8	55	250
Spring	9	70	375
Spring	10	70	375
Spring	11	70	375
Summer	12	80	450

Historical system losses (2000–2018), calculated using the approved Wakool loss method, were used to determine the seasonal loss rate and loss threshold. Note that:

- periods of unregulated flow conditions were filtered out
- the monthly loss was calculated using only months where there were seven or more days of data available
- travel time for the system is within a month, and therefore it is assumed that phenomenon such as loss and gains from bank storage are reduced by using monthly data
- the use of average loss behaviour can be a potential risk of impact to water users in the NSW Murray system. An approach with a risk profile similar to that use for NSW resource assessments is used to determine the seasonal loss rate (between the 95th percentile and the maximum monthly loss recorded)
- there is limited confidence in the data currently available.

This approach was applied from 1 July 2019, noting key time steps for quarterly billing.

Environmental water accounting for the Millewa Forest watering event

PPMs provide the framework to allow for directed releases and the recognition of return flows/re-use from held environmental water (and excludes planned environmental water). The delivery of environmental water to Millewa Forest was proposed for November 2019. Without PPMs in place, 100% of the delivered volume of water passing into Millewa Forest would have been debited, with no recognition of return flows.

The water order for the Millewa action is 15.89 GL of NSW planned environmental water (RMIF, MAA) plus 14.1 GL of CEWO adaptive (held) environmental water, running across November 2019.

In an adjacent system, the Wakool, an agreed initial accounting approach under PPMs was developed to facilitate environmental watering. The agreed Wakool system environmental use debit had a continuing loss rate of 70% for spring. The accounting approach reflected the seasonal dynamics of the Wakool system and was based on nearly 20 years of data. In the absence of modelling to determine an appropriate accounting approach for the Millewa forest, and due to the geographical proximity and likely similar hydrologic response of the channel systems, the Wakool system accounting approach formed the basis for an interim one-off accounting approach for the proposed environmental watering action in the Millewa forest.

The hydrodynamic modelling for the Barmah–Millewa watering shows a conservative continuing loss rate of around 250 ML/d for current Murray flow conditions. This amounts to about 25-30% of the 30 GL Millewa only watering action by volume over November 2019. However, with the Barmah regulators closed and greater head driving the Millewa only flows, greater inundation (higher losses) could be expected than suggested by this modelling.

Recognising 60% of the CEWO component (held environmental water) of the proposed Millewa watering action:

- enables the NSW Millewa environmental outcomes to be achieved
- suitably addresses the conservatism needed to ensure no others are impacted.

Appendix B: Annual Environmental Release River Operations Report 2019–20

WaterNSW provided the following report to the department. It forms part of this annual review.

ENVIRONMENTAL WATERING ACTIONS

In Table 1, provide an overview of the environmental water actions undertaken using PPMs in the 2019–20 water year.

Table 1. Summary of PPM watering actions in 2019–20

Name of environmental watering action	Event #1	Event #2
River system	Murray–NSW Millewa Forest Regulators – NSW use only	Edward–Wakool River System
Type of PPM event	Return flow for held water	Directed release
General description of watering action	Millewa Forest regulators remained open at conclusion of overbank flow event. The event was targeting fish movement outcomes through the forest on recession of the watering event.	Delivery of flow hydrographs to provide breeding cues, maintain habitat and promote successful recruitment of native fish through the Wakool River, Yallakool Creek and Colligen Creek system
Start date	1 November 2019	1 July 2019
End date	28 November 2019	30 June 2020
Was this an agreed or interim action?	Interim action	Agreed action with continuous review
Delivery pathway		
Environmental site/s watered	Millewa Forest	Wakool River, Yallakool Creek and Colligen Creek
Total volume of water delivered (ML)	40,000 ML delivery to the site, with debit of 24,000 ML based on accounting arrangement	240,681 ML delivered through the Wakool River system – environmental water delivered 43,225 ML – debit based on accounting method – 12,106 ML

Accounting method used	Assumed loss	Combination of multisite water assumed loss and Wakool system assumed loss

WATER ORDERS

In Table 2, provide an overview of the environmental water orders received for Prerequisite Policy Measures in the 2019–20 water year (including any order that was subsequently refused/rejected).

