Australian Government

Murray–Darling Water & Environment Research

Murray–Darling Water and Environment Research Program End-of-Program Evaluation

October 2025

Contents

Acknowledgement of Traditional Owners

We acknowledge and offer respect to the Traditional Owners, and their Nations, of the Murray–Darling Basin, who have a deep cultural, social, environmental, spiritual and economic connection to their lands and waters

Other acknowledgements

The MD-WERP End-of-Program Evaluation was coordinated and prepared by Jacobs Group Australia in collaboration with the MDBA.

Executive Summary

The Murray–Darling Water and Environment Research Program (MD-WERP) was established in 2019 following the 2018–19 fish deaths in the lower Darling (Baaka). With a $20 million investment over five years, the Program aimed to strengthen scientific knowledge of the Murray–Darling Basin to inform water and environmental management decisions and improve outcomes for Basin communities.

This End-of-Program Evaluation assesses the Program's effectiveness and impact in meeting its strategic objectives, contributing to water reform, and enhancing Australia's capacity to manage the Basin under changing conditions. The evaluation is structured around two Key Evaluation Questions (KEQs) from the Program's Monitoring, Evaluation, Reporting and Improvement (MERI) Plan.

The evaluation applied a range of evidence collection methods, including:

- document review of over 100 Program reports, deliverables, and planning documents
- interviews with Governing Panel members, research leads, and MDBA staff
- surveys of End-User Advisory Group (EUAG) members, policy makers, water managers, and researchers
- a Lessons Learned Workshop with Program leadership and delivery partners.

Performance was assessed using a 5-point qualitative rating scale (Very Low, Low, Medium, High, Very High), based on evidence against each KEQ and sub-question. Ratings were supported by data from across the evidence sources.

KEQ2: To what extent have Program activities and outputs effectively supported the achievement of Program outcomes?

Rating: High

MD-WERP delivered applied, fit-for-purpose research across four strategic themes (climate adaptation, hydrology, environmental outcomes, and social, economic and cultural outcomes). Outputs such as HydroBOT, low-flow prediction models, and ecological forecasting tools are already influencing Basin Plan Review (BPR) processes and operational decision-making.

Sub-KEQ1: Has the Program met its objectives?

Rating: High

The Program largely met its 5 strategic objectives. It delivered high-quality, policy-relevant research, had substantial co-investment targets, and established a strong foundation for

enduring research through tools like the Knowledge Hub and CATE Framework. However, some limitations affected the full realisation of objectives related to social, cultural, and First Nations outcomes. Delays in governance (e.g. ethics approvals) and uptake of outputs in these areas suggest that while the Program was highly successful overall, there is room for improvement in integration and adoption planning across all domains.

Sub-KEQ2: How did the Program meet the needs of emerging issues and react flexibly to changing research priorities within the Program structure?

Rating: High

The MD-WERP program demonstrated strong flexibility in responding to emerging issues, supported by a layered governance structure, risk management processes, and mechanisms like Project Variation Requests. Tactical investments were particularly effective in addressing short-term needs, and several strategic projects adapted their scope in response to environmental events and stakeholder feedback. Some researchers noted that change processes could be cumbersome, and flexibility was constrained by rigid deliverables and late-stage reporting changes. These limitations reduced the overall responsiveness of the Program to a degree.

Sub-KEQ3: Was the collaboration between researchers and policy makers maintained successfully throughout the Program?

Rating: High

Collaboration between researchers and policy makers was a core strength, especially in Themes 1 to 3, facilitated by embedded Commonwealth Theme Leads, EUAGs, and co-design processes. Theme 4 faced some challenges due to limited representation from social policy experts and unclear uptake pathways. Cross-theme collaboration was limited, highlighting the need for more integrative governance in future programs.

Sub-KEQ4: Has MD-WERP research produced fit-for-purpose products or tools to enhance adoption and achieve benefits?

Rating: High

MD-WERP delivered a wide range of fit-for-purpose tools, particularly in Themes 1 to 3. These were co-designed with end users and are already embedded in BPR and operational workflows. However, the adoption of Theme 4 social, cultural and community outputs was delayed by governance and approval processes and limitations related to membership. Overall, the Program clearly demonstrated its capacity to produce usable, impactful tools, but there was uneven uptake.

KEQ3: To what extent has the Program improved our water policy, capacity to manage risks, and river operations/water management outcomes?

Rating: High

The Program enhanced understanding of the Basin across the quadruple bottom line (environmental, social, cultural, economic), improved evidence-based policy development, and strengthened operational decision-making. While technical outputs are already embedded in MDBA workflows, adoption of social and cultural outputs is ongoing. The Program established a strong platform for enduring research, with legacy tools such as the Knowledge Hub and the CATE Framework supporting future integration and uptake.

Sub-KEQ1: Has the Program enhanced understanding across the quadruple bottom line?

Rating: Medium

MD-WERP made a strong contribution to enhancing understanding of the Murray–Darling Basin across environmental, social, cultural, and economic dimensions. Strategic research in Themes 1 to 3 delivered cutting-edge tools and models that advanced knowledge of climate impacts, hydrology, and ecological resilience within the Basin. Theme 4 broke new ground in social and cultural research, including First Nations engagement and community resilience, setting a precedent for future programs. However, as the work was more formative and the cultural research in particular faced significant challenges, the knowledge gained was less than planned (e.g. multiple projects were discontinued). The impact of outputs related to the economics of catchment management were also less clear than the Environmental studies.

Sub-KEQ2: Did the Program meet the needs of end users?

Rating: High

MD-WERP was largely successful in meeting the needs of end users either directly or indirectly. Themes 1 to 3 provided several examples where co-designed tools were directly aligned with operational and policy priorities. These outputs are already being used by MDBA and other agencies, demonstrating strong relevance and usability. More examples will likely become clear with time. On the other hand, difficultly with engaging with state agencies meant that uptake of locally contextualised research was not as strong as it could have been. It also appears more time should have been spent identifying pathways for the adoption of social and cultural outputs into policy and identifying appropriate end-users to engage with in these areas.

Sub-KEQ3: Are outputs being used to inform policy and management?

Rating: High

Several outputs from Themes 1 to 3 are actively being used in BPR, environmental water planning and operational risk management. Theme 4 outputs are fit-for-purpose but require further integration. Full utilisation will depend on continued engagement and post-program support.

Sub-KEQ4: Is there a clear pathway for benefits realisation?

Rating: High

The Program established structured pathways for benefits realisation through the CATE Framework and Engagement and Adoption Plan. Technical outputs have documented handover plans and end users. Theme 4 pathways are less mature and require further development.

Sub-KEQ5: Has the Program influenced enduring research in the Basin?

Rating: Very High

MD-WERP has set a new benchmark for collaborative, policy-relevant science. It established lasting partnerships, embedded tools and methods into institutional practice, and shaped future research directions. Stakeholders consistently described the Program as a model for future investment.

Recommendations

Seven overarching recommendations emerged from the End-of-Program Evaluation which are listed below. Additional, more specific recommendations and how these may be addressed are provided in Section 4 of the report.

- Streamline governance and approval processes to reduce administrative burden.
- Promote cross-theme integration to enhance interdisciplinary collaboration.
- Broaden and improve end-user engagement, especially with Basin states and social policy experts.
- Enhance adoption pathways through clearer ownership and post-program monitoring.
- Invest in capacity building for qualitative and cultural data use.
- Ensure impact and legacy by embedding outputs into policy frameworks.
- Secure enduring funding mechanisms to avoid inefficiencies of short-term cycles.

Conclusion

MD-WERP has successfully delivered high-value, policy-relevant research that improves the capacity to manage water resources in the Murray–Darling Basin. It has laid the foundation for a more enduring, integrated research ecosystem. Continued investment in adoption, integration and long-term funding will be critical to realising the full benefits of the Program and supporting future Basin management challenges.

1. Introduction

1.1. Program context

In response to the 2018-19 lower Darling (Baaka) fish deaths, and the subsequent independent review, the Australian Government announced a $20 million fund to improve scientific knowledge of the Basin in 2019. This $20 million funding established the 5-year Murray–Darling Water and Environment Research Program (MD-WERP), which aimed to strengthen scientific knowledge of the Murray–Darling Basin to help inform water and environment management decisions and improve outcomes for the Basin and its communities.

1.2. Purpose

The MD-WERP Monitoring, Evaluation, Reporting and Improvement (MERI) Plan (MD-WERP 2025a) set the scope for evaluations as evidence-based assessments of the appropriateness, effectiveness, efficiency and impact of the Program. This included evaluating delivery and benefits of the Program, with a focus on delivering a set of high-level outcomes and strategic objectives.

The MERI Plan established the need for 2 Program-level evaluations:

- Mid-term (2023) health check on the effectiveness of the Program (referred to as the Mid-Term Evaluation in this document).
- End-of-term (2025) full and final Program evaluation (referred to as End-of-Program Evaluation in this document).

This End-of-Program Evaluation reviewed and assessed the effectiveness and impact of the Program in meeting its key objectives and contributing to Australia's capacity to better manage waterways in the Murray–Darling Basin, both now and in the future under a changing climate. The report reflects on the achievement of Program outcomes and examines how the Program has contributed to water policy, risk management, and river operations and management outcomes.

1.3. Program overview

MD-WERP aimed to generate new knowledge to support adaptive management to improve water policy, reduce risk in management decisions and enhance outcomes of water management. The strategic objectives of the Program (MDBA 2021) were to :

- maximise value to water reform and management from investment
- leverage co-investment with research providers and key stakeholders

- facilitate adoption of research by advancing cooperation between users and researchers
- invest in applied research that delivers better informed environmental water management decisions by Commonwealth agencies and improved outcomes for communities
- be a platform from which to launch a more enduring research program.

The Program was administered by the MDBA on behalf of the Australian Government and guided by an independently chaired Governing Panel comprised of representatives from the Department of Climate Change, Energy, the Environment and Water (DCCEEW), Commonwealth Environmental Water Holder (CEWH) and MDBA.

1.4. Program design

The Program aimed to deliver results through 3 investment streams:

- Strategic research – practical, applied, multi-year research projects developed and delivered through collaboration between the Program's Australian Government partners and two research consortia.
- Tactical projects – short-term and responsive outputs to assist decisions and policy makers on water management, river operations, and Basin Plan implementation.
- Communication, adoption, transparency and engagement (CATE) – to enable end user understanding and adoption of the Program's research outcomes so that the new information, knowledge and capability could be leveraged for new and updated policies and ultimately support better management of the Murray–Darling Basin.

An overview of the 3 investment streams is provided below. Full Program details including budgets, milestones and a list of individual projects can be found in the MD-WERP Closure Report.

Strategic Research

Four themes were identified as the focus of the strategic research, with research questions for each theme representing the priority areas of research identified by the Australian Government partners. A summary of the strategic research outputs is shown in Figure 1.

Figure 1. Outputs from the MD-WERP strategic research investment

Theme 1

Climate adaptation synthesised current knowledge, delivered new modelling methods, and generated projections of plausible futures of water availability in the Basin. Adaptation options were identified and evaluated for their efficacy across economic, environmental, social and First Nations' values. Four projects were undertaken to address the 5 research questions:

- RQ1.Which of the Basin's economic, social, environmental, and cultural values are most vulnerable to the flow-related impacts of a changing climate?
    - T1.S: Synthesis and implementation.
    - T1.SA Showcasing adaptability.
- RQ2. How do other threats interact with a changing climate to affect vulnerabilities?
    - T.1SI Synthesis and implementation.
    - T1.SA Showcasing adaptability.
    - T1.TK Climate adaptation toolkit.
- RQ3. What is the best way to evaluate the effectiveness of water management arrangements to manage risks, including a changing climate?
    - T1.SI Synthesis and implementation.
- RQ4. What adaptation options can provide better protection to vulnerable values in the Basin?
    - T1.FS Foundational science.
    - T1.SA Showcasing adaptability.
- RQ5. How do we undertake climate adaptation at regional scales that are most relevant to communities and environmental assets?
    - T1.FS Foundational science.
    - T1.SA Showcasing adaptability.

Theme 2

Hydrology focussed on low flows and floodplain flows. The low-flow component was aimed at improving the simulation of low flows, and the floodplain component aimed to improve prediction capabilities relating to flood inundation extent, depth and duration and floodplain volumes. Research projects were undertaken to examine 5 research questions:

- RQ6. How can low flow predictions be improved to support water planning?
    - T2.6 Enhancing low flow prediction to support water resources planning.
- RQ7. How can floodplain flow volumes, components, and inundation prediction be improved to support environmental watering and water resources planning?
    - T2.7 Enhancing floodplain inundation and volume prediction to support environmental watering and water resource planning.

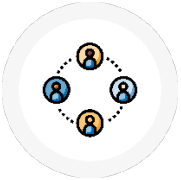
- RQ8a. How can adaptation through enhanced river operations management improve water outcomes?
    - T2.8a Enhancing river operation outcomes using forecasts and optimisation.
- RQ8b. How can our understanding of groundwater management be used to improve our water resources practices?
    - T2.8b Groundwater as an adaptation to current water resources management.
- RQ-H. How can we better disentangle and model the impacts of climate and development drivers on the hydrology of the Basin?
    - T2.H Impact of hydrological non-stationarity and changing catchment conditions on runoff in the northern Basin.

Theme 3

Environmental outcomes focussed on improving understanding of low-flow requirements of environmental assets and values under a changing climate. It also looked at prioritisation of environmental assets, values and functions for conservation and restoration, as well as improving predictive ecological modelling in relation to water management outcomes. Nine projects were undertaken to answer 3 research questions:

- RQ9: What are the low flow needs of the environment?
    - T3.9.1 Drivers of ecological resilience and persistence during low and cease-to-flow conditions in the northern Murray–Darling Basin.
    - T3.9.2 Forecasting risks to fish and their available habitat from low flows and hypoxia.
    - T3.9.3b Maintaining Barkandji fish traps and their cultural values.
- RQ10: How can we best prioritise water-dependent ecosystems for management to ensure representative populations and communities of native biota are protected and restored?
    - T3.10.1 A data atlas for conservation prioritisation.
    - T3.10.2 Evaluating protection gaps and conservation prioritisation.
- RQ11: How can we predict the health of aquatic ecosystems and their response to changes in flow?
    - T3.11.1 Spatially explicit population models for fish in the Barwon-Darling river system.
    - T3.11.2 Predicting changes to the persistence and connectivity of in-channel aquatic habitat in the lower Darling River.
    - T3.11.3 Predicting change in floodplain habitat availability at the Basin scale.
    - T3.11.4 Assessing future vulnerability of species and ecological communities.

Theme 4



Social, economic and cultural outcomes focussed on the relationship between riverine health and social, emotional, and economic well-being. It looked at the relationship between ecological outcomes and social, economic, and cultural benefits of environmental water. It also looked at how the cultural, economic and social outcomes for First Nations people can be improved and what makes community adaptable and resilient to a future with less water. Eight projects were undertaken to answer 3 research questions:

- RQ12: What is the relationship between the condition of the riverine ecosystem and social, economic and cultural values?
    - T4.12.1 The mental health benefits from improvements to riverine ecosystem health.
    - T4.12.2 The recreational and tourism value of healthy rivers.
- RQ13: What are the cultural, economic, and social outcomes for First Nations people and how can they be improved?
    - T4.13.2a Winaga-Li Gunimaa - incorporating cultural values into environmental flows.
    - T4.13.2b Wetland grasses, ancient grains, and indigenous food production.
- RQ14: How can communities adapt to and be more resilient to a future with less water? What makes a community more resilient and adaptable to a future with less water?
    - T4.14.1 Basin-wide socio-economic, socio-demographic and biophysical data platform.
    - T4.14.2 Pathways to community resilience.
    - T4.14.3 Navigating change.
    - T4.14.4 Water cultures of the MDB.

The strategic research was co-designed and delivered through a collaboration between the Australian Government and the MD-WERP Research Consortia, with co-investment by the research consortia. The two research consortia were led by CSIRO (Themes 1 and 2) and La Trobe University (Themes 3 and 4). Each theme had a Commonwealth Theme Lead and Coordinator embedded in the MDBA as part of the collaborative co-design and delivery. Themes 1 to 3 also had an End User Advisory Group (EUAG) and Theme 4 had a Community of Practice to engage and collaborate with end users.

Tactical investment

A total of 13 tactical projects were delivered by MD-WERP from 2019–20 to 2025–26 (Table 1). Key outputs included:

- technical reports
- communication products
- monitoring frameworks
- models/algorithms
- better understanding of Basin condition trends and drivers
- capacity building.