Provide further detail in an attachment as needed, including water orders and assumed use statements. If any water order using PPMs was refused, please provide documentation and rationale supporting this decision.

Table 2. Water orders for PPM events in 2019–20

Order number	**Event 2 – Order 1 Colligen Creek**	**Event 2 – Order 2 Colligen Creek**	**Event 2 – Order 3 Colligen Creek**	**Event 2 – Order 4 Colligen Creek**
Organisation submitting order	DPIE – EES	DPIE – EES	DPIE – EES	DPIE – EES
Date order was submitted	1/7/19	31/7/19 – amendment of order 1	6/8/19	25/10/19
Volume of order (ML)	170.5	5,270	3,400	2,880
Organisation delivering order				
Release date	1/7/19 – 31/7/19	1/7/19 – 31/7/19	1/8/19 – 20/8/19	26/10/19 – 10/11/19
Form of water order submitted (e.g. Form A, email, verbal, other)	WaterNSW water order form	WaterNSW water order form	WaterNSW water order form	WaterNSW water order form
Water ordered but refused				
List of supporting documents				

Order number	Event 2 – Order 1 Yallakool Creek	Event 2 – Order 2 Yallakool Creek	Event 2 – Order 3 Yallakool Creek	Event 2 – Order 5 Yallakool Creek	Event 2 – Order 6 Yallakool Creek
Organisation submitting order	DPIE – EES	DPIE – EES	DPIE – EES	DPIE – EES	DPIE – EES
Date order was submitted	1/7/19	31/7/19 – amendment of order 1	6/8/19	5/11/19	25/10/19
Volume of order (ML)	170.5	5,270	3,400	7,560	2,880
Organisation delivering order					
Release date	1/7/19 – 31/7/19	1/7/19 – 31/7/19	1/8/19 – 20/8/19	26/10/19 – 30/11/19	26/10/19 – 10/11/19
Form of water order submitted (e.g. Form A, email, verbal, other)	WaterNSW water order form	WaterNSW water order form	WaterNSW water order form	WaterNSW water order form	WaterNSW water order form
Water ordered but refused					
List of supporting documents					

Order number	Event 2 – Order 1 Wakool River	Event 2 – Order 1 Multi-site	Event 1 – Order 1 Millewa Regulators
Organisation submitting order	DPIE – EES	DPIE – EES	DPIE – EES
Date order was submitted	29/1/20	17/7/19	-
Volume of order (ML)	120	RMIF 32,000 HEW 18,000	

Order number	Event 2 – Order 1 Wakool River	Event 2 – Order 1 Multi-site	Event 1 – Order 1 Millewa Regulators
Organisation delivering order			
Release date	29/1/20– 3/2/20	17/7/19 – 30/11/19	1/11/19 – 28/11/19
Form of water order submitted (e.g. Form A, email, verbal, other)	WaterNSW water order form	Email	Email – confirmation of use of volume not used in multisite water order
Water ordered but refused			
List of supporting documents			

COMPARISON OF FORECAST AND ACTUAL ENVIRONMENTAL WATER USE

Provide an overview of:

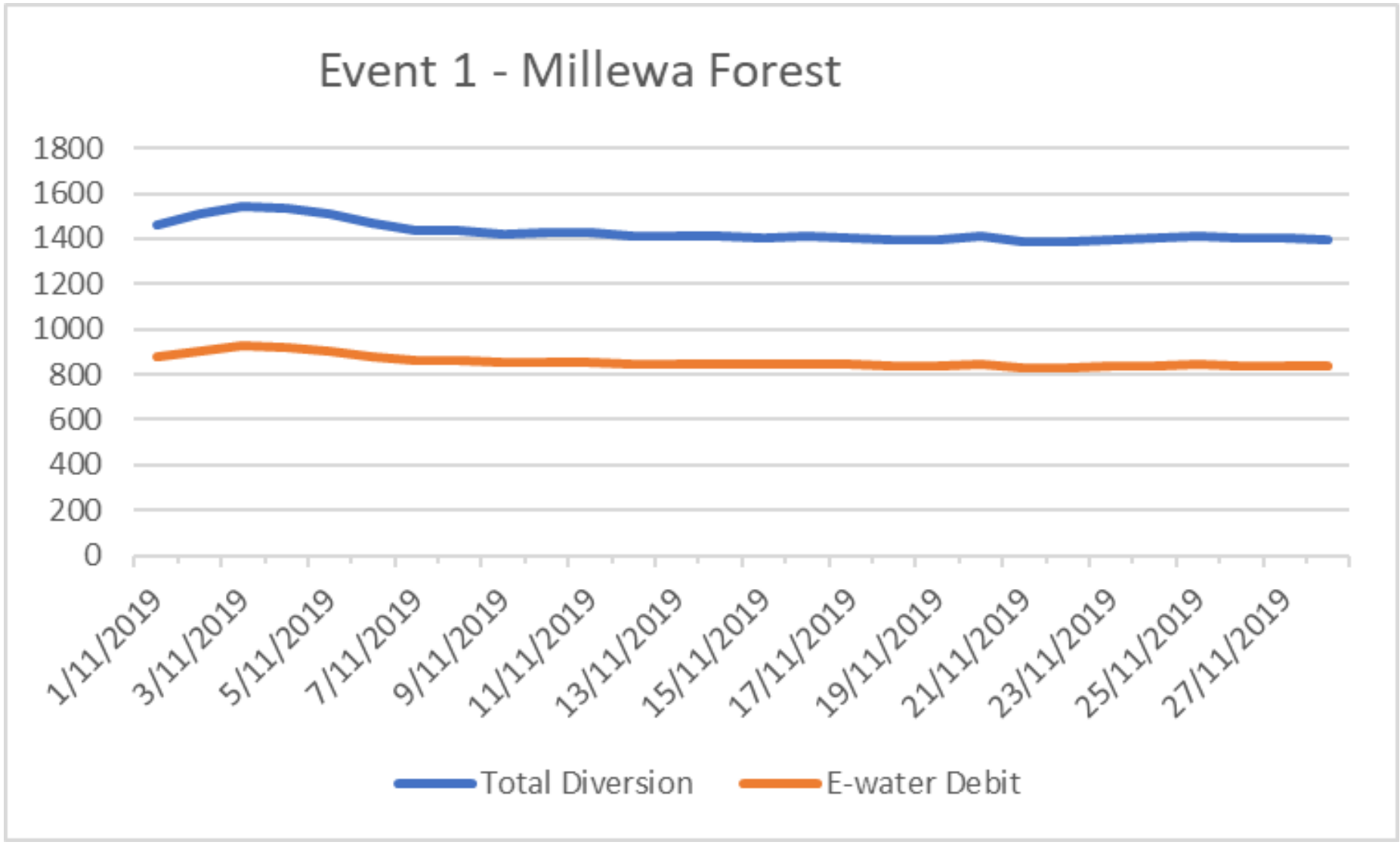
- *target daily flow rates and volumes*
- *actual daily flow rates and volumes*
- *forecast losses and actual losses (at an appropriate temporal scale for the event)*
- *volume of environmental water debited (with licence corresponding licence numbers)*
- *volume of water delivered to the Murray Valley that will be recognised as environmental water.*

Attach any supporting information.

Assumed use is the amount we debit an account upfront assuming an amount of loss is going to occur