Table 1. Description of tactical projects

Tactical project	Description
TP03 Evaluation of causes of reduced flow through the Northern Basin	Explains the causes of reduced flow in the northern Basin
TP07 Innovation sweep, scoping and development of drone-based waterbird monitoring	Innovation sweep forming a watch-list of emerging technologies that have the potential to be used to monitor ecological outcomes of interest to the MDBA at the landscape scale. Developed an automated tool for counting nesting waterbirds using drone imagery
TP09 Waterbirds foraging habitat	A method for identifying and prioritising foraging habitats for potential management to support waterbirds throughout their lifecycle
TP12 Riverbank stability and erosion	Synthesis of the scientific knowledge on the influences on erosion in the different reaches of the River Murray. Communication products to explain drivers of bank erosion along the River Murray. Developed a River Murray erosion monitoring plan for riverbanks along the main channel.
TP13 Summary and analysis of blue-green algal trends in the Basin	Synthesis of knowledge and trend analysis of Blue Green Algae blooms in the Basin
TP17 Operational ranges of the River Murray fishways	Investigation of fishway functionality at Locks 6-10 on the Murray River and provision of operational guidelines to maximise future fish passage potential
TP18 Enhancing local fish communities on Country by utilising natural managed waterbodies as nursery ponds for native fish	Better understanding and improving the effectiveness of utilising environmental flows, natural managed wetlands and native fish stock enhancement practices to recover threatened native fish
TP19 A rapid-assessment tool for hydrological indicators	Developed an efficient model for predicting site-specific flow indicator (SFI) achievement for any environmental water recovery amount
TP20 Assessing anthropocentric and climatic risks to future groundwater conditions in the Murray–Darling Basin	Explored the applicability of data-driven approaches for investigating groundwater use patterns in the Basin in relation to surface water availability and climate variability

Tactical project	Description
TP24 Demonstrating the ability of long-range forecasts to enhance annual environmental water planning	Demonstrated a proof-of-concept approach to forecasting wetland inundation at sub-seasonal to annual time scales and a framework describing how these forecasts may provide insight into the likelihood of waterbird nesting outcomes
TP26 First Nations data for Local Water Community Insights	Providing advice for an on-going approach to the ethical use of First Nations data from publicly available sources
TP33 Testing and refining the experimental Hume and Dartmouth Dam inflow forecasting method	Investigated how sub-seasonal to seasonal streamflow forecasts may be of value to MDB river operators. Investigated the performance of hydrological model-derived ensemble streamflow forecasts for inflows into major reservoirs in the headwaters of the Murray River with climate model forcing
TP36 Yorta Yorta X-ray of Country	Drone surveys to support First Nations understandings of Country and impacts of river regulation on creation stories First Nations people

Communication, Adoption, Transparency and Engagement (CATE)

The overarching technical objectives of the Program's CATE component aimed to ensure available research outcomes were effectively understood, synergised across themes and integrated with other MDBA functions. The technical objectives were intended to guide and integrate with the communication objectives.

The overarching communication objectives aimed to ensure the research outcomes were effectively communicated to the target stakeholder groups and the information was translated into narratives that can be easily understood, adapted and translated for multiple uses, including the development of new and updated policies.

To achieve these objectives the purpose and audience for CATE was clearly defined (Figure 2). To assist achievement of the CATE objectives, a CATE Delivery Partner (Elysium EPL and Water Technology) was engaged to support the MD-WERP Implementation Team by delivering against the focus areas of end-user engagement and adoption, integrating research outcomes, and science translation and communication (Table 2).

Key outputs from the CATE investment were:

- Synergies of Outcomes Report – identified areas of research from the 4 strategic themes that can be brought together to enhance decision making and knowledge of the Basin.
- Knowledge Hub – improved communication and increase end-user engagement/ adoption, enabling effective policy development.
- Science Narrative – supported policy translation and provide foundational communication to various target audiences.

- Synthesis Report – examined the emergent messages coming from the Program and the broader science narrative and identified future research opportunities to build on the MD-WERP foundation.
- Quarterly Program newsletter – updated stakeholders on progress and highlight projects.
- Annual progress updates – demonstrated progress in meeting the Program's objectives with a comprehensive summary of Program activities, outcomes and outputs.
- Newsroom stories and social media – shared good news regarding milestones and regional content.
- Annual symposium – shared and discussed research and knowledge developed through the Program, exploring future research opportunities, and discussing approaches for adopting the research findings for the benefit of the Basin and its communities.

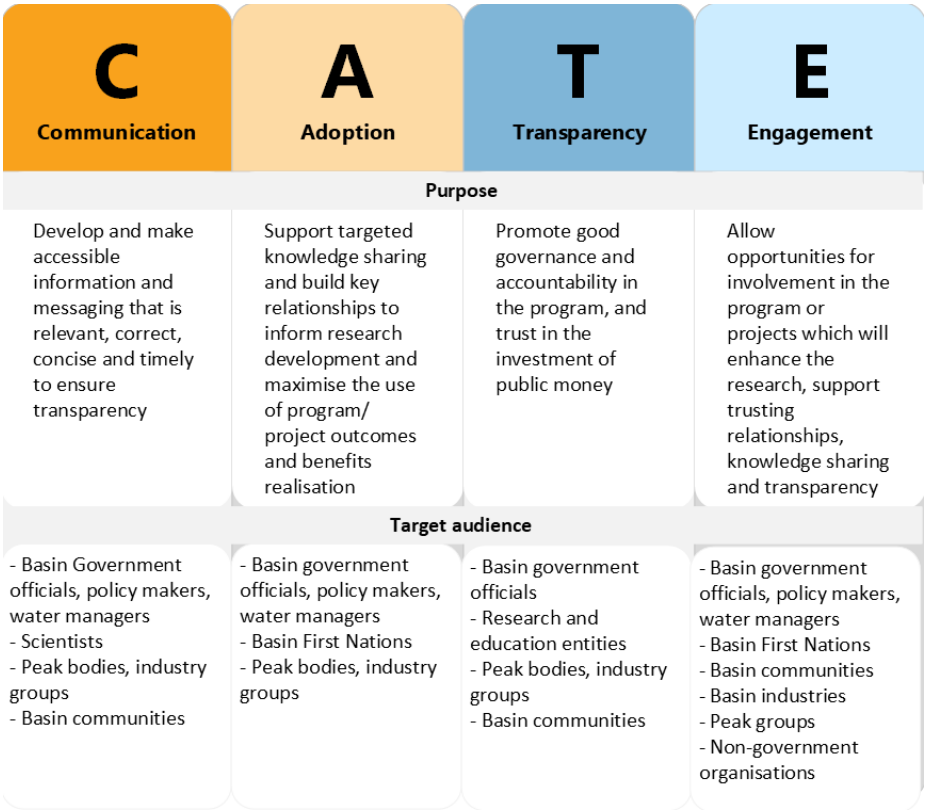


Figure 2. Purpose and audience of MD-WERP CATE investment stream

Table 2. Focus areas of the MD-WERP CATE Delivery Partner.

Drive end-user engagement and adoption	Integrate research outcomes for demonstration of policy exploration and application	Provide Program-level science translation and communication
Advise on how to best activate end user engagement and championing and assist in end user agencies transitioning from interested observers to active users of the research	Facilitate cross-theme workshops to encourage knowledge sharing and generate ideas for integrating research outcomes. Develop a 'Synergies of outcomes' report to identify and explain research synergies across the strategic research themes that can be combined to aid decision-making and policy development and enhance sustainable management	Develop a technical synthesis science narrative to support science to policy translation as a foundation for project communications and build on research integration by synthesising research outputs to develop a narrative for target audiences (i.e., key recommendations or findings for policy makers)

2. Evaluation methods

The evaluation methods were first presented to the MDBA in the MD-WERP End-of-Program Evaluation framework report (Jacobs 2025a). These methods were reviewed and approved by the MDBA before being applied. This section outlines what we consider to be the key elements of the method. Full details were presented in a Gap Analysis and Evaluation Plan (Jacobs 2025b).

2.1. Evaluation scope

In scope

The End-of-Program Evaluation focuses on 2 of the 3 guiding Key Evaluation Questions (KEQs) from the MERI Plan (MD-WERP 2025a):

KEQ2: To what extent have Program activities and outputs effectively supported the achievement of Program outcomes?

KEQ3. To what extent has the Program improved our water policy, capacity to manage risks and river operations/water management outcomes?

The documents reviewed (see Appendix A) were provided by the MDBA, with additional reports and journal articles sourced online, where deemed necessary.

Out of scope

KEQ1 (To what extent was the Program implemented in an efficient manner?) was assessed in the Mid-term Evaluation (MD-WERP 2025b) and at the request of the Governing Panel was not included in the End-of-Program Evaluation.

Furthermore, First Nations engagement, co-design and project delivery was not within scope. An Indigenous supplier was contracted separately to undertake the First Nations evaluation. That said, Theme 4 (which included First Nations research) was part of the Program and some reference to the Program's experience with First Nations research is inevitably touched on in this report when addressing the KEQs and sub-KEQs.

A critique of individual research projects for the purpose of evaluating the benefit of the outcomes was also out of scope and we note that one was not conducted at the time of writing.

Documents that weren't shared by the MDBA weren't explicitly within scope.

2.2. Evaluation objectives and audience

Table 3. sets out the objectives, evaluation domains and audience for the End-of-Program Evaluation, as stated in the MD-WERP MERI Plan (MD-WERP 2025a).

Table 3. Focus of the End-of-Program Evaluation

Evaluation objectives	Evaluation domains	Audience
• Review and assess the effectiveness and impact of the Program in meeting its key objectives and contributing to Australia's capacity to better manage and address current and future conditions of the Murray–Darling Basin. • Reflect on the Program's achievements against the KEQs. • Be transparent about the value of the Program in achieving outcomes and setting up a platform for ongoing research.	Effectiveness Impact	• Australian Government (funding body) • Internal MDBA Executive • External stakeholders (e.g. state governments, research institutions, broader public)

2.3. Theory of change

The Theory of Change (ToC) approach to program evaluation involves mapping out the pathway from a program's activities to its intended outcomes. It involves identifying the desired objectives and then working backward to determine the necessary steps, inputs, and/or activities required to achieve those objectives. This method helps clarify how and why

a program worked, or was expected to work, by making explicit the causal links between inputs, outputs, outcomes, and impacts.

At the end of a program, ToC helps assess whether the program achieved its intended outcomes and whether the assumptions and causal pathways outlined at the beginning held true. This can be especially valuable for identifying which components of the program were most effective, where gaps occurred, and how external factors may have influenced results.

The MD-WERP MERI Plan presents a theory of change for the Program (also referred to as a program logic) whereby a series of actions, supported by the Program inputs, deliver a series of outputs, which in turn will deliver short-term outcomes that converge to support the high-level Program outcomes (Figure 3).

This End-of-Program Evaluation was based around this programmatic ToC and included investigation of governance processes, co-design activities, collaboration activities, outputs, and outcomes being achieved for policy and management end users.

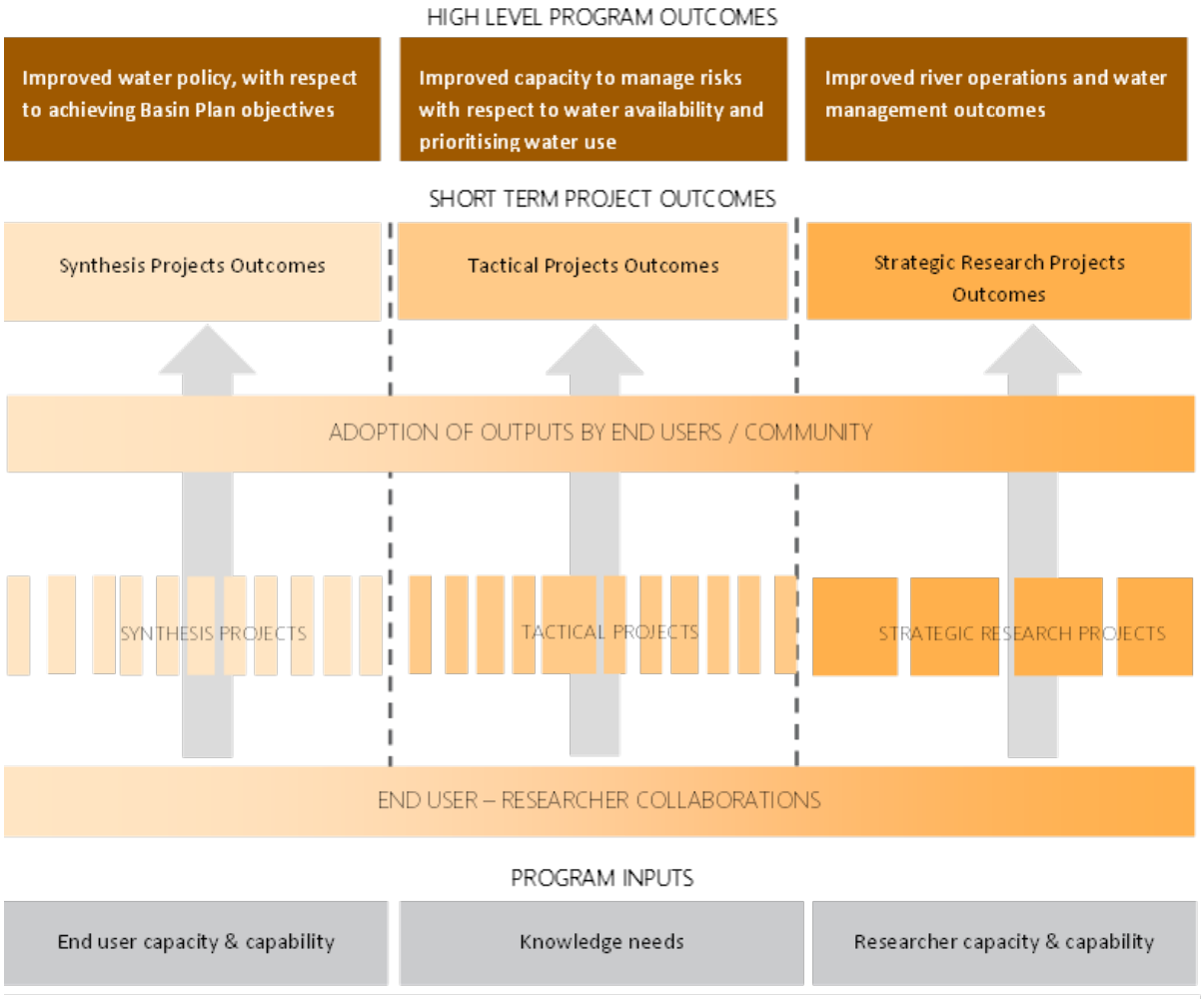


Figure 3. Summary of the MD-WERP theory of change / program logic

2.4. Key evaluation questions, sub-questions, and domains

For the purpose of program evaluation, key questions are often ascribed to given evaluation 'domains'. Evaluation domains are areas of inquiry that provide focus for an evaluation (see Figure 4 for examples). The 2 KEQs that are the focus of this evaluation fall into the Effectiveness domain (KEQ2) and Impact domain (KEQ3).

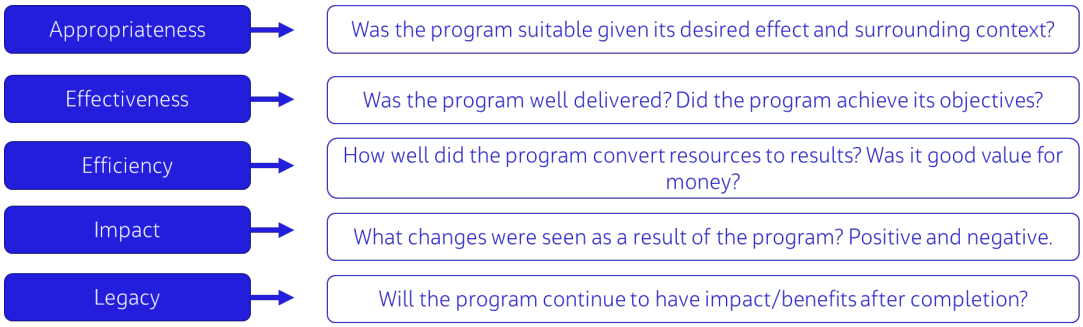


Figure 4. Evaluation domains

To aid in the evaluation of the overarching KEQs, additional sub-questions were developed in collaboration with the MD-WERP Governing Panel.

- KEQ2 (Effectiveness domain)
    - Has the Program met its objectives?
    - How did the Program meet the needs of emerging issues and react flexibly to changing research priorities within the Program structure?
    - Was the collaboration between researchers and policymakers maintained successfully throughout the Program?
    - Has MD-WERP research produced fit-for-purpose products or tools to enhance adoption and achieve benefits?
- KEQ3 (Impact domain)
    - Has the Program enhanced our understanding of the Basin across the quadruple bottom line?
    - Does the Program meet the needs of end users?
    - Are the outputs well utilised and being effectively used to inform evidence-based policy development, risk management and river operation/water management?
    - Is there a clear pathway for benefits realisation in the future?
    - Has the Program influenced enduring research in the Basin?

2.5. Evaluation indicators and evidence

Table 4 sets out the indicators and evidence needs for the MD-WERP End-of-Program Evaluation, based on the Program objectives, evaluation domains, KEQs and the KEQ sub-questions.

Indicators and evidence needed to respond to both KEQ2 and KEQ3 has considered tactical research projects as well as the four priority themes of the strategic research components of the Program (i.e. Climate adaptation, Hydrology, Environmental outcomes, and Social, economic and cultural outcomes).

Indicators and evidence needed to respond to KEQ3 also considered the primary areas of impact where the Program was expected to deliver value (i.e. policy, risk management, and river operations and water management).

Table 4. Key evaluation questions, sub-KEQs and indicators

Domains	Key question	Sub-questions	Indicators and evidence to consider

Effectiveness	KEQ2: To what extent have program activities and outputs effectively supported the achievement of program outcomes?	Has the Program met its objectives?
		
		The objectives of the Program are:
		• Maximise value to water reform and management from investment
		• Leverage co-investment with research providers and key stakeholders
		• Facilitate adoption of research by advancing cooperation between users and researchers
		• Invest in applied research that delivers better informed environmental water management decisions by Commonwealth agencies and improved outcomes for communities
		• Be a platform from which to launch a more enduring research program.
			• Evidence that governance processes were in place to align research with program objectives (e.g. application assessments, review processes, change process etc)
			• Evidence that the Program maximised value to water reform and management from investment
			  ○ Examples of instances of improved knowledge for each of the research questions
			  ○ Examples of improved knowledge relating to developing appropriate reform and policy responses
			  ○ Examples of improved knowledge to support effective risk management
			  ○ Perception by policy makers, river operators and / or water managers, researchers, and community members that MD-WERP research outcomes have improved outcomes for the environment and Basin communities
			• Evidence that co-investment with research providers and key stakeholders was leveraged
			  ○ Proportion of total investment that involved co-investments
			• Evidence that the Program facilitated adoption of research by advancing cooperation between users and researchers
			  ○ Evidence of appropriate and timely engagement with intended end users to increase likelihood of research being fit for purpose
			  ○ Examples of projects that involved collaboration between researchers and policy makers/river operators/water managers
			  ○ Perception of value of research outputs and outcomes for adoption by river operators / water managers
			• Evidence that the research delivered better informed environmental water management decisions by Commonwealth agencies and improved outcomes for communities

Domains	Key question	Sub-questions	Indicators and evidence to consider
			○ Examples of ways improved knowledge is contributing to improved water management decisions ○ Examples of projects that have led to improved water management decisions ○ Perception of value of research outputs and outcomes for adoption by policy makers ○ Perception of improved knowledge contributing to improved management actions and strategies by river operators/water managers • Evidence that the Program provided a platform from which to launch a more enduring research program ○ Likelihood rating or net promoter score from each stakeholder group that they would participate in or recommend to others a similar research program again ○ Examples of researcher partners adopting or planning to adopt features or lessons learned from this research program into their future research approach
		How did the Program meet the needs of emerging issues and react flexibly to changing research priorities within the Program structure?	• Evidence of the Program's flexibility with respect to changing research priorities within the Program structure ○ Evidence of mechanisms/processes to adapt projects ○ Evidence the projects changed from their original plans, with records to explain the rationale for the change (proof it was related to changing research priorities – not just lack of time, or preferred research focus of the delivery team) ○ Examples of projects that changed from their original plans to meet emerging needs and respond to changed research priorities • Perspectives of staff and initiative leads around ability to adapt in response to changing research priorities • Evidence of the purpose and need for tactical projects and their direct links to emerging issues

Domains	Key question	Sub-questions	Indicators and evidence to consider
			○ Number of tactical projects funded (and completed) with a clear need and direct link to emerging issues
		Was the collaboration between researchers and policy makers maintained successfully throughout the Program?	• Evidence of sustained productive and beneficial collaboration between researchers, policy makers, and water managers throughout the Program ○ Examples of projects that involved sustained collaboration ○ Perception of the level of productivity and benefit associated with collaboration between researchers, policy makers and/or river operators/water managers
		Has MD-WERP research produced fit-for-purpose products or tools to enhance adoption and achieve benefits?	• Evidence of fit-for-purpose products or tools to support adoption and application of knowledge generated through the Program ○ Evidence of a clear purpose/need for products or tools developed through the Program, with the purpose/need driven by policy makers, river operators and/or water managers. ○ Perspectives of policy makers, river operators/water managers around the appropriateness and usefulness of products developed through the Program ○ Examples of 'fit-for-purpose' products or tools developed. ○ Evidence/examples of products or tools that improve Basin Plan-related water policy, improve risk management with respect to water availability and water use, improve outcomes from river operations and water management.
Impact	KEQ3. To what extent has the Program improved our water policy, capacity to manage risks and river operations/water management outcomes?	Has the Program enhanced our understanding of the Basin across the quadruple bottom line?	• Perception of the extent to which the Program has enhanced understanding of the Basin across the quadruple bottom line. • Examples of projects with a focus on improved knowledge for each element of the quadruple bottom line.
		Does the Program meet the needs of end users?	• Evidence of Program outputs (in development &/or planned) that will assist policy development, risk management, and river operations/water management. • Policy-makers – number of projects that directly reference recommendations or applications for policy makers; perception of policy makers about the extent to which the Program met their needs.

Domains	Key question	Sub-questions	Indicators and evidence to consider
			• River operators and/or water managers – number of projects that directly reference recommendations or applications for river operators and/or water managers; perception of river operators and/or water managers re the extent to which the Program met their needs.
		Are the outputs well utilised and being effectively used to inform evidence-based policy development, risk management and river operation/water management?	• Examples/number of improvements (or plans for improvement) to evidence-based policy, risk management, and river operation/water management resulting from Program outcomes and outputs • Perspectives on the extent to which Program outputs have been (and continue to be) used to inform improved evidence-based policy, risk management, and river operation/water management • Where Program outputs are not seen to be useful, rationale for why this is the case (e.g., What is it about the outputs that make them inappropriate for use? Was the target audience consulted appropriately prior to commencement of the research and development of outputs?) (similar to sub-KEQ: Has MD-WERP research produced fit-for-purpose products or tools to enhance adoption and achieve benefits?)
		Is there a clear pathway for benefits realisation in the future?	• Evidence of a program structure that facilitates benefit realisation from research from start to finish • Evidence of benefit realisation released following completion of the program
		Has the Program influenced enduring research in the Basin?	• Perspectives of policy makers, river operators/water managers, researchers and the community around the ability of the Program to have an enduring influence on research in the Basin • Qualitative assessment of the enduring influence of the research Program in the Basin, based on answers to sub-KEQ2 – Has the Program met its objectives? (Evidence the Program has been successful enough to garner support for a more enduring research program)

2.6. Performance assessment scale

Figure 5 shows the performance assessment scale used for evaluating each of the KEQs and sub-KEQs. The performance assessment scale provides a qualitative assessment of how MD-WERP has performed against the evaluation questions. The evaluation questions (presented in Section 0) are the benchmark for the assessment.

The purpose of the performance assessment scale is to support the accompanying evaluation narratives, enable findings to be concisely summarised and communicate clearly where there are areas for improvement.

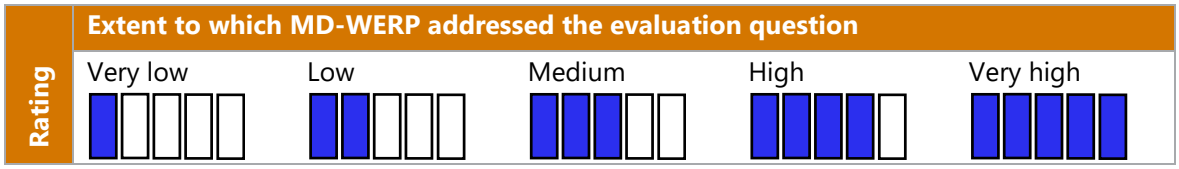


Figure 5. Performance assessment scale

2.7. Data collection approach

Document review and gap analysis

The Program information available online and/or provided by the MDBA's MD-WERP Implementation Team was reviewed during a gap analysis. This included the Program documents (MDBA naming conventions retained) listed in Appendix A.

The content and type of information available was cross-checked against the indicators and evidence needed to respond to the KEQs and sub-KEQs (Table 4). Data and information gaps were identified based on a perceived (qualitative) lack of sufficient evidence (Jacobs 2025b). The most frequently identified gap in information related to the adoption and use of Program outputs and outcomes by end users. Another gap was the documentation of actions resulting from engagement with EUAGs, including changes to project goals and approaches to ensure fit-for-purpose outcomes and outputs (i.e. were end-user needs properly listened to and considered when projects were designed and/or modified?).

To support a comprehensive evaluation, we sought to collect the required information using a mix of surveys, interviews and a 'Lessons learned' workshop.

Semi-structured interviews

Interviews provide an opportunity to explore in-depth program experiences, achievements, impacts and opportunities. Interviews allow a deeper understanding of what did and didn't work at both the program and project level.

For the purposes of this evaluation, interviews were conducted with:

- Governing Panel members (Independent Chair, DCCEEW, CEWH, MDBA) – 4 people
- MDBA Program Delegate – one person
- Research Consortium Director (La Trobe University) – one person
- Research Consortium Program Manager (CSIRO) – one person.

Interview questions aimed to complement existing data and information, and fill information gaps identified in the gap analysis, supplementing the survey approach. Interviews were also used to clarify information and build further understanding of the Program. Interviews took place via video call. Interview questions and discussion topics are presented in 0.

Survey

For the purposes of this evaluation, surveys were developed for distribution to all known EUAG members (Appendix C) to help fill knowledge gaps and to strengthen evidence for addressing the KEQs. Theme leads helped to distinguish which EUAG members identified as policy makers, water managers, and researchers so that different perspectives could be sought. In total 18 responses to the surveys were received while the number for each group was as follows:

- EUAG policy makers – 5 responses
- EUAG water managers – 11 responses
- Key research consortium collaborators – 2 responses

Surveys predominantly included general questions that were sent to all participants, as well as some specific questions targeted at members of the three groups (see Appendix D).

Lessons Learned Workshop

The online Lesson Learned workshop was held on the 20 June 2025, and invited leadership across the themes to reflect on what did and didn't work during the Program and its legacy. Invitees included a selection of the Program's Implementation Team, Commonwealth Theme Leads and Coordinators, Consortia Research Leads and Project Managers.

The workshop explored lessons learned in relation to:

- Program achievements – in particular its objectives
- Program governance, management and relationship management – in particular how these have affected the achievement of Program objectives
- co-design processes and collaborative research approaches and interactions between the Program research themes
- the approach to data management and storage.

Following the workshop, the outputs were collated and included in the evidence base for the Program Closure Report and Program Evaluation Report Appendix F(Appendix E).

Lessons learned gathered through the project closure reports, surveys, and interviews were added to this spreadsheet providing a complete summary for Program records.

3. Evaluation findings

3.1. Effectiveness

Rating	Rational
High 	MD-WERP demonstrated strong effectiveness in supporting its intended outcomes through well-structured governance, co-designed research, and high levels of stakeholder engagement. Strategic and tactical projects delivered fit-for-purpose tools that are already influencing Basin Plan Review processes. Collaboration between researchers and policy makers was a core strength, and the Program met its co-investment targets. Some limitations, particularly in Theme 4 regarding delayed delivery (and hence uptake) of social and cultural outputs, prevented a full score, indicating room for improved integration and adoption planning in future programs.

The MD-WERP successfully delivered applied research outputs that were highly relevant to environmental water management and policy development across the Murray–Darling Basin. Strategic and tactical projects produced tools such as HydroBOT, low-flow prediction models, and climate adaptation frameworks, many of which are already informing Basin Plan Review (BPR) processes and operational decision-making. Themes 1 through 3 demonstrated strong integration of outputs into MDBA workflows, while Theme 4 (focussed on social, cultural, and community resilience) generated valuable insights and foundations for further research and integration to realise their full potential.

The Program also maximised value for investment through robust governance structures, co-design processes, and impact planning pathways, supported by engagement activities such as annual symposia and development of the Knowledge Hub. Importantly, the Program met its co-investment target, with over 40% of strategic research funding contributed by research consortia and in-kind support from MDBA[1].

Collaboration between researchers and policymakers was a core strength of the Program, facilitated by embedded Commonwealth Theme Leads and Coordinators, End-User Advisory Groups (EUAGs), and structured engagement mechanisms. While collaboration was particularly strong in technical domains, Theme 4 faced challenges due to governance/contracting delays (i.e. related to Human Research Ethics Committee approvals, governance reviews, and contracting complexities connected to protecting Intellectual and

[1] The co-investment target and value of annual co-investment by CSIRO and LTU were taken from the MD-WERP Progress Reports.

Cultural Property) and the complexity of cultural engagement and co-design with First Nations people. The Program also demonstrated flexibility in responding to emerging issues, with several projects adapting their scope and methods in response to environmental events, stakeholder feedback, and evolving priorities. MD-WERP further established a foundation for enduring research in the Basin, with its co-design model, synthesis activities, and legacy tools such as the Knowledge Hub and CATE framework recognised as valuable assets for future programs.

Stakeholder feedback gathered through interviews, surveys, and the lessons learned workshop was overwhelmingly positive. Participants consistently described the Program as high value for money, well-managed, and impactful. Policymakers and water managers confirmed the usefulness of outputs, particularly those aligned with BPR, and praised the Program's collaborative approach. Many noted strengthened relationships between researchers and government agencies. However, it was also acknowledged that the full realisation of community outcomes, particularly those from Theme 4, will require additional time and continued engagement.

Sub-KEQ1 Has the Program met its objectives?

Rating	Rational
High 	MD-WERP largely met its five strategic objectives, delivering high-quality, applied research that informed water reform, supported environmental water management, and fostered collaboration between researchers and end users. Co-investment targets were exceeded, and the program laid a strong foundation for enduring research through its co-design approach and legacy tools like the Knowledge Hub. However, some limitations affected the full realisation of objectives related to social, cultural, and First Nations outcomes. Delays in governance (e.g. ethics approvals) and delivery of outputs from Theme 4 limited the ability for the outcomes to be integrated through the synergies of outcomes and synthesis work. While the Program was highly successful overall, there is room for improvement in integration and adoption planning across all strategic research themes.

To address this sub-KEQ the MD-WERP program was evaluated against its five strategic objectives. Generally, the evidence from project documentation, stakeholder interviews, surveys, and workshops indicates that the Program largely met its goals, delivering high-quality, policy-relevant research and establishing a strong foundation for future water and environmental research in the Murray–Darling Basin. The findings are summarised below and a detailed evaluation of each of the evidence streams is provided in Appendix F.

Objective 1: Maximise value to water reform and management from investment

The Program ensured that research investments were aligned with national water reform priorities through a rigorous co-design process involving Australian Government agencies (MDBA, CEWH, DCCEEW), researchers, and end users (including state government agencies). Strategic and tactical projects addressed pressing issues such as climate adaptation, low-flow

hydrology, ecological resilience, and supporting better outcomes from environmental watering. Key examples include:

- HydroBOT (T1.TK): A climate adaptation decision-support tool now integrated into Basin Plan Review workflows.
- Low-flow prediction models (T2.6): Used to improve environmental watering strategies and water resource planning.
- Floodplain inundation mapping (T2.7): Supporting infrastructure planning and ecological restoration.
- Waterbirds foraging habitat (TP09): informing managers when, where, and for how long management actions such as Commonwealth environmental watering might be needed managers when, where, and for how long management actions such as environmental watering might be needed.

These outputs were supported by synthesis activities such as the Knowledge Hub and annual symposia, which improved accessibility and uptake of research findings.

Objective 2: Leverage co-investment with research providers and key stakeholders

The MD-WERP research consortia exceeded their co-investment target, securing $6,586,941 of in-kind contributions. This included staff time, data sharing, and infrastructure support from CSIRO, La Trobe University, and other partners. The high level of co-investment reflects strong partnerships and shared ownership of research outcomes, enhancing the Program's overall value and sustainability.

Objective 3: Facilitate adoption of research by advancing cooperation between users and researchers

Collaboration between researchers, policymakers and water managers was a central feature of MD-WERP. Embedded Commonwealth Theme Leads and Coordinators, and EUAGs ensured outputs were relevant and usable. Examples of successful cooperation include:

- Climate adaptation toolkit (T1.TK): Co-developed with MDBA staff and integrated into quality assurance processes.
- Groundwater optimisation tools (T2.8a): Refined based on feedback from operational teams.
- Species vulnerability mapping (T3.11.4): Delivered via a Shiny app co-designed with policy staff.

Theme 4 faced challenges with an extended co-design period for First Nations projects, and limited representation on the CoP. For instance, the mental health benefits of ecosystem health project (T4.12.1) and tourism and recreation benefits (T4.12.2) produced novel evidence, but their target audience weren't present/were underrepresented on the CoP. This led to uncertainty about who within the MDBA or Basin state governments would champion integration of their outcomes into policy development or water management. It was also noted that the CoP members were more familiar with models, data sets, and operational

tools rather than qualitative or participatory outputs from social research and were therefore not the most suitable group to champion these kinds of outputs.

Objective 4: Invest in applied research that delivers better informed environmental water management decisions and improved outcomes for communities

The Program delivered applied research, some of which is already influencing environmental water management decisions and others for which the likelihood of influence appears high. Through co-designed strategic and tactical projects, the program produced tools and knowledge tailored to the needs of the Australian Government. Examples include:

- T1.TK Climate adaptation toolkit (including HydroBOT) is now used in BPR scenario planning and environmental watering strategies.
- T2.6 Low flow prediction models improved the simulation of low flows, supporting CEWH's water delivery planning.
- T2.7 Floodplain inundation mapping tools are being used to assess environmental watering options and infrastructure risks.
- T2.H.3 Hydrological non-stationarity analysis, which supported long-term planning under changing climate conditions.
- T3.11.4 Species vulnerability assessments provided a Shiny app for visualising biodiversity risks under climate change, now integrated into MDBA workflows.
- TP07 Drone-based waterbird monitoring, produced a drone monitoring, automated counting tool which is expected to improve monitoring efficiency and coverage (although not yet utilised).
- TP13 Blue-green algae synthesis, which provides a knowledge synthesis that is expected to inform risk mitigation strategies for water quality (although not yet utilised).