Event 1 NSW Millewa Forest

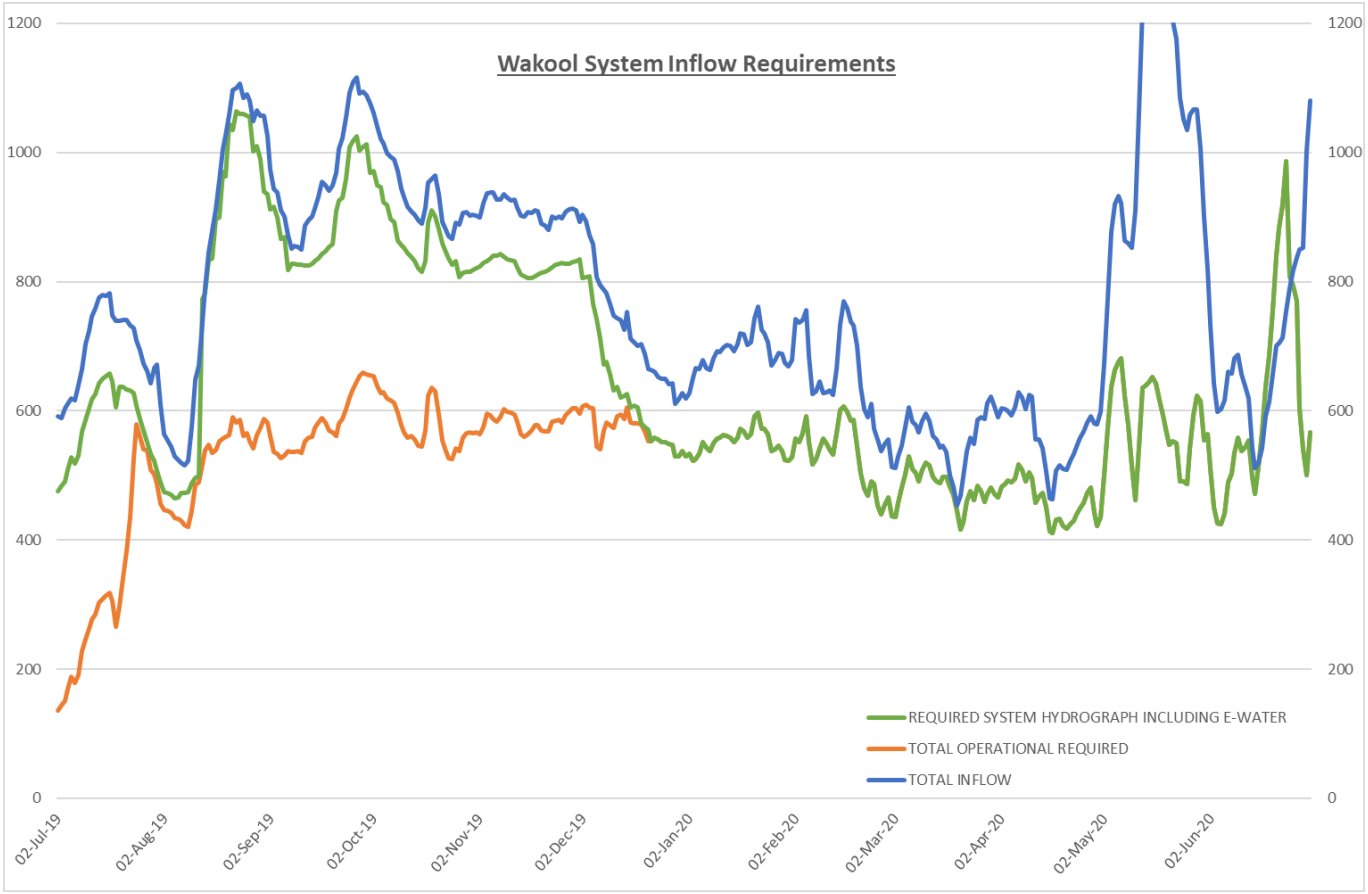
- Water order did not provide a target flow rate for the five delivery sites used for the event. Rather regulator settings targeting outcomes were used, with a commitment of volume remaining from the multi-site water event.
- A loss rate of 60% was applied to determine usage. As there are no exit flow measurements, determination of actual losses is not achievable.
- Actual daily delivery rate and volume debited is provided in the chart below; total delivery was 40,000 ML; debited use 24,000 ML – 12,000 ML RMIF; 8,110 ML HEW (50AL513824); and 3,890 ML Murray Additional Allowance.
- Volume delivered to the Murray recognised as environmental water – 24,000 ML.