Adoption and engagement were embedded throughout the program. Commonwealth Theme Leads and EUAGs ensured outputs were relevant and usable. The Knowledge Hub and plain-language explainers helped make complex research accessible to policymakers and water managers.

While Theme 4 produced valuable outputs through projects such as T4.14.3 Navigating change and T4.14.2 Pathways to community resilience, these require further integration into MDBA's policy and engagement frameworks.

Objective 5: Be a platform from which to launch a more enduring research program

MD-WERP established a strong foundation for future research in the Basin. Its co-design model, structured impact pathways, and legacy tools such as the Knowledge Hub, CATE Framework, and data management approach by MDBA are recognised as valuable assets. Stakeholders expressed high confidence in the Program's design and delivery, with many indicating a strong likelihood of participating in or recommending similar programs in the future.

Examples of enduring influence include:

- Water cultures (T4.14.4): A formative project that explored cultural relationships with water and is informing future engagement strategies.
- Climate–hydrology modelling (T1.FS): Feeding into ongoing Basin Plan Review and state-level planning.
- Fish ecology studies (T3.11.2): Integrated into long-term monitoring and restoration efforts.

The absence of enduring funding mechanisms and the need for continued integration of outputs were noted as areas requiring attention.

Sub-KEQ2 How did the Program meet the needs of emerging issues and react flexibly to changing research priorities within the Program structure?

Rating	Rational
High 	MD-WERP demonstrated strong flexibility in responding to emerging issues, supported by a layered governance structure, risk management processes, and mechanisms like Project Variation Requests (PVRs). Tactical investments were particularly effective in addressing short-term needs, and several strategic projects adapted their scope in response to environmental events and stakeholder feedback. Some researchers noted that change processes could be cumbersome, and flexibility was constrained by rigid deliverables and late-stage reporting changes. These limitations reduced the overall responsiveness of the Program to a degree.

MD-WERP demonstrated a high degree of flexibility in responding to emerging issues and shifting research priorities. This adaptability was supported by a layered governance structure, a robust risk management framework, and mechanisms such as Project Variation Requests (PVRs), which enabled adjustments to project scope, budget, deliverables, and timelines. Several strategic projects modified their approaches mid-delivery in response to environmental events, stakeholder feedback, and evolving policy contexts. For example: ecological modelling projects in Theme 2 (e.g. T2.H.3) and Theme 3 (e.g. T3.11.3 and T3.11.4) revised their methods to incorporate updated hydrological scenarios; while Theme 4 projects (e.g. T4.14.2 and T4.14.3) adapted their engagement strategies in response to cultural sensitivities. Furthermore, tactical investments were scoped to address immediate operational needs, with projects such as TP07 (Drone-based waterbird monitoring), TP13 (Blue-green algae synthesis) and TP17 (Operational ranges of the River Murray fishways) delivering timely, fit-for-purpose outputs.

Stakeholder perceptions of the Program's responsiveness were largely positive. Interviews, surveys, and the lessons learned workshop highlighted the value of the Program's layered governance model, which enabled autonomy while maintaining accountability. The MD-WERP Implementation Team was commended for its clear communication and support.

However, several limitations were identified that constrained the Program's overall responsiveness. One of the most frequently cited issues was that the change process could be cumbersome. While PVRs were available, researchers reported that the procedures for modifying deliverables were often slow, particularly for projects requiring ethical approvals. For instance, T1.TK, T2.6, T2.7, T2.8a, and T2.8b all reported that PVRs and modification approvals slowed research adaptation, even when technical work was moving ahead.

Another criticism was that the role of EUAGs in either approving or advising on deliverables was not consistently understood. This ambiguity led to delays in project deliverable approvals and confusion about the level of influence EUAGs had over changes in research direction. Theme 4 projects were particularly affected by these limitations. These projects required more time and flexibility than the Program structure allowed. For example, working with First Nations people requires time for relationship building, and culturally appropriate engagement and co-design, which was not acknowledged in the first few years of the Program.

Sub-KEQ3 Was the collaboration between researchers and policymakers maintained successfully throughout the Program?

Rating	Rational
High 	MD-WERP achieved a high level of collaboration between researchers and policy makers, where co-design, embedded Commonwealth Theme Leads and Coordinators, and EUAGs/CoP ensured sustained, productive engagement (particularly in Themes 1 to 3). These mechanisms were instrumental in aligning research outputs with policy needs and operational priorities. However, Theme 4 revealed critical gaps (e.g. limited social policy representation in the CoP) highlighting inconsistencies in engagement across themes. While the Program set a strong precedent for integrated science–policy partnerships, these structural weaknesses prevented a perfect score.

In addressing this sub-KEQ the collaboration between researchers and policymakers and between researchers was evaluated across the Program's themes. Collaboration between researchers and policymakers was a defining strength of the MD-WERP, particularly within the technical themes (1 to 3). These themes benefited from sustained engagement through co-design processes, embedded Commonwealth Theme Leads and Coordinators, and iterative feedback loops that ensured outputs were policy-relevant and integrated into Basin Plan Review workflows. For example, the Climate adaptation toolkit (T1.TK) was co-developed with MDBA policy teams and is now embedded in Basin Plan Review scenario testing. Similarly, hydrological modelling projects such as T2.6 and T2.8a were refined based on feedback from river operations staff, resulting in tools that are now used in water delivery optimisation and low-flow forecasting. Ecological modelling projects (e.g. T3.11.3 and T3.11.4) developed species vulnerability assessments and interactive tools (e.g. Shiny apps) in collaboration with MDBA staff, ensuring direct applicability to biodiversity risk planning.

Collaboration within Theme 4 was more fragmented and faced several structural challenges. A key issue raised in the project closure reports and surveys was that the CoP was structured primarily around technical expertise and there was little representation from social science, public health, tourism or community resilience perspectives. For instance, a survey respondent noted that "the end user advisory group [CoP] for Theme 4 was limited to economic rather than social policy membership" which reduced the effectiveness of feedback and alignment with policy needs. As a result, projects such as T4.12.1, T4.12.2, T4.14.2 and T4.14.3 often struggled to secure meaningful review or ownership within the CoP. The research outputs (e.g. wellbeing indicators, tourism datasets, resilience frameworks and community adaptation insights) were seen as difficult to validate within CoP processes, and no clear MDBA or state champions emerged to advocate for their adoption. This limited the CoPs effectiveness as a translation pathway for Theme 4, pushing researchers to rely instead on mechanisms such as other CoPs, symposia and direct engagement with councils, NGOs and community groups to ensure their findings were heard and applied.

Stakeholder feedback on collaboration gathered through interviews, surveys, and the lessons learned workshop was generally positive. Participants described researcher–policymaker relationships as genuine and productive, especially in technical areas. For example, survey responses indicated that 83% of participants agreed that collaboration was productive and beneficial, and 78% agreed that the Program advanced cooperation leading to improved adoption of research outcomes. However, several stakeholders acknowledged that collaboration in Theme 4 was inconsistent and that the lack of early engagement with appropriate end users limited the relevance and uptake of outputs. These criticisms underpin several key recommendations for future programs discussed in Section 4.

Despite the productivity of engagement with EUAGs, the process was often reported to be resource intensive. This was attributed to the MDBA and state representatives having to spread their time across multiple groups, the technical complexity of outputs that demanded long and detailed discussions, and that researchers had to invest heavily in preparing materials. The Mid-Term Evaluation (2023) and closure reports (e.g. T2.6, T2.7, T4.12.1, T4.14.2, T4.14.3), and Engagement and Adoption Plan (MDBA 2025h) observed this challenge, highlighting the need for leaner, better-targeted engagement in future Basin research programs.

For the Program as a whole, cross-theme collaboration among researchers appeared to be limited, reportedly because the program was designed and governed in Theme-based silos, adoption pathways differed between technical and social outputs, and time/engagement burdens limited cross-theme integration. These issues were identified in the Mid-Term Evaluation (2023), the Synergies of Outcomes Report (2024), and the Synthesis Report (2025), all of which recommended stronger front-end co-design, clearer cross-theme governance, and earlier investment in integrative synthesis. They were also raised in the lessons learned workshop, where participants highlighted the need for more structured cross-theme planning

and joint workshops. It was noted that some integration occurred (e.g. ecological modelling from Theme 3 informing community resilience work in Theme 4) but these instances were ad hoc rather than systematically embedded.

Sub-KEQ4 Has MD-WERP research produced fit-for-purpose products or tools to enhance adoption and achieve benefits?

Rating	Rational
High 	MD-WERP delivered a wide range of fit-for-purpose tools (e.g. low-flow prediction models, and ecological risk assessment apps) that were co-designed with end users and are already being used in Basin Plan Review and operational decision-making. These outputs are technically robust, policy-aligned, and supported by strong engagement mechanisms like EUAGs and embedded Commonwealth Theme Leads and Coordinators. However, the adoption of Theme 4 outputs has been delayed through governance approval processes and limitations related to EUAG membership. Therefore, while the Program clearly demonstrated its capacity to produce usable, impactful tools, uneven uptake across themes prevented a top score.

MD-WERP delivered a range of fit-for-purpose products and tools, particularly in the technical themes of climate adaptation, hydrology, and environmental outcomes. These outputs were co-designed with end users, including policymakers, water managers, and operational staff, and several are already embedded or being integrated into Basin Plan Review workflows and business as usual operational systems. For example, HydroBOT developed under Theme 1 has been integrated into scenario testing and quality assurance processes, while low-flow prediction models and floodplain inundation mapping tools from Theme 2 are now used by MDBA operations teams to optimise water delivery and assess environmental watering strategies. Theme 3 contributed predictive ecological models and species vulnerability assessments, including a Shiny app developed with MDBA input, which is now used to inform biodiversity risk planning. These tools were supported by structured engagement mechanisms such as the EUAGs, embedded Commonwealth Theme Leads and Coordinators, and tailored communication and adoption plans, maximising the likelihood that outputs were relevant, accessible, and usable.

Stakeholder feedback provided through surveys confirmed the value of these outputs. Policymakers and water managers reported improved capacity to evaluate management approaches and inform environmental water decisions. Additionally, the Knowledge Hub was widely praised as a legacy platform that enhances accessibility and supports ongoing adoption.

As noted previously, the uptake of products from Theme 4 has been more limited, in part due to delays in project delivery and also due to an unclear uptake pathway. For example, youth engagement frameworks and community values typologies from T4.14.2 and T4.14.3 were well-received but lack defined mechanisms for uptake into MDBA's community engagement

strategies. Similarly, the approach to fit-for-purpose product development was more constrained in Theme 4; survey responses from researchers noted qualitative social and economic research outputs were not easily translated into policy-relevant formats, and that agencies lacked the capacity to use these types of data effectively. These issues underscore the need for improved co-design processes, clearer adoption pathways, and stronger integration of social and cultural research into policy frameworks.

3.2. Impact

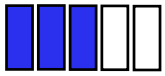
Rating	Rational
High * 	MD-WERP has had a substantial and tangible impact on water policy, risk management, and operational decision-making across the Murray–Darling Basin. It delivered a suite of high-value, co-designed tools (e.g. climate-hydrology models, ecological forecasting systems, and water quality risk assessments) that are already embedded in Basin Plan Review processes and MDBA workflows. These outputs have directly enhanced the evidence base for policy and improved the capacity of agencies to manage environmental risks and water operations. The adoption of social and cultural outputs from Theme 4 is ongoing, so there was no proof of adoption to assess, hence a less than perfect score. Nonetheless, it is apparent that the Program set a new benchmark for applied research in the Basin. Tangible evidence of its influence is already available in planning and policy frameworks, and its legacy tools and frameworks are positioned to support long-term improvements.

*** This rating is made in the context of the relatively short-term nature of the Program (5-years total with 4 years of research) and noting there is no promise of extension.**

MD-WERP has made a tangible contribution to improving water policy, risk management, and operational decision-making across the Murray–Darling Basin by producing a diverse suite of strategic and tactical research outputs. These outputs enhanced understanding across the quadruple bottom line (environmental, social, cultural, and economic dimensions) with many technical products already embedded in Basin Plan Review processes and MDBA workflows. Notable examples include predictive ecological models, climate-hydrology simulations, and water quality forecasting tools, which are reported to be informing policy and operational planning (see specific examples in Appendix F). Social outputs, such as community resilience frameworks, were also recognised as valuable, though their adoption has been slower due delays in delivery.

The primary intended end user of MD-WERP outputs was the MDBA and stakeholder feedback from the organisation was overwhelmingly positive, with participants consistently describing the Program as impactful, well-managed, and aligned with Basin Plan priorities. Themes 1 to 3 were particularly praised for delivering usable outputs, while Theme 4 was acknowledged as formative and promising, albeit requiring further support for integration. The Program was viewed as a model for future research investment, though concerns were raised about the absence of enduring funding mechanisms and the time required for full realisation of community and cultural outcomes.

Sub-KEQ1 Has the Program enhanced our understanding of the Basin across the quadruple bottom line?

Rating	Rational
Medium 	MD-WERP made a strong contribution to enhancing understanding of the Murray–Darling Basin across environmental, social, cultural, and economic dimensions. Strategic research in Themes 1 to 3 delivered cutting-edge tools and models that advanced knowledge of climate impacts, hydrology, and ecological resilience within the Basin. Theme 4 broke new ground in social and cultural research, including First Nations engagement and community resilience, setting a precedent for future programs. However, as the work was more formative and the cultural research in particular faced significant challenges, the knowledge gained was less than planned (e.g. multiple projects were discontinued). The impact of outputs related to the economics of catchment management were also less clear than the environmental studies. Despite these "issues", MD-WERP broadened the scope of Basin science and knowledge and brought the concept of integrated, transdisciplinary research to the forefront, even if the Program did not fully realise its transdisciplinary goals. The Program has filled critical knowledge gaps and conducted research that will likely influence future work in emerging disciplines.

The MD-WERP program significantly enhanced understanding of the Basin across the quadruple bottom line (environmental, social, cultural, and economic dimensions) though the depth of impact to date varied across themes.

Environmental understanding was most strongly advanced through Themes 1 to 3. For example, T3.11.4 developed species vulnerability assessments under climate change, including a Shiny app now used by the MDBA to visualise biodiversity risks. Similarly, T2.6 improved low-flow prediction models, which are now informing environmental water planning and delivery strategies. These outputs are already embedded in Basin Plan Review workflows and have strengthened the evidence base for ecological and hydrological decision-making.

Social understanding was improved through Theme 4 projects such as T4.14.3, which developed a typology of community values and concerns related to water management. This work is helping to inform more nuanced engagement strategies and policy framing. T4.14.2 explored youth perspectives on climate adaptation and community resilience, offering insights into how younger generations perceive and respond to water-related change. These outputs are beginning to influence MDBA's engagement strategies, though further integration is needed.

Cultural understanding, particularly in relation to First Nations perspectives, appears to have been advanced through projects like T4.13.2a, which developed the Sandstory protocol, a culturally appropriate method for sharing and embedding Indigenous knowledge in

environmental water planning. This project also produced engagement protocols that are now being considered for broader application across MDBA programs. The cultural research has reportedly faced several challenges that are outside the scope of this report to evaluate but have been touched upon. The examples of the research and their impact are fewer and less clear than the environmental, social, and economic realms, but the impression from the evidence evaluated for this report is that the work has helped lay a foundation for future cultural integration in Basin management.

Economic insights were less developed but still advanced through several projects. The T1.FS work modelled the impacts of climate change on water availability and agricultural productivity, providing a foundation for economic risk assessment. The T4.12.2 project quantified the tourism value of healthy rivers, linking ecological health to regional economic benefits. Additionally, the research identified the risks of over-reliance on water-dependent industries and the need for economic diversification in vulnerable communities. These findings support the case for integrated water and economic planning, though further investment in economic modelling is recommended.

In summary, MD-WERP broadened the scope of Basin science and set a new benchmark for integrated, applied research. It has successfully filled critical knowledge gaps in environmental and hydrological domains and laid the groundwork for future research in social and cultural areas. The evaluation highlighted several areas where future programs could build on these achievements (see Section 4).

Sub-KEQ2 Does the Program meet the needs of end users?

Rating	Rational
High 	MD-WERP was largely successful in meeting the needs of end users either directly or indirectly. Themes 1–3 provided several examples where co-designed tools were directly aligned with operational and policy priorities. These outputs are already being used by MDBA and other agencies, demonstrating strong relevance and usability. More examples will likely become clear with time. On the other hand, difficultly with engaging with state agencies meant that uptake of locally contextualised research has not been as strong as it could have been. It also appears more time should have been spent identifying pathways for the adoption of social and cultural outputs into policy and identifying appropriate end-users to engage with in these areas. While the Program delivered high-value outputs and strengthened relationships with end users, these inconsistencies across themes constrained its overall effectiveness in some areas.

In the context of this Program the types of end users are separated into tiers that describe the expected level of engagement and how they would be expected to use the research from the program (Table 5).

Table 5. MD-WERP End-users as defined in the Engagement and Adoption Plan (MDBA 2025h)

Tier 1 Direct Users	Tier 2 Indirect Users	Tier 3 Beneficiaries
• Commonwealth research partners (e.g. CSIRO, La Trobe University) • Basin Government water policy advisers (e.g. MDBA, DCCEEW, VEWH) • Basin Government water managers (e.g. WaterNSW, DEWSA, Sunwater) • First Nations people • Science community	• Basin Governments (i.e. Basin Plan policy developers, Basin state policy officers) • Private water managers • First Nations people • Local government and associated bodies • Science community • Basin Community Committee • Industry groups	• Peak bodies • Industry groups • Community groups • Environmental groups • Local government and associated bodies

For Tier 1 direct users the Program largely met their needs in hydrology and environmental outcomes. Theme 2 projects such as T2.6 and T2.7 were co-produced with MDBA and state hydrologists and delivered algorithms and model improvements now being embedded into operational Source modelling frameworks. T2.8a worked directly with MDBA river operators, CEWH and the Bureau of Meteorology (BoM) to trial ensemble inflow forecasts for operational decision-making at sites including Narran Lakes and Hume Dam. Outputs from Theme 3, such as the T2.10.1 conservation data atlas and T2.11.2 refuge waterhole persistence models, also provided Basin-scale tools to support SDL accounting and environmental water planning. These tools were transferred to MDBA data systems such as GitHub and MDBOK and cited by policy staff as valuable for environmental watering strategies and biodiversity planning. However, social and economic project outputs have been less well adopted. For example, T3.12.1 and T3.12.2 generated novel indicators and data, but project closure reports acknowledged that these lack clear "owners" within MDBA or Basin state governments, limiting their short-term integration into ongoing MERI or Basin Plan frameworks.

For Tier 2 indirect users the Program met needs unevenly. Positively, climate adaptation research (T1.FS and T1.SI) directly informed Basin Plan review processes and SDL adjustment considerations, while the MD-WERP Synthesis Report (2025) and the Synergies of Outcomes Report (2024) were prepared to provide Basin-scale lessons in a policy-ready form. Again though, socio-economic outputs were less straightforward for policy staff to use. For example, while T3.14.2 and T3.14.3 highlighted how regional communities respond to water reform, the Mid-Term Evaluation found that such findings were difficult for policy teams to incorporate into Basin Plan reporting compared to quantitative hydrology and ecology outputs.

For Tier 3 beneficiaries MD-WERP achieved mixed success in meeting needs. On one hand, several Theme 4 projects were designed specifically to meet the needs of community end-users and the participatory methods used gave communities a strong voice in the research.

For example, T3.14.3 engaged communities through workshops and interviews, producing narratives that captured local experiences of water reform and adaptation, which were accessible and meaningful to community participants. Similarly, T3.14.2 worked with councils and regional organisations to co-develop resilience frameworks, embedding social insights into Basin-scale discussions on adaptation. However, due to less clarity in adoption pathways noted above, many social and community findings relied on forums such as the annual symposia for dissemination, rather than being fully embedded in MDBA decision-making. There was no clear evidence in the Program literature how local community, government, and industry groups have or will benefit from the outputs.

Stakeholder feedback gathered through interviews and surveys confirmed that the Program improved end-user capacity to evaluate management approaches and inform environmental water decisions. Water managers and policy makers consistently described the outputs from Themes 1 to 3 as valuable and usable, citing examples such as predictive species models and groundwater integration tools. The Knowledge Hub was widely praised as a legacy platform that supports ongoing access and adoption. Understandably, several respondents noted that the full impact of the Program, particularly in community and cultural domains, will take time to materialise. They also suggested that future programs should invest more in capacity building to support the use of qualitative and cultural data in decision-making. Finally, as mentioned previously, there was a perceived lack of economic modelling related to water management in the Program which would conceivably represent a missed offering to end-users.

In summary, MD-WERP met the needs of end users in most areas, delivering high-value, fit-for-purpose outputs that are already influencing policy and operational decisions. The Program's structured engagement mechanisms and co-design processes were key strengths, but difficulties faced in Theme 4 revealed areas for improvement.

State governments

An additional evaluation finding that is aligned with this sub-KEQ, but requires separate treatment, is that involvement from Basin state governments wasn't strongly leveraged. To a degree this was by design, with the program focussing most strongly on the needs of the MDBA and other Australian Government water agencies. However, the lesser involvement, particularly during co-design, meant that some outputs lacked alignment with state-level operational needs. One interviewee noted that engagement with state governments was not particularly strong when establishing the Program which led to degree of disengagement by Basin state agencies. This may have manifested in the Program through limited ongoing support by state agencies, generally speaking. For instance, several MD-WERP project closure reports highlighted that while State government representatives were recognised as critical end-users, their limited availability and competing demands placed constraints on engagement. This was most clearly expressed in T2.8a and T2.8b. The Mid-term Evaluation (2023) also noted that state representatives were often heavily committed to other statutory

responsibilities (e.g. Basin Plan Review, SDL accounting, and water recovery programs) which limited the degree of engagement they could devote to MD-WERP projects.

While state government agencies are of course working with limited resources, these issues may be mitigated to a degree by undertaking more meaningful engagement early in these types of programs and making them more equal partners in the process. This may may encourage more in-kind support. Ideally, future programs should embed state representatives in governance structures and project teams from the outset (provided state government representatives are seen as a primary end-user). This would ensure research questions reflect diverse jurisdictional priorities. Doing so would strengthen adoption pathways, improve local policy relevance, and foster more coordinated water management across the Basin.

Sub-KEQ3 Are the outputs well utilised and being effectively used to inform evidence-based policy development, risk management and river operation/water management?

Rating	Rational
High 	MD-WERP produced a range of outputs (e.g. climate adaptation models, ecological forecasting tools, and water quality risk assessments) that are already being used to inform the Basin Plan Review, environmental water planning, and operational risk management. These outputs were developed with strong end-user engagement and have been embedded into MDBA systems and workflows. However, as the Program has only just concluded, the full extent of utilisation, particularly for social and cultural outputs, will take time to become clear. While early signs of uptake are promising, long-term impact will depend on continued integration, resourcing, and post-program monitoring.

MD-WERP delivered a wide range of outputs that are already being used to inform evidence-based policy, risk management, and river operations across the Murray–Darling Basin. Utilisation has been strongest for outputs from Themes 1 to 3, where technical products and tools have been co-designed with end users and embedded into operational systems. For example, Theme 1's HydroBOT (T1.TK10) and scenario modelling tools (T1.FS, T1.SA) are now integrated into Basin Plan Review workflows and ESLT method refinement. Theme 2's low-flow prediction models (T2.6), floodplain inundation mapping tools (T2.7), and groundwater integration frameworks (T2.8a/b) have been adopted by MDBA operations teams and are actively used in water delivery optimisation and risk planning. Theme 3 contributed predictive ecological models and species vulnerability assessments (T3.11.3, T3.11.4), including a Shiny app for biodiversity risk visualisation, which are informing environmental watering strategies and biodiversity policy.

Theme 4 outputs were also considered fit-for-purpose but have seen slower uptake. Slow uptake was reported in the closure reports of T4.12.1, T4.12.2, T4.14.2, and T4.14.3. The main reasons provided were lack of clear institutional owners, poor alignment with MDBA reporting systems, and weak representation in the CoP (as discussed in Section 3.1, Sub-KEQ3), which meant outputs were yet to be embedded into Basin Plan evaluation, policy frameworks or BAU activities. Theme 4 and some tactical projects also reported delays due to governance processes (e.g. internal governance reviews, ethical clearances). So, while valuable, they were delivered too late to enable integration into the Basin Plan Review or other time-sensitive decision-making processes (e.g. T4.14.4 and T4.13.2a).

Sub-KEQ4 Is there a clear pathway for benefits realisation in the future?

Rating	Rational
High 	MD-WERP established a clear and well-structured pathway for benefits realisation, particularly through its CATE Framework and Engagement and Adoption Plan (EAP). These frameworks embedded impact planning, end-user engagement, and benefit realisation mapping into every stage of the Program. For Themes 1–3, outputs have already been integrated into operational systems and Basin Plan Review workflows, with documented handover plans and business owners identified. It is unclear whether the pathway is appropriate for Theme 4. There has been little uptake recorded. It may be that the pathway is appropriate but was harder to follow in these less mature disciplines (in the water management space) as it appears the end-users and policy needs for the theme are ill defined. There is also an impression the policy frameworks aren't necessarily appropriate for incorporating the knowledge gained through social and first nations research. The impression is that work must be done across research and policy bodies to make the pathway to benefits both more visible and actionable for these disciplines.

MD-WERP successfully established a clear and structured pathway for benefits realisation, particularly for technical and policy-relevant outputs. This was achieved through the implementation of the CATE Framework and the Engagement and Adoption Plan (EAP), which together provided mechanisms for translating research into real-world outcomes. For Themes 1 to 3 the pathway is already operational. Outputs such as modelling tools, decision-support frameworks, and predictive ecological models have been embedded into Basin Plan Review workflows, operational systems, and risk planning frameworks. These outputs are supported by documented handover plans, accessible repositories (e.g. MDBOK, MDBA GitHub), and designated business owners responsible for their continued use. In contrast, Theme 4 has a conceptually clear but less mature pathway. Stakeholder input confirmed that the Program laid a strong foundation for benefits realisation, with the co-design process, structured impact pathways, and embedded end-user engagement consistently cited as strengths. However, risks to future benefit realisation were identified, including late delivery of some outputs, reliance on specific individuals or "champions" for adoption, and the need for sustained technical support and funding.

Sub-KEQ5 Has the Program influenced enduring research in the Basin?

Rating	Rational
Very high 	MD-WERP has had a clear influence on research in the Murray–Darling Basin, setting a new benchmark for collaborative, policy-relevant science. It established strong and potentially enduring partnerships between researchers, government agencies, and communities, and embedded tools, datasets, and methods into institutional practice. The Program's co-design approach, open data sharing, and interdisciplinary integration has reshaped stakeholder expectations for how Basin research is conducted. Stakeholders consistently described MD-WERP as a model for future programs, and its legacy tools (e.g. the Knowledge Hub) and frameworks (e.g. CATE, MERI) are already supporting ongoing research and planning. The Program has not only delivered outputs but also built the foundations for a more connected, resilient, and enduring Basin research ecosystem.

MD-WERP has had a demonstrable and positive influence on enduring research in the Murray–Darling Basin. Evidence from Program documentation, stakeholder interviews, and surveys indicates that the Program has not only produced high-quality research outputs but also established lasting networks, embedded tools and methods into institutional practice, and shaped future research directions. Multiple Project Closure Reports showed that MD-WERP projects created or strengthened collaborations between research organisations, MDBA staff members, Basin state agencies, and community stakeholders. These partnerships have continued beyond the funded period, with researchers integrating findings into ongoing Basin monitoring and modelling programs.

Tools and datasets developed under MD-WERP, such as climate adaptation decision-support tools and environmental flow assessment methods, have been embedded in MDBA and state programs. The CATE Framework and MERI Plan provide mechanisms for continued use, tracking, and refinement of research outputs, signalling a shift from short-term project delivery to long-term knowledge stewardship. Several annual reports note that MD-WERP outputs have been foundational for new research proposals, either through direct continuation of MD-WERP topics or as inputs to other Basin research programs. Examples include expanded climate adaptation modelling, fish ecology studies, and hydrologic modelling for floodplain restoration.

The Program's co-design approach, open data sharing, and interdisciplinary integration have set a precedent for future Basin research. Stakeholders noted that MD-WERP has reshaped expectations for how Basin research should be conducted, emphasising "relational, place-based, and inclusive methodologies". Interviews and surveys confirmed that MD-WERP has laid the groundwork for enduring research, with respondents indicating high likelihood of participating in or recommending similar programs in the future. The Knowledge Hub was widely mentioned as a key legacy tool for accessibility and future use. The Governing Panel Chair described the Program as a "model for collaborative science", noting its role in

restoring public trust and informing future reforms. The La Trobe University Consortium Program Manager highlighted the importance of First Nations engagement and community-centred research as key legacies.

Participants in the lessons learned workshop praised the Program's strategic relevance, collaborative design, and policy influence. Opportunities for enduring impact include embedding outputs into Basin Plan Review processes and broader national water research frameworks. Overall, MD-WERP's outputs, methods, and collaborations are likely to long outlast the Program funding window, influencing how Basin research is designed, delivered, and integrated into decision-making.

4. Recommendations, implications, opportunities

The final step in the journey of MD-WERP is to reflect on the lessons learned and how they could be used to ensure the legacy of this program and improve outcomes and impacts from future research programs of this nature. This section synthesises each of the recommendations that have arisen from this evaluation under broad themes, outlines their implications for future research and policy, and identifies strategic opportunities to build on the Program's legacy. The recommendations are grounded in evidence collected through Program document review, stakeholder interviews, surveys, and the lessons learned workshop.

While First Nations research is being explicitly treated in a separate evaluation, the end-of-program evaluation questions that guided this report touched on some issues raised from that body of work as they relate to the effectiveness and impact of the broader program. Readers should refer to the separate First Nations evaluation of MD-WERP for an in-depth view of that part of the Program.

4.1. Recommendations

1. Streamline governance and approval processes

Robust governance and approval processes, such as those adopted by MD-WERP, enable the running of an effective, efficient, impactful program. However, such processes create a time and resource burden for researchers and may lead to project delays. Based on feedback from the research group, we recommend that steps be taken to simplify and clarify governance structures in the future to reduce administrative burden and improve responsiveness, particularly for project variations and deliverable approvals. This could be achieved by:

- simplifying project variation and deliverable approval processes
- increasing the number of delegates authorised to approve deliverables

- removing EUAGs from the formal approval chain for research outputs
- minimising late-stage changes to reporting templates and requirements
- including Theme Leads in Governing Panel meetings when relevant
- improving communication of governance decisions to research teams
- reviewing and simplifying publication approval requirements.

Streamlined processes will improve efficiency, reduce delays, and support timely adoption of outputs, especially in dynamic or emergent research contexts.

2. Promote cross-theme integration and interdisciplinary collaboration

The design of future programs should foster integration across research themes from the outset, enabling interdisciplinary approaches to complex Basin challenges. This could be achieved through:

- fostering integration across research themes from the outset
- developing shared planning sessions and joint workshops
- aligning reporting structures to support synthesis and cross-theme learning
- introducing cross-cutting research questions and shared impact pathways
- providing dedicated engagement leads from the start of the program to facilitate collaboration
- embedding mechanisms for interdisciplinary co-design.

Integrated research will produce more holistic insights and reduce duplication. It will also enhance the relevance of outputs to policy and operational needs.

3. Broaden and improve end-user engagement

Additional steps should be taken to ensure end-user engagement is embedded throughout the program, with clear roles, responsibilities, and feedback mechanisms. This was done well for some parts of MD-WERP, but the following would strengthen the process:

- clarifying EUAG roles and expectations early in the program
- identifying and engage appropriate end-users for each theme (e.g. state water managers, social policy experts)
- embedding end-users directly within project teams to foster continuous engagement
- establishing structured feedback loops to inform project refinement
- using focused technical reviews or Communities of Practice for specialised outputs.

Strengthening engagement throughout the program will improve the fit-for-purpose nature of outputs and increase the likelihood of adoption and impact.

4. Enhance engagement and adoption pathways

Engagement and adoption pathways should be strengthened by investing in initiatives that help ensure the legacy of the program's impact beyond its completion. Specific recommendations are:

- maintaining and expanding platforms like the Knowledge Hub for long-term accessibility
- monitoring uptake and use of products post-program to track impact
- investing in training and support for end-users to apply research findings
- clarifying product ownership and delivery mechanisms for long-term maintenance
- ensuring policy timelines are embedded in project planning.

Clear, enduring adoption pathways and monitoring of uptake will ensure that research translates into real-world outcomes and supports long-term policy and operational improvements.

5. Invest in capacity building for qualitative and cultural data use

Agencies and policy teams should be supported to better understand and apply qualitative research outputs. This will not be easy, and a solution is not immediately apparent from the evaluation. However, ways to achieve this could include:

- supporting agencies in applying qualitative and cultural research outputs
- facilitating cross-sector knowledge exchange (e.g. between water, health, and community sectors)
- strengthening First Nations engagement frameworks with culturally appropriate governance
- co-developing governance and contracting models for First Nations-led research
- building institutional capacity to use qualitative and participatory data in decision-making.

6. Ensuring impact and legacy

MD-WERP's outputs (i.e. tools, knowledge, and partnerships) need to continue to deliver value beyond the Program's end. By embedding research into policy and operational systems, maintaining access to tools, and supporting ongoing collaboration, they help avoid the inefficiencies of short-term programs. This may be achieved by:

- Supporting continued integration of outputs into policy and operational frameworks.
- Securing enduring funding mechanisms to avoid inefficiencies of short-term cycles.
- Maintaining and updating embedded tools and datasets to ensure long-term usability.
- Tracking long-term adoption and impact through post-program monitoring.
- Supporting continuation of research networks formed under MD-WERP.

- Promoting the MD-WERP model as a foundation for future Basin research programs.

The impact will be a more resilient and connected Basin research ecosystem, with stronger continuity in knowledge development and better capacity to respond to future challenges.

7. Secure enduring funding mechanisms

There needs to be continues lobbying for research programs in the Basin with long-term funding models to avoid inefficiencies associated with short-term programmatic cycles. Sporadic funding of short-term programs, while helpful, lose considerable time and funding to their establishment. Stable funding will enable deeper research, stronger relationships, and more consistent integration of science into policy and practice, which will result in better outcomes for the Basin and its communities.