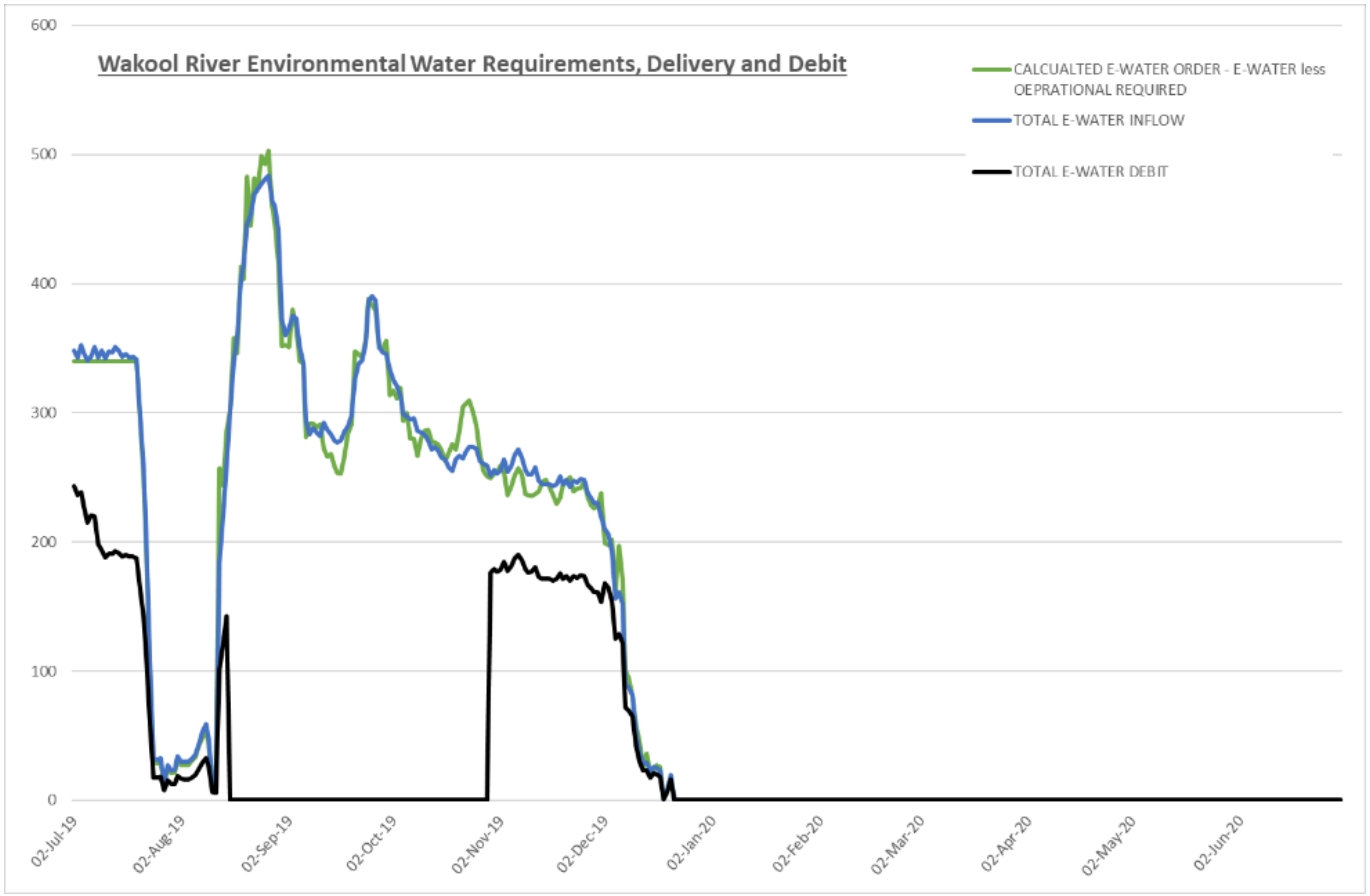


Event 2 Edward–Wakool

- DPIE – EES provided planned hydrographs for the event. Comparison of the requested and delivered system hydrograph for the Wakool River system is provided in the charts below.

- A seasonally variable loss rate was applied to determine usage; Winter 55%; Spring 70%; Summer 80%; Autumn 65%. Assessment of actual losses has not been considered at this time.
- Actual daily delivery rate and volume debited is provided in the chart below; total delivery was 43,225 ML; event debited use 12,106 ML – HEW (50AL503537). An additional 16,215 ML was excluded from debit in this event having been debited as part of the Hume Multisite water event.
- Volume delivered to the Murray recognised as environmental water – 12,106 ML.




Wakool River Environmental Water Requirements, Delivery and Debit
CALCUALTED E-WATER ORDER - E-WATER less OEPRATIONAL REQUIRED
TOTAL E-WATER INFLOW
TOTAL E-WATER DEBIT
600
500
400
300
200
100
0
02-Jul-19
02-Aug-19
02-Sep-19
02-Oct-19
02-Nov-19
02-Dec-19
02-Jan-20
02-Feb-20
02-Mar-20
02-Apr-20
02-May-20
02-Jun-20

STAKEHOLDER CONSULTATION

In Table 3, provide a summary of stakeholder consultation. Attach any supporting documents.

Table 3. Summary of stakeholder consultation

Date	Stakeholder forum/name	Environmental watering action/s discussed	Type of consultation (e.g. Workshop, webinar, phone call, letter, survey, public exhibition)	Summary of feedback	Stakeholder requests	List of supporting documents
	NSW Murray–Lower Darling EWAG	All proposed water actions discussed	Stakeholder meeting	Supportive of trial in Wakool–Yallakool for higher flow targets	Nil	
	Edward–Wakool System Operations Advisory Group	Actions undertaken in Wakool River system	Agency working group for event management		Nil	
	Barmah–Millewa Operations Advisory Group	Actions undertaken in the Millewa forest watering events – both individual and multi-site	Agency working group			

RECOMMENDATIONS TO IMPROVE FUTURE ENVIRONMENTAL WATERING ACTIONS

In Table 4, provide a summary of key issues encountered in 2019–20 and recommendations for addressing these. Attach any supporting documents.

Table 4. Summary of issues and recommendations

Environmental watering action	Issue	Agencies involved	Stakeholders involved	Recommendations	List of supporting documents
All	WaterNSW water order form irrelevant	WaterNSW & DPIE – EES		Transition to non-standard water ordering for all events	

Appendix C: Annual Environmental Watering Statement

DPIE – EES provided the following report to the department and forms part of this annual review.

Annual Environmental Watering Statement

LIST OF ENVIRONMENTAL WATERING ACTIONS

In Table 1, provide a list of the environmental water actions undertaken using Prerequisite Policy Measures (PPMs) in the 2019–20 water year. As an attachment, please provide the following supporting documentation for each event:

(a) Water Event Plan (Form A – Request to Deliver Environmental Water)
(b) Water Event Outcome (Form B – Environmental Water Delivery Report)
(c) Water Order

Table 1. List of environmental watering actions using PPMs in 2019–20

Event number (From Form A)	Event name	Targeted Valley
MUR19/20–01	Multisite Hume to SA	Murray
MUR19/20–02	Edward–Wakool 2019–20	Murray
MUR19/20–12	Koondrook–Perricoota to Thule	Murray
MUR19/20–03	Millewa Regulators 2019–20	Murray

ENVIRONMENTAL OUTCOMES

In Table 2, provide a summary of the objectives of the environmental watering event and the extent to which these objectives were met. Please also provide information on the environmental outcomes observed to date, any ongoing monitoring of these outcomes and any relevant comments. Attach any supporting documents.

Table 2. Summary of environmental outcomes

Event number	Event name	Environmental objectives	Degree to which environmental objectives were satisfied	Environmental outcomes observed or being monitored	Comments
MUR19/20–01	Multisite Hume to SA	Native fish; Ecosystem functions; Waterbirds	Yes, the objectives were achieved	The event provided habitat for native fish, waterbirds and benefits to ecosystem function from Hume dam to the Murray mouth.	This event inundated wetlands and floodplain creeks from the Hume dam all the way to the Murray mouth. The PPM allowed for environmental water to be re-used at several sites along the way.
MUR19/20–02	Edward–Wakool 2019–20	Native fish; Connectivity	Yes, the objectives were achieved	Environmental flows in this system provide opportunities for fish to disperse and colonise new habitats, access food resources and utilise suitable spawning habitats. Murray cod abundance has increased in recent years.	This event re-used flows delivered as part of the Multisite event and outside the multisite period a separate PPM in-channel use loss rate was applied.

Event number	Event name	Environmental objectives	Degree to which environmental objectives were satisfied	Environmental outcomes observed or being monitored	Comments
MUR19/20–03	Millewa Regulators 2019–20	Native fish; Connectivity; Vegetation; Waterbirds	Yes, the objectives were achieved	The event provided benefits for vegetation (river red gum forest and marshlands), native fish, waterbirds, and ecosystem function for the Millewa Forest and Murray and Edward rivers. Millewa is a Living Murray icon site and Ramsar wetland.	Flows into Millewa were coordinated with the Multi-site Hume to SA (also known as the Murray River Spring Flow event). Forest regulators were managed so connectivity was provided for Murray cod and trout cod over the September to November breeding period and to provide nesting and foraging habitat for Australasian bitterns.
MUR19/20–12	Koondrook–Perricoota to Thule	Native vegetation; Native fish; Waterbirds; Ecosystem functions	Yes, the objectives were achieved	Although the event only watered a relatively small proportion of the Koondrook–Perricoota forest, those areas that did get water saw a good response in vegetation condition.	This event re-used flows delivered as part of the multi-site

STAKEHOLDER CONSULTATION

Section 5.1 of the procedures manuals states that the Annual Environmental Watering Statement must document “any feedback from consultation with stakeholders on the actions undertaken”.