This recommendation is not a novel thought, but it is important to keep advocating for base-funding for long-term research platforms and to continue to build institutional partnerships to support sustained research investment.

4.2. Implications and opportunities

MD-WERP has demonstrated that well-structured, co-designed research can deliver high-value outcomes for water policy, risk management, and operational decision-making in the Murray–Darling Basin. Key lessons learned include the importance of embedding end-user engagement from the outset, maintaining flexibility in governance to respond to emerging issues, and ensuring that research outputs are accessible, fit-for-purpose, and aligned with policy cycles. The Program's success was underpinned by strong collaboration between researchers and policy makers, particularly through mechanisms such as EUAGs, embedded Commonwealth Theme Leads and Coordinators, and structured co-design processes.

The implications of the Program's success are significant. MD-WERP has set a new benchmark for inclusive, impact-oriented research in the Basin, demonstrating that its collaborative approaches across disciplines can generate actionable knowledge across environmental, social, cultural, and economic domains. The Program's co-design model, structured impact pathways, and legacy tools such as the Knowledge Hub and CATE framework offer a replicable foundation for future initiatives. Opportunities exist to build on this foundation by integrating more outputs into the Basin Plan Review, expanding interdisciplinary collaboration, and fostering enduring research platforms through institutional partnerships and long-term funding strategies. The Program has also contributed to rebuilding trust between Australian Government agencies and communities, highlighting the value of transparent, collaborative science in addressing complex water management challenges.

5. Conclusion

MD-WERP has successfully delivered applied, policy-relevant research that enhances capacity to manage water resources in the Basin. Through strong collaboration, co-design, and targeted investment across four research themes, the Program produced outputs that are already informing the Basin Plan Review and operational decision-making. There are lessons to be learned, both from what worked and what didn't, as would be expected of a program of this nature which included formative elements such as social-environmental collaborative research. Regardless, the Program has laid a strong foundation for enduring research, with legacy tools and frameworks that support future adoption, impact, and innovation in Basin science and management.

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Appendix B. Interview questions

1. Are you pleased with the Program's outputs and achievements? To what extent do you think the knowledge generated through the Program has led to or will lead to better informed environmental water management decisions by Commonwealth agencies and improved outcomes for communities?
2. Do you think the Program will provide a platform for a more enduring research Program?
3. Are you aware of any discussions that demonstrate the success of the Program in terms of providing an enduring legacy and impact?
4. To what extent do you think the knowledge generated through the Program has improved our ability to evaluate the effectiveness of management in the Basin - or more broadly?
5. Do you think the Program has provided value for money?
6. Do you think the research consortium approach was a success?
7. Could you describe how the overarching RQs were formed? How would you rate the success of that approach, in hindsight? Do you think the overarching RQs were appropriate for the Program? Could they have better?
8. To what extent do you think the tools and communications products developed are likely to support the adoption and application of knowledge generated through the Program?
9. To what extent do you think the knowledge generated through the Program has enhanced our understanding of the Basin across the quadruple bottom line?
10. To what extent do you think the collaboration between researchers and policy makers was maintained successfully throughout the Program?
11. Are there any lessons you've learnt from the Program that you're likely to use in the future? What worked and didn't work?

Appendix C. End-users contacted for surveys

Theme	Role and/or area of interest	Organisation
1. Climate adaptation		
	Theme Coordinator	MDBA
	Theme Lead	MDBA
	ACT representative	ACT
	QLD representative	Queensland
	ACT representative	ACT
	Advisor - Research Consortium Theme Co-Lead	CSIRO
	Advisor - Research Consortium project liaison	Deakin University
	VIC representative	Vic DEECA
	SA representative	South Australia
	Commonwealth representative	CEWH
	Commonwealth representative	DCCEEW
	Commonwealth representative	CEWH
	NSW representative	NSW
	Commonwealth representative	BoM
	Advisor - Research Consortium Theme Co-Lead	Deakin University
	Commonwealth representative	ABARES
	Commonwealth representative	BoM
	QLD representative	Queensland
	External Guest	Water Trust Australia
2. Hydrology		
	Theme Co-Lead	MDBA
	Theme Co-Lead	MDBA
	Theme Coordinator	MDBA
	Member - Hydrology EUAG	CEWH
	Theme Advisory Panel	MDBA
	Theme Advisory Panel	MDBA
	Theme Advisory Panel	MDBA
	Theme Advisory Panel	MDBA
	Theme Advisory Panel	MDBA
	Theme Advisory Panel	MDBA
	Modelling Advisory Group	NSW DCCEEW
	Modelling Advisory Group	NSW DCCEEW
	Modelling Advisory Group	Queensland DES
	Modelling Advisory Group	Vic DEECA
	Modelling Advisory Group	SA DEWNR
	Modelling Advisory Group	SA DEWNR
	Modelling Advisory Group	ACT Government
	Advisor - Research Consortium Co-Lead	CSIRO
	Member - Hydrology EUAG	eWater

Theme	Role and/or area of interest	Organisation
3. Environmental Outcomes		
	Theme Leader	MDBA
	Theme Coordinator	MDBA
	NSW DCCEEW – Fisheries (Murray Darling Program Leader)	NSW DCCEEW EES
	NSW DCCEEW Water – Principal Water Scientist	NSW DCCEEW Water
	Strategic policy	MDBA
	NSW DCCEEW - Fisheries	NSW DCCEEW Fisheries
	Riverine Ecology - Vegetation and MDBA GIS Spatial Science	MDBA
	Victoria Internal Working Group Co-ordinator (on secondment)	Vic DEECA
	QLD DES – Principal Scientist (Aquatic Ecosystems)	Queensland
	Environment Water Coordination team	MDBA
	a/g in B. Betteridge's role till June 2025	MDBA
	Riverine Ecology - Waterbirds	MDBA
	ACT representative – EPSDD Conservation Research	EPSDD Conservation Research
	NSW DCCEEW – A/Snr Team Leader, Environmental Water and Floodplains	NSW DCCEEW Fisheries
	Advisor - Research Consortium Theme Lead	Griffith University
	River Connectivity	MDBA
	Director, Environmental Water Science	CEWH
	CEWH research and delivery teams	CEWH
	Water Quality and Salinity	MDBA
	Riverine Ecology - Fish	MDBA
	DEECA – Manager Environmental Water Strategic Planning	Vic DEECA
	DEECA - Senior Manager at Strategy and Evaluation (intergovernmental)	Vic DEECA
	DEECA - Senior Manager in Waterways Monitoring and Research	Vic DEECA
	DEECA - Waterways Monitoring and Research	Vic DEECA
	SA representative – Basin Plan	SA
	SA DEW - Manager Environmental Science and Research Partnerships	SA
4. Social, economic and cultural outcomes		
	Commonwealth Government	DCCEEW
	NSW representative	NSW DPIE
	Water Policy	DCCEEW
	Water Policy (BP Review)	MDBA
	VIC representative	Vic DEECA
	Research	ANU
	Commonwealth Government	CEWH
	Commonwealth Government	MDBA
	State Government	NSW DPIE
	Commonwealth Government	MDBA
	Commonwealth Government	ABARES

Theme	Role and/or area of interest	Organisation
	Consultant	Private
	Social Science	MDBA
	State water policy	DPI
	Social Science	MDBA
	Research	University of Melbourne
	First Nations	MLDRIN
	State water policy	DEECA
	State water policy	SA DEW
	Independent Facilitator	DG Consultants
	Commonwealth Government	MDBA
	Commonwealth Government	MDBA
	Commonwealth Government	DCCEEW
	Research	University of Canberra
	State Government	Vic DEECA
	Consultant	Marsden Jacob Associates
	Consultant	NC Economics
	Social Science	MDBA
	State Government	Vic DEECA
	State water policy	SA DEW
	Industry partnerships	MDBA
	National water policy	WaterTrust
	Strategic Partnerships	MDBA
	Research	Monash University
	Research	ex Australia Institute
	State Government	NSW DPIE
	Commonwealth Government	DCCEEW
	Commonwealth Government	MDBA
	First Nations	MLDRIN
	Commonwealth Government	CEWH
	Commonwealth Government	MDBA
	Commonwealth Government	MDBA
	State Government	NSW DPIE
	Commonwealth Government	MDBA
	State Government	NSW DPIE
	Commonwealth Government	DCCEEW
	Economics	MDBA
	Commonwealth Government	MDBA
	Commonwealth Government	MDBA
	State Government	Vic DEECA
	Commonwealth Government	MDBA
	Commonwealth Government	MDBA
	Commonwealth Government	MDBA

Theme	Role and/or area of interest	Organisation
	Consultant	Private
	Economics	One Basin CRC
	Water Policy	Queensland RDMW
	Economics	DCCEEW
	Water Law	University of Melbourne
	Commonwealth Government	ABARES
	Commonwealth Government	MDBA
	Economics	DCCEEW
	Water policy	WaterTrust Australia
	Water Policy	Ricardo Pty Ltd
	Advisory - Consortium Researcher	University of Adelaide
	Commonwealth Government	MDBA
	First Nations	NIAA
	Advisory - Consortium Researcher	Griffith University
	Commonwealth Theme 4 Coordinator	MDBA
	Water Policy	Queensland RDMW
	Economics	NC Economics
	Economics	DCCEEW
	State Government	NSW DPIE
	Commonwealth Government	MDBA
	First Nations	MDBA
	Economics	ABARES
	Basin Plan Review	MDBA

Appendix D. Survey questions and prompts

All

1. Engagement approaches used since the Mid-term Evaluation were appropriate for the purpose. (Strongly agree/Agree/Neither agree nor disagree/Disagree/Strongly disagree; Please provide a reason for your response)
2. Engagement approaches used since the Mid-term Evaluation supported fit-for-purpose research by occurring in a timely manner. (Strongly agree/Agree/Neither agree nor disagree/Disagree/Strongly disagree; Please provide a reason for your response)
3. Advice from EUAGs was used to improve project objectives and approaches to ensure fit-for-purpose outcomes and outputs. (Strongly agree/Agree/Neither agree nor disagree/Disagree/Strongly disagree; Please provide a reason for your response)
4. MD-WERP's approach to engagement has advanced cooperation between users and researchers, leading to improved adoption of research outcomes. (Strongly agree/Agree/Neither agree nor disagree/Disagree/Strongly disagree; Please provide a reason for your response)
5. Collaboration between researchers, policy makers and/or river operators/water managers was productive and beneficial to all concerned. (Strongly agree/Agree/Neither agree nor disagree/Disagree/Strongly disagree; Please provide a reason for your response)
6. Would you participate in or recommend to others a similar research program again? Why/why not?
7. Which features or lessons learned from this research program are you likely to use in the future?
8. The approach used to vary/modify projects in response to changing research priorities was clearly defined and easily achieved, and appropriate governance processes were followed. (Strongly agree/Agree/Neither agree nor disagree/Disagree/Strongly disagree; Please provide a reason for your response)
9. Can you suggest any good case study examples of Program outputs or outcomes (in development &/or planned) that will assist policy development, risk management, or river operations/water management?
10. Outputs and outcomes from MD-WERP will have an enduring influence on research in the Basin. (Strongly agree/Agree/Neither agree nor disagree/Disagree/Strongly disagree; Please provide a reason for your response)

Researchers

1. Collaboration between themes and research consortia has improved since the Mid-term Evaluation. (Strongly agree/Agree/Neither agree nor disagree/Disagree/Strongly disagree; Please provide a reason for your response)

2. MD-WERP research partnerships were valuable and led to the achievement of co-benefits for those involved. (Strongly agree/Agree/Neither agree nor disagree/Disagree/Strongly disagree; Please provide a reason for your response)
3. Did you change the scope/approach of your research project during the Program? If 'yes' was the process used to vary your project straightforward and were you well supported with your request for the variation? Briefly describe the reason for the change.
4. Do you think you will adopt and transfer any lessons learned from this Program into future research programs? Please provide examples.

Policy

1. MD-WERP research outputs and outcomes are valuable for policy development. (Strongly agree/Agree/Neither agree nor disagree/Disagree/Strongly disagree; Please provide a reason for your response)
2. Products (e.g., Knowledge hub, Climate adaptation toolkit) developed through MD-WERP are appropriate and useful for informing improved evidence-based policy development. (Strongly agree/Agree/Neither agree nor disagree/Disagree/Strongly disagree; Please provide a reason for your response)
3. To what extent have the outputs and outcomes from MD-WERP met your needs for the development and/or modification of strategies or policy?
4. **Where outputs and outcomes from MD-WERP have not met your needs, please explain why that is the case.**
5. Please provide brief examples of improvements to evidence-based policy and/or risk management that have resulted from MD-WERP outcomes and outputs.

Water managers

1. MD-WERP has provided valuable research outputs and outcomes (improved knowledge) for adoption by river operators and/or water managers. (Strongly agree/Agree/Neither agree nor disagree/Disagree/Strongly disagree; Please provide a reason for your response)
2. Products (e.g., Knowledge hub, Climate adaptation toolkit) developed through MD-WERP are appropriate and useful for use by river operators and/or water managers. (Strongly agree/Agree/Neither agree nor disagree/Disagree/Strongly disagree; Please provide a reason for your response)
3. Research outcomes from MD-WERP have improved management actions, strategies and outcomes for the environment. (Strongly agree/Agree/Neither agree nor disagree/Disagree/Strongly disagree; Please provide a reason for your response)
4. Research conducted through MD-WERP has resulted in better informed environmental water management decisions by Commonwealth agencies. (Strongly agree/Agree/Neither agree nor disagree/Disagree/Strongly disagree; Please provide a reason for your response)

5. Research conducted through MD-WERP has resulted in better informed environmental water management decisions and improved outcomes for communities. (Strongly agree/Agree/Neither agree nor disagree/Disagree/Strongly disagree; Please provide a reason for your response)
6. Please provide examples of the environmental water management decisions informed by MD-WERP.
7. Knowledge generated through the Program has improved our ability to evaluate the effectiveness of management approaches. (Strongly agree/Agree/Neither agree nor disagree/Disagree/Strongly disagree; Please provide a reason for your response)
8. To what extent have the outputs and outcomes from MD-WERP met your needs for the development and/or modification of management plans and approaches?
9. Where outputs and outcomes from MD-WERP have not met your needs, please explain why that is the case.
10. Please provide brief examples of improvements to risk management and/or river operations/water management that have resulted from MD-WERP outcomes and outputs.

Appendix E. Lessons learned workshop output

Table 6. Summary of responses from workshop participants to questions and prompts during the MD-WERP Lessons Learnt Workshop

Key themes & notes	Questions & prompts	Summary of responses
General Notes: Responses from workshop participants to the workshop discussion starter – What were the main successes of MD-WERP? - have been summarised and grouped into five themes (noting these were unprompted and determined by the participants)	What were the main successes of MD-WERP?	General: The Program was considered to have provided 'high value for money' (not prompted). Collaboration: The collaborative approach between the MDBA and research staff was seen as very successful. 'The way the Program was set up did not reflect a typical contract management approach and worked more as a partnership', engendering a strong sense of community. The continual co-design approach of project activities to meet emerging MDBA needs ensured targeted science, and 'the openness of the MDBA to learn about a new science domain and see its benefits (social science) contributed to the Program's success'. The structured theme-level engagement of the research teams with MDBA and external stakeholders (Basin states, CEWH etc) was also beneficial to Program outcomes. Science: The high calibre of the MD-WERP researchers and quality of the research were noted. The fact that the Program was commissioned because of a knowledge gap and policy need (following the 2018-19 fish death event in the Darling-Barka River and Menindee Lakes) was seen as a driver to ensure correctly targeted, strategic research of technical high quality and environmental relevance to the Murray–Darling Basin. The 5-year duration of the Program was thought to enable time to answer questions and respond to learnings in a comprehensive way. The amount of new knowledge and tools generated by the Program were seen as significant, and 'the development of new capabilities along with the publication of many journal articles and conference papers point to the success of the Program'. Additionally, the inclusion of the tactical projects was seen to work well, providing an interesting and quick approach to operationalising science to meet immediate needs. Governance: The successful management of 27 Strategic projects and 14 Tactical projects all of which had different teams and focuses was seen as testament to the success of the approach to Program governance. The day-to-day running of the Program is thought to have been managed well by the MDBA's small MD-WERP Implementation Team, which provided clear communication of expectations and timelines and supported project teams with time management issues, all of which improved project outputs, budgeting and financial forecasting.

Key themes & notes	Questions & prompts	Summary of responses
		The Program structure and project approval process enabled the research teams a degree of autonomy to 'get on' with the scientific research and adapt the scope of the projects as learnings occurred. Although the degree of project flexibility was constrained to an extent by the requirements for milestones and deliverables, the scope of some components of the projects (e.g., case studies conducted for Theme 1) was made intentionally flexible at the outset of the Program, so the research could adapt to meet the needs (and answer the evolving questions) of key stakeholders such as river operators. Communication products and events: The communication products, workshops and symposiums were all seen as a success of the Program.
Governance and Program approach	Did the governance model & approach to delivering the Program support achieving Program objectives?	There was agreement that the governance model and approach supported the achievement of Program objectives and benefits and improvements were noted for future Programs. Key benefits included: The structure of the governance model included different levels of authority and clear responsibilities for each level, which had multiple benefits, including: 'The Governing Panel was required for high level issues and decision making' 'The Science Leadership Team enabled researchers to share progress, issues, support each other' the 'Theme Leads and Program Delegate ensured high quality outputs' the 'Centralised contract management meant MDBA theme leads and coordinators could focus on the research content' 'Having a formal and layered governance structure enabled timely identification and escalation of risks, which enhanced the management of sensitive relationships and project variations/issues in a timely manner') The model created space for research to occur over five years without a lot of micro-management The MD-WERP Implementation Team used good processes and record-keeping practices and was great to work with. The fortnightly deliverables reviews with the Implementation Team were excellent, as was their patient support and help with reporting Regular, focussed theme-level discussions and progress updates The Governing Panel and Executive Leadership Team were supportive of the research teams and prepared to work out-of-session when needed to ensure progress was not hampered. Their endorsements were felt as strongly supportive of the work Suggestions for improvement included: Minimise changes to the approach to Program management to reduce inconsistencies Reduce and streamline the approval process for project extensions and project deliverables (particularly research outputs). This includes removing the EUAGs from the approval process for deliverables increasing the number of delegates who can approve project deliverables

Key themes & notes	Questions & prompts	Summary of responses
		Having more diverse Governing Panel members and including theme leads in Panel meetings when relevant Minimise changes to templates towards the end of the Program, particularly when the work has been done/signed off Ensure policy perspectives and requirements are included early in the Program, and are properly understood by research team members, to help shape the project scope and objectives. This should be led by the MDBA and CEWH teams Review the role and responsibilities of the Communication and Engagement Steering Group and include oversight of Communication and Engagement at the beginning of the Program Improve communication with the research teams about overarching Program deliverables, such as the CATE component, which have implications for the theme planning and outputs Improve communication about the results of decisions from Governing Panel meetings Review requirements for approvals to publish reports.
Co-design processes and collaborative approaches	Was the collaboration between researchers & policymakers maintained successfully throughout the Program?	There was consensus that the Program supported constructive and mutually beneficial collaboration between researchers and policymakers throughout, with the regular organised events – symposiums, collaboration sessions, workshops, meetings – renewing the desire for collaboration when/if there was a slight decline. Structured approaches to enable collaboration were reported as including: 'Monthly multi-project meetings with MDBA teams and researchers; 3 monthly research lead catch ups; tracking emerging themes across all theme projects and communicating to rest of agency; providing MDBA data/corporate knowledge to ease researcher tasks and understanding of context; REOs providing local networking support; respect of boundaries between independence of researchers' decisions about method, interpretation and product standard while having support to insist on fulfilment of RIPs.' Participants commented that the collaboration with End-User Advisory Groups (EUAGs) was sometimes challenging for the researchers due to differing expectations and aspirations of EUAG members representing their respective organisations. The MDBA was the key client for the research and state-based EUAG members often seemed to have different priorities, with some possibly wanting more deep involvement in the Program. Comments also noted future Programs should ensure all members of the MDBA end-user teams likely to benefit from the research are involved in collaborative activities (to support maximum uptake). The challenge associated with the misinterpretation of research results in the absence of the wider research context was noted. Suggestions for improvements to the Program approach included: Governance/management Setting up a cross-organisation workspace. Ensuring early interaction between Themes teams and with MDBA policy areas to identify gaps in answering key questions in the policy space

Key themes & notes	Questions & prompts	Summary of responses
		Greater use of MDBA expertise to support First Nations projects and more direct engagement between MDBA First Nations Team staff and researchers. Extending time frames for relationship building with First Nations A rolling series of presentations, including training sessions to demonstrate models, open to all MDBA and EUAG members, once research is complete (separate to annual Symposium) More feedback from users on the use of the research outputs Having First Nations leaders on the Governing Panel would have improved First Nations projects Having a dedicated engagement lead from the outset.
Research Workshop participants were asked to comment on components of the approach to the research program (listed to the right) that they would 'drop, keep, add, improve'	Research consortia approach	There was agreement that the research consortia approach worked effectively. No aspects of the approach were identified as needing to be removed. Keep The use of broad, multi-party consortia, which were set up as partnerships between the Commonwealth and research institutions Add Consider embedding MDBA staff with the research teams for a while and vice versa (junior researcher in MDBA to understand government requirements) Improve Cross-institutional collaboration should be adopted throughout the Program life cycle Reduce the risk of duplicating research in other programs Increase the cross-consortia, cross-theme and cross-MDBA collaboration and integration from the start of the Program, for deep relevance and targeted outcomes and outputs Increase opportunities and collaboration with Basin state science agencies.
	Research themes and key areas of focus	No aspects of the approach of using research themes and key areas of focus were identified as needing to be removed. Keep The themes covered the broad range of topics that were required from a policy perspective, particularly the social aspect The separate CATE integration theme – this was needed to draw together the Program outcomes Add Keep groupings by themes but also align projects by area of focus from the start of the Program (the focus areas didn't really get much attention until the CATE process tried to develop messages around them. Research didn't place an equal emphasis on all focus areas) Cross-theme meetings

Key themes & notes	Questions & prompts	Summary of responses
	Research project selection and approval process	Improve The line of sight between the research questions and focus areas. Clearly identify how the research can be linked to policy and management – this needs to be led by MDBA & CEWH teams, in collaboration with the researchers Integration across themes. Theme 1 was often talked about being the place where integration should occur. Drop – The project variation process should be conducted directly with researchers, the MDBA (end-users) did not need to be involved Keep The approach worked well and enabled all levels of decision makers to be aware of the realities of delivering the research The Research Implementation Plans – these were effective documents for tracking compliance and objective attainment at project levels Clear definition of deliverables and milestones made the teams own the responsibility to manage expectations related to project outcomes and outputs Add More clarity on approvals process for academic papers Build in a way to filter project submission from the start
	Research questions	Improve The approach used to develop, select and approve the Tactical projects needs improvement Project variation processes need to be defined at the start The breadth and scope of the research questions (for Theme 1 these were incredibly broad and not particularly achievable, so they were not used as they were) Projects need to refer to and use their Research Implementation Plans more comprehensively. The response to this section was mixed and possibly reflected different interpretations of the task, with some participants responding based on the more defined research questions that guided individual projects and others (most) responding based on the overarching research questions for the Program. One participant noted the research questions, and the process used to develop them, were generally sound (including the use of co-design). One participant commented that the original, overarching research questions seemed out of date by the time the projects were co-designed and approved. Another noted the need for the overarching research questions to be developed by and/or with the policymakers. Some interesting suggestions for improvements in this area were provided and are summarised below. Keep

Key themes & notes	Questions & prompts	Summary of responses
		The co-development (with researchers and policymakers) of research questions and themes worked well Add Integrated research questions rather than just theme-based Review of the main research question if new projects are needed/ proposed (e.g., Theme 4 First Nations projects did not – by necessity – fully align with the Theme 4 research questions) Improve The (main) research questions should be developed by and/or with the policymakers, rather than external contractors who may not be fully aware of the current and immediate science-to-policy issues Better identification of the alignment between research questions and projects is needed More direct links between research questions and policy and/or management levers and opportunities would help improve the scoping and co-design of research projects and help ensure uptake of research outputs and outcomes The line-of-sight to Program logic Codesign for Theme 4 needed to include industry end users as well as Commonwealth partners to build bridges to other policy domains (health, tourism, deliberative democracy and conflict management/peace making) expertise. Closing the Gap (FN) links also should have been built in from start Multi-disciplinary methods that are scientifically based to provide a strong foundation for working with different data forms (qualitative, quantitative, participatory) Interpretation of data into theories and models, consistent with agreed methodologies.
	Project management requirements	Drop – Duplicative reporting to different committees created inefficiencies and administrative burden Keep Strong engagement between the MDBA and research partners helped maintain trust and alignment across scientific and program management requirements The project variation process Patience and care with project management was a definitive strong point – it supported the alignment of academic and agency expectations of compliance and professionalism The MDBA Implementation team's Excel deliverable tracker was an excellent tool The knowledge hub is a great idea, but it would be useful to set it up earlier in the Program Add Project management software, with templates built by Project Managers Improve Have a clearer project management framework and develop all project templates at beginning of the Program

Key themes & notes	Questions & prompts	Summary of responses
		Maintenance of stakeholder contact list for newsletter and other correspondence Contract management needs to be simplified (e.g., have multi-year work orders) Define clear, measurable Program benefits at the start Finance management and tracking Streamline approvals processes Embed CATE earlier in the Program Approval to publish – streamline to Consortia theme lead and Commonwealth theme lead rather than whole ELT Plan for appropriate resources to reduce burden for the core team (e.g., have full time staff for the MDBA Theme Lead/Coordinator roles. The time requirement of 0.5 FTE was not enough to complete the required tasks.
	EUAGs	There was agreement that the EUAGs were useful, important, and generally worked effectively. No aspects of the approach were identified as needing to be removed. Keep Very important to have the EUAG members engaged even if it was challenging at times The engagement and feedback by the EUAGs to the research was timely and useful EAUG members provided great feedback on research plans and deliverables when they were of interest to the members Add Clear responsibilities for EUAGs (e.g., some members were not sure if they had an approval, advisory, or 'for noting' role on behalf of their organisations) Broader base of expertise in the EUAGs Improve The line-of-sight between Program outcomes and outputs and the subsequent impacts on jurisdictional policy Meeting attendance and engagement by EUAG members across all themes The clarity and documentation of the roles and responsibilities of EUAG members, noting the MDBA was the main client for MD-WERP, not the Basin state organisations, who may have different priorities and research needs.
Data management	What issues related to data storage, delivery & management were you	Issues identified with data storage, delivery and management included the hosting of data and models on platforms the MDBA cannot support. The reticence of some participants to have data stored by the MDBA was also noted. Participants commented that researchers having access to the MDBA GitHub and computer systems (as visitors) helped expedite the transfer of data and code to the MDBA and facilitated collaboration. However, restrictions (real or perceived) on the public access of repositories on the MDBA GitHub, meant that researchers were using copies on their own private GitHub to make code available for research publications.

Key themes & notes	Questions & prompts	Summary of responses
	aware of, if any?	One participant commented on potential problems with accessing models into the future. Another noted the MDBA's data management policy matured throughout the life of the Program.
	How might processes for data storage, delivery, management be improved for future Programs like MD-WERP?	Another commented that the MDBA's use of the data analytics management framework (DAMF) is critical to connect all inputs to outputs to ensure there is a clear pathway for establishing data access, storage and usage. They noted that the build of the mapping exercise should continue beyond the life of MD-WERP, to complete the work across all themes and projects When considering improvements to data management for future research Programs, participants suggested: Using a broader understanding of "modelling" from a social science perspective so it includes sociological theories (explaining social structures and functions), and modelling is not limited to predictive processes Ensuring a better understanding of Human Research Ethics Committee (HREC) approval processes and how HRECs work with IP control and access, including identification (moral rights) or deidentification of knowledge holders. Perpetual access versus constraints on secondary uses should also be considered Data management and handover should be planned at the beginning of the Program and data ownership and the need to provide all Contract Material, including data, to MDBA should be made clear Ensuring researchers and MDBA data team members meet early in the Program to develop data requirements that are built into the contracts, and to ensure the format of code and geospatial files is appropriate for MDBA systems. Clear definitions of data requirements/access/licences, as well as expectations, must be set at the start of the Program to ensure a clear understanding of the ongoing responsibilities for data storage and access Including regular meetings with the data team (meetings should include DAMF mapping) Contracts should require the delivery of data with associated reports, even at the draft stage. If draft reports include maps, graphs, tables of data (including spatial data, e.g. polygons), the data should be sent to the MDBA at the same time rather than at the end of the Program. Invoices should not be paid until data is sighted. Contract managers should cross check the data with the report content and confirm the data has been received Datasets and code should be published in a timely manner

Appendix F. Detailed evidence for addressing evaluation questions

KEQ2: To what extent have program activities and outputs effectively supported the achievement of program outcomes?

Sub-KEQ1 Has the Program met its objectives?

To address this sub-KEQ we investigated each of the Program's five objectives individually.

Objective 1: Maximise value to water reform and management from investment

This objective relates to the need for water reform to deliver outcomes for the Basin environment and communities.

The Program activities undertaken to achieve the objective were:

- A governance processes was put in place to ensure research aligned with water reform and management needs.
- Impact planning pathways were planned and undertaken for strategic research activities across the four themes.
- Research questions and themes were co-designed through engagement and consultation with Commonwealth partners, state collaborators, and members of the research community.
- Engagement activities including the annual symposium, development of the MD-WERP website, publication of newsletters and progress reports, development of Knowledge Hub

Evaluation of evidence

Literature

Through the review of the Program literature, we identified the following elements of MD-WERP that allowed it to maximise value to water reform and management from investment.

1. Project streams

The Program sought to deliver value to water reform through knowledge generated from (1) strategic research, (2) tactical investment, and (3) synthesis activities (including communication and adoption support). These activities were intended to lead to improved river operations and water management outcomes, improved capacity to manage risks with respect to water availability and prioritising water use, and improved water

policy, with respect to achieving the Basin Plan objectives. This is laid out in the Program's Program Logic/Theory of Change.

2. Strategic Research Theme Selection

Themes were co-designed by the Australian Government partners (DCCEEW, CEWH, MDBA) and the Research Consortia. This participatory approach ensured that the research would address real-world policy and management needs. Themes were then selected to support four strategic objectives, including: (1) maximising value from investment, (2) facilitating adoption, (3) improving environmental water management, and (4) building a platform for enduring research. The four priority Themes were also identified; at the time, these were seen to reflect the most pressing challenges in the Basin (i.e. Climate adaptation, Hydrology, Environmental outcomes, and Social, economic, and cultural outcomes).

3. Individual Project Selection

Projects within each theme were jointly scoped and developed by researchers and end users to ensure relevance and usability. This included identifying needs, developing research questions, and iterative refinement of plans.

End-User Advisory Groups (EUAGs) mainly included Government policy makers (i.e. MDBA staff) but also other stakeholders (e.g. State government employees). The EUAGs provided input into project design and delivery, and they acted to ensure that outputs were fit for purpose and to pre-emptively identify barriers to adoption.

Further to this, each project underwent benefits mapping to define desired outcomes and impacts, identify new capabilities required, and to highlight barriers to adoption and business changes needed.

In addition to the strategic research undertaken, short-term, targeted tactical projects were selected as needs became apparent. For these, engagement and adoption plans were developed post-approval and tailored to each project.

4. Governance and Oversight

The governance structure for the Program also helped to ensure that value for money was achieved from the Program. Specifically, the Governing Panel endorsed the strategic direction and project selection, Theme Leaders and Coordinators within MDBA ensured alignment with policy needs, and the Program Implementation Team supported co-design and adoption planning.

5. Engagement and adoption planning

An Engagement and Adoption Plan (EAP) (MD-WERP Program Engagement and Adoption plan V0.3 March 2023) was developed for the Program which described the process by which the Program would maximise value to water reform using the money invested in the research program.

The MD-WERP EAP required that each consortium develop Communication and Engagement Plans for each project, with a focus on research development and academic engagement. The plans were consistent with the MD-WERP CATE Framework, the Program Communications Plan, Transparency Principles, and the EAP. The main elements of the EAP are as follows:

EAP element	Description

Co-Design Approach	• Government policy makers and other stakeholders were included throughout the research lifecycle to ensure relevance and usability.
	• A three-phase co-design process was adopted, specifically:
	  ○ Discovery – Establish shared understanding of scope and objectives.
	  ○ Analysis & Planning – Develop and prioritise research questions with stakeholder input.
	  ○ Refinement – Finalise Research Implementation Plans with clear impact pathways.

End User Advisory Groups (EUAGs)	• EUAGs were established for each of the four research themes. • EUAGs were comprised of representatives from Commonwealth agencies, state governments, and the research sector. • The groups provided ongoing input to ensure research aligns with user needs and is ready for adoption.
Communication, Adoption, Transparency and Engagement Framework	• The CATE framework guided all communication and engagement activities. • It ensured alignment with program objectives and clarity of roles. • The framework included annual end-user forums, theme workshops, briefings across jurisdictions, project-level communication plans, and impact pathway development.

6. Impact pathways

Impact pathways are structured frameworks that map the journey from research inputs to real-world outcomes, ensure that research is aligned with end-user needs, and provide a clear logic for how research will lead to change in policy, practice, or understanding. Each research theme included defined pathways outlining:

- Inputs - Resources such as funding, expertise, and partnerships.
- Activities - Research design, data collection, analysis, and stakeholder engagement.
- Outputs - Tangible products like models, tools, reports, and datasets.
- Expected outcomes - Changes in knowledge, attitudes, skills, or practices among end users.
- Expected impacts - Long-term benefits such as improved water management, ecological resilience, or community wellbeing.

7. Engagement

A range of engagement activities were undertaken to build awareness, understanding, and trust among stakeholders. These activities included annual symposia (2022-25) which were organised to showcase progress, foster dialogue between researchers and end users, and

peer review. They helped clarify program outputs and built broader awareness among stakeholders.

Synthesis and explainer products (part of CATE stream) were developed to translate research into accessible formats for water managers, policy makers, and communities. These products were designed to translate complex research outputs into accessible, actionable knowledge for water managers, policy makers, and Basin communities and include the following:

Engagement Products	Examples
Synthesis Reports	• Cross-theme integration of findings (i.e. the Synergies of Outcomes Report). • Narrative summaries of research progress and emergent insights (i.e. Theme-level synthesis updates and Synthesis Report).
Explainer Products	• Plain-language summaries of technical reports. • Visual aids like infographics, maps, and diagrams. • Short form briefs for policy makers and operational staff. • Examples: Fact sheets on climate adaptation tools, summaries of tactical project findings (e.g., drone-based waterbird monitoring).
Digital Platforms	• Knowledge Hub was developed to be a user friendly, easily searchable knowledge repository for MD-WERP outputs (launched March).