In Table 3, please provide a summary of stakeholder consultation. Attach any supporting documents.

Table 3. Summary of stakeholder consultation

Date	Stakeholder forum/name	Environmental watering action/s discussed	Type of consultation (e.g. Workshop, webinar, phone call, letter, survey, public exhibition)	Summary of feedback	Stakeholder requests	List of supporting documents

February 2020	MLD EWAG meetings	Edward–Wakool Multisite Hume to SA (including the Millewa Forest and Thule Creek events)	Meeting	EWAG is generally supportive of events and outcomes being achieved	None	

RECOMMENDATIONS TO IMPROVE FUTURE ENVIRONMENTAL WATERING ACTIONS

Section 5.1 of the procedures manuals states that the Annual Environmental Watering Statement must document "Any issues encountered in undertaking agreed actions, and any recommendations to address those issues or improve the operation of PPMs".

In Table 4, please provide a summary of key issues that arose in the ordering or delivery and accounting of environmental water during 2019–20, with recommendations for addressing these. Attach any supporting documents.

Table 4. Summary of issues and recommendations

Event number	Issues related to the ordering, delivery and accounting of environmental water	Agencies involved	Stakeholders involved	Recommendations	List of supporting documents
MUR19/20–01	Multi-jurisdiction use of water – Koondrook–Perricoota beneficiary of returned flows from upstream Barmah Millewa/River Murray Channel flow events. Greater clarification needed on reporting of these type of events.	MDBA WNSW GMW DPIEW CEWO		Should be managed by Environmental Water Improvement Group	

Event number	Issues related to the ordering, delivery and accounting of environmental water	Agencies involved	Stakeholders involved	Recommendations	List of supporting documents
MUR19/20–02	Currently the 70% loss applied in spring and 80% loss in summer seems very conservative to environmental water holders	DPIE–EES CEWO WNSW		More accurate measurement of losses in the system. Develop accounting system to measure flow (outside of multi-site events) for Werai Forest. Complementary works (to the Yarrawonga to Wakool constraints management project) need to be implemented for the Niemur River Offtake, Tummudgery Creek Regulator and Reed Beds Creek Regulator.	
MUR19/20–12	Potential third-party impacts means that only small volumes can be delivered to the Koondrook–Perricoota forest system.	DPIE-EES MDBA TLM WNSW		Alternative downstream flow option (now Koondrook–Perricoota Flow Enabling Works) works need to commence in conjunction with the Yarrawonga to Wakool constraints management project.	

Appendix D: Consultation requirements

Section 3.3 of the procedures manuals lists the following minimum consultation requirements associated with the operation of the trial and agreed actions within NSW:

- the regulator (Department of Planning, Industry and Environment – Water) will consult with WaterNSW, NRAR, Department of Planning, Industry and Environment – Biodiversity and Conservation, SCBEWC, MDBA (River Operations and TLM) and the CEWO when conducting each annual review
- the regulator (Department of Planning, Industry and Environment – Water) will consult with licensed water users or their representative groups regarding any proposal for change to the agreed actions, or to implement any new trial actions
- the river operator (WaterNSW) will consult with licensed water users or their representative groups prior to submitting the Annual Environmental Releases River Operations Report
- the environmental water manager (Department of Planning, Industry and Environment – Biodiversity and Conservation) will consult with:
    - the river operator (WaterNSW) regarding proposed watering actions before placing an order
    - stakeholders when developing, and the community more generally when delivering, environmental water orders relying on the use of actions as appropriate
    - other environmental water managers and stakeholders (including environmental water advisory groups (EWAGs),) when preparing annual environmental watering statement reporting on environmental outcomes from delivering environmental water orders relying on the use of PPMs.