Interviews

This first program objective relates to 'value for money' regarding the investment in research versus the practical benefits realised or potentially realised from the results. The governing body were questioned directly about this during the interviews and in all cases the response was resoundingly very positive. The main theme in the responses were that the implementation team achieved a lot with the available funds. One interviewee commented that competitive funding processes, like that adopted for MD-WERP, tend to help drive value for money. Another said that it was "one of the best (research programs) that I've been involved in… maybe the best". One noted that while each piece of research has the potential to substantially improve water policy and management, the value ultimately comes down to whether or not the knowledge is applied. To this point, another view was that the Program was well designed to tightly couple researchers with end-users to maximise the likelihood of practical application of the research.

Lessons Learned Workshop

There were no discussions in the workshop the spoke directly to this objective.

Surveys

There were no discussions in the surveys the spoke directly to this objective.

Objective 2: Leverage co-investment with research providers and key stakeholders

Evaluation of evidence

This objective requires the Program to leverage in-kind support from the research providers and stakeholders, where possible building on, linking to and leverage research that has occurred and is underway (Annual Progress Report 2020-21). A goal was set to receive a minimum of 40% co-investment from the research consortia for strategic research activities. Evidence for the objective comes from the Annual Progress Reports. Co-investment as in-kind support from CSIRO and La Trobe University for each year of the Program is shown below.

Year	In-kind spend
2020-21	$551,950
2021-22	$2,017,624
2022-23	$1,949,338
2023-24	$1,501,358
2024-25	$923,593
2025-26	$195,028
TOTAL	**$6,586,641**

The total value of co-investment was $6,586,641 which is 47% of the federal government funds invested. Therefore, 40% co-investment was achieved from the research consortium for strategic research activities which marks the achievement of this program objective.

Lessons Learned Workshop

There were no discussions in the workshop the spoke directly to this objective.

Surveys

There were no discussions in the surveys the spoke directly to this objective.

Interviews

There were no discussions in the interviews the spoke directly to this objective.

Objective 3: Facilitate adoption of research by advancing cooperation between users and researchers

Evaluation of evidence

Literature

The adoption of research outputs and engagement with end users in the design, development and delivery of the research was seen as critical to the successful delivery of the Program. The main Program activities undertaken to achieve this objective include:

Program Activities	How they facilitated research adoption
Co-Design of Research Projects	To Ensured research was relevant, practical, and aligned with policy and operational needs end users (e.g. MDBA, CEWH, DCCEEW) collaborated with researchers to shape project goals, methods, and deliverables, Research Implementation Plans (RIPs) were developed for each theme, and a six-month co-design process was undertaken involving workshops, meetings, and iterative feedback.
Embedding Commonwealth Theme Leads	MDBA staff were embedded within each research theme as "Commonwealth Theme Leads." They acted as liaisons between researchers and policy teams, provided real-time feedback, and helped align outputs with Basin Plan priorities. This approach strengthened two-way communication and built trust between researchers and end users.
End User Advisory Groups (EUAGs)	The EUAGs (which have been previously described) provided feedback on project relevance and usability and helped shape adoption pathways and identify barriers. This helped tailor outputs to real-world needs, though improvements were recommended.
Annual Symposia and Forums	Events were held in between 2022-25 to showcase research progress and foster dialogue (e.g. the annual symposium). Participants included researchers, end users, policy makers, community members, and First Nations representatives. The events improved understanding of program outputs, strengthened relationships, and clarified adoption pathways.
Community of Practice (Theme 4)	A collaborative Community of Practice group was developed for Theme 4 that focused on social, economic, and cultural outcomes. The group included MDBA policy staff, CEWH, DCCEEW, NGOs, and consultants. It aimed to enhance the science–policy interface and broaden engagement beyond traditional EUAGs.
Benefit Realisation Mapping	Each theme developed maps linking project outputs to expected outcomes and benefits which worked to informed engagement strategies and track progress toward adoption and impact. This provided a structured way to align research with end-user needs.
Project-Level Communication & Engagement Plans	Each theme developed maps linking project outputs to expected outcomes and benefits which worked to informed engagement strategies and track progress toward adoption and impact. This provided a structured way to align research with end-user needs.
Synthesis & Explainer Products	These included plain-language summaries, infographics, and briefs tailored to end users. The aim was to translate complex research into actionable knowledge.

Challenges identified

The Mid-Term Evaluation found that there was not always clear ownership or structured mechanisms for how research would be adopted into MDBA, CEWO, Basin States, or broader Basin Plan Review processes.

Key Points from the Mid-Term Evaluation were as follows:

- Some projects had strong champions (e.g. MDBA hydrologists using Theme 2 models), but others (especially Theme 4 and some Theme 3 outputs like T3.11.3, T3.11.4, T4.14.3, T4.14.4) lacked a clearly identified "owner" responsible for ensuring

translation into policy or operational practice. The project closure reports suggest that this did in fact lead to delays in adoption.

- Benefit realisation maps and adoption pathways were inconsistent across themes. Some projects (e.g. T2.6, T2.7, T2.8a, T2.8b) clearly mapped outputs into MDBA/State modelling platforms, while others relied on more informal expectations that "outputs will be useful," without mechanisms to guarantee uptake.

Synthesis products for quadruple bottom line decision-making were not yet well developed, limiting how easily adoption could occur across multiple policy domains. Now, at the end of the program, it does appear that greater cross-theme collaboration was needed to facilitate decision making that balances environmental, social, economic, and cultural outcomes together.

Interviews

The Governing Panel members were questioned about whether collaboration between researchers and policy makers was maintained successfully throughout the Program. The responses were positive on the whole, although the success of the collaboration varied to a degree between themes. The main points presented were:

- Researchers worked together very closely and in a genuine way.
- the EUAGs were committed to making the research better for the purpose of policy improvements.
- The level of success varied between Themes. For instance, Themes 1 and 2 had clear links between the science and a group of policy makers that apply such findings, but the link in Theme 4 was less clear. Theme 3 was not mentioned.
- While use of the EUAGs was helpful in achieving this program objective, more could have been done to engage with water managers from the Basin State governments. One interviewee noted that the Program was postured as Commonwealth Government program for achieving Commonwealth needs with the MDBA clearly in charge and the Basin States being invited to join. It followed that basin States weren't strongly involved early in the co-design process or represented in the EUAGs. Given that they strongly represent the water managers on the ground, better engagement with the State governments would likely have driven more adoption. Theme 1 was considered particularly successful as it included a project that was a collaboration with one of the basin state governments (NSW). So, this project had a strong link between the researchers, the EUAGs (which are predominantly MDBA staff), and the basin state water managers. There was only one example of this though.
- An interviewee suggested that greater investment could allow for improved interactions with end-users. For instance, end-users (e.g. from CHEW) could be embedded in the projects leading to more, regular and considered engagement rather than end-users "commenting from the outside".

Lessons learned workshop

Lessons learned workshop attendees were also questioned about the success of cooperation with end-users, and the response was positive in each instance. Several comments were made that the Program led to greatly strengthened relationships between the research consortia and the MDBA in particular, and one comment mentioned strengthened relationships with community and other stakeholders (undefined). One comment stated, "The research was relevant to MDBA needs and was flexible to meet these as understanding increased."

The feedback was more mixed on the subject of coordination between researchers across the Program. Positive comments included that there was effective collaboration between consortia partners and the Science Symposium was effective for research coordination and collaboration. However, there were multiple comments indicating that collaboration between the Themes was not as strong as it could have been due to the design of the Program. Specifically, the early determination of the study questions meant that there was limited co-design across themes despite there being clear opportunities. This was also highlighted and discussed in detail in the Synergies of Outcomes Report (CATE Delivery Partner, 2024).

Surveys

Evidence for the achievement of this third objective also came from the surveys. All groups were asked if they agree that "Advice from EUAGs (and CoP) was used to improve project objectives and approaches to ensure fit-for-purpose outcomes and outputs". 61% (11 respondents) agreed or strongly agreed, with 28% (5) being neutral. Examples of positive feedback included "Participants were very appreciative of the opportunity to review the content of scrolling stories prior to publication. They felt heard and respected." Also, "Yes, as the Theme coordinator, I provided comment opportunities to the EUAG on deliverables. Their feedback was sent to the researchers, and the researchers were required to address the EUAGs' feedback in their final deliverables." 11% (2) respondents who were involved in Theme 4, disagreed. This conforms with the interview comments discussed above about EUAG engagement for that Theme specifically. One of the survey responders noted that "The end user advisory group for Theme 4 was limited to economic rather than social policy membership. This was useful for T4.12.1 and T4.12.2 which each had an opportunity to present twice to the CoP, however because T4.14.2 and T4.14.3 were delayed due to floods and slow governance decisions delaying project start by a year, these projects were not presented to the CoP and no advice was provided." Another relevant question asked was whether respondent agreed that "MD-WERP's approach to engagement has advanced cooperation between users and researchers, leading to improved adoption of research outcomes." 78% (14) agreed or strongly agreed, 16% (3) were neutral, and 6% (1) disagreed. The respondent that disagreed was again from Theme 4. They commented that "There has only been one presentation to the CEWH for T4.12.1 and T4.12.2 and no other engagement with departmental end users, and no engagement for T4.14.2 and T4.14.3 each with

significant implications for quadruple bottom line outcomes from policy and regulation, and approaches to community engagement, communications and co-research." Finally, respondents were asked whether they agreed that "Collaboration between researchers, policy makers and/or river operators/water managers was productive and beneficial to all concerned." 83% (15 agreed or strongly agreed), while 17% (3) were neutral. An example of a positive comment was "In my role I have been a conduit between the research, policy makers, and water managers, so have seen firsthand how people are interacting with the science and tools developed from the Program."

Objective 4: Invest in applied research that delivers better informed environmental water management decisions by Commonwealth agencies and improved outcomes for communities

To achieve this objective MD-WERP undertook a range of activities across the three investment streams. These activities were designed to generate fit-for-purpose knowledge, tools, and decision-support frameworks that could be directly adopted by agencies like MDBA, CEWH, and DCCEEW. When addressing this objective we acknowledge that it will take time for some research to be adopted into decision-making and for communities to see the benefit, or for such benefit to be measured.

Evaluation of evidence

Literature

Key program activities aligned to this objective, taken from the Program literature, are summarised below.

1. Strategic research projects aimed to deliver applied, co-designed research across the four program themes. Activities included:

- Development of 14 priority research questions via the Research Prospectus.
- Co-design of Research Implementation Plans (RIPs) with end users.
- Delivery of tools like:
    - Climate adaptation toolkit (T1.SI6 and T1.SI7)
    - Floodplain inundation models (T3.11.3.3)
    - Predictive ecological models (T3.11.4.3)
    - Social resilience frameworks (T4.14.2.3 and T4.14.3.2)

These activities provided evidence for Basin Plan Review, improved scenario planning, and enhanced ecological and community resilience assessments.

2. Tactical projects acted as 'rapid-response research' to address emerging operational needs. Examples include:

- Drone-based waterbird monitoring (TP07)

- Hydrological non-stationarity analysis (T2.H.3)
- Blue-green algae synthesis (TP13)
- Fishway operational range assessments (TP17)

These projects delivered practical insights to address immediate water operations and risk mitigation needs.

3. Synthesis & Explainer Products were produced to translate complex research into usable formats for decision-makers. Examples of these products include:

- Creation of plain-language summaries, infographics, and briefs.
- Development of the Knowledge Hub website.
- Integration of findings into benefit realisation maps and impact pathways.

Each of these activities supported uptake by CEWH, MDBA, and Basin Plan Review team.

5. Engagement with Commonwealth agencies was undertaken and maintained throughout the Program to ensure research relevance and usability. Specific activities included:

- Embedding Commonwealth Theme Leads in each research theme.
- Undertaking regular workshops with CEWH, MDBA, and DCCEEW.
- Participating in Annual Symposia and Community of Practice forums.

Together these activities strengthened the science–policy interface and ensured outputs were policy-ready.

6. The Monitoring, Evaluation, Reporting and Improvement (MERI) framework developed for the Program (MD-WERP, 2025b) worked to track effectiveness and impact of the Program research. This included the Mid-Term and end-of-program (herein) evaluations and setting of various performance indicators for adoption, collaboration, and capacity building. Ultimately, the MERI helped to provided evidence of improved decision-making capacity for policy makers and water managers and, subsequently, community outcomes.

Examples of Applied Research Impact are relatively limited given the Program only just concluded, but some standout examples identified from the project documentation include:

- Farm dams and climate change (T1.FS2): Influenced NSW policy decisions.
- Low flow prediction tools (T2.6.6 / T2.6.7): Enhanced CEWH's environmental watering strategies.
- Mental health benefits of waterways (T4.12.1.3): Informed community wellbeing initiatives.
- Floodplain modelling (T2.7.1 / T2.7.4): Improved planning for environmental flows and infrastructure risk.

Interviews

Some evidence for the fourth objective comes from the interview process. The interviewees were asked "To what extent do you think the knowledge generated through the Program has led to or will lead to better informed environmental water management decisions by Commonwealth agencies and improved outcomes for communities?". Their responses were overwhelmingly positive. Generally speaking, the Program produced a large amount of material which has been made available in an understandable format (e.g. through Knowledge Hub) which will mean that it'll be more likely to influence end-users.

Specific examples were given of project that looked at river operations for the Murray River (T3.12.2) and Naran Lakes (T2.6.6 / T2.6.7). An interviewee pointed to them as tangible examples of where the research looked at how environmental water could be managed better on a day-to-day basis. Additionally, he could see the research will cascade through to longer-term environmental water guidance and planning documents that are part of the Basin Plan. Others referred to significant advances in hydrological and climate change modelling (e.g. T1.FS2 which looked at interactions between climate change and farm dams) that is already being used in environmental water management. It stands to reason that improvements in such models lead to improvements in water management.

Surveys

Through the surveys water mangers (2 responses) were asked whether they agree that "Research conducted through MD-WERP has resulted in better informed environmental water management decisions by Commonwealth agencies." One response was neutral as the Program was only just finishing, while the other strongly agreed stating that the "Information has been fundamental in improving MDBA capability in the BPR". When asked whether they agreed that "Research conducted through MD-WERP has resulted in better informed environmental water management decisions and improved outcomes for communities.", both responded neutral as the research still needs to be shared with the community and/or it didn't directly involve community engagement (e.g. Theme 1). Both note that communities will have access to the research and tools so therefore have the opportunity to be more informed and engage better. Specific examples of environmental water management decisions informed by MD-WERP were not given, but one noted that "Information has been fundamental in improving MDBA capability in the BPR". Furthermore, both responders agreed or strongly agreed that knowledge generated through the Program has improved our ability to evaluate the effectiveness of management approaches. This was in a general sense, with no specific examples given. Finally, both respondents agreed or strongly agreed that *MD-WERP has provided valuable research outputs and outcomes (improved knowledge) for adoption by river operators and/or water managers*. On this point it was stated that "Modelling and data improvements were integrated into ESLT method via climate adaptation toolkit/HydroBOT that will feed into BPR." Also, "There has been a significant shift in

knowledge and method development which is already being incorporated into BPR. Some of the tools can be considered for use in operational planning."

The research groups were asked for specific examples of *program outputs or outcomes (in development &/or planned) that will assist policy development, risk management, or river operations/water management?* The following examples were given:

Theme 1 (Climate adaptation)

- Science Applications & Assessment Toolkit (including the HydroBOT) (T1.TK)
- Showcasing Adaptability (Scrolling Stories) created innovative communication and engagement outputs such as "scrolling stories" to demonstrate adaptation strategies and lessons learned across projects. These tools broadened the reach of Basin science beyond technical audiences (T1.SA).

Theme 2 (Hydrology)

- Enhancing Low Flow Prediction to Support Water Resources Planning (T2.6)
- Enhancing Floodplain Inundation and Volume Prediction (T2.7)
- Water forecasting with river operators and e-water delivery (T2.H)
- Groundwater supply and use informing adaptation (T2.8a and T2.8b)
- Knowledge in changing hydrology across different parts of the Basin informing model improvement (i.e. T2.6, T2.7, and T2.H)

Theme 3 (Environmental outcomes)

- Long-term persistence and connectivity of in-channel refuge waterbodies in the Darling (Baaka) River (T3.11.2)
- Predictive model outputs of species responses to climate change that are being utilised in decision making (including outside MDBA) (T3.11.3, T3.11.4, T3.9.1, T3.9.2)

Theme 4 (Social, economic and cultural outcomes)

- Various projects working with local communities across the Basin that are leading to a more sophisticated understanding of the relationships community members have with water and with rivers and wetlands, and how that shapes questions about policy outcomes (T4.13.2a, T4.14.2, T4.14.4).
- Voices from the Basin (T4.14.3) – it was commented that this would alleviate the risk of conflict within and across the Basin as it provides insight into other people's concerns and perspectives on water management, thus moving away from a tightly held dominant narrative that is often portrayed as a collective narrative.
- Forecasting work related to reservoir inflows (T2.H)
- Development of tools for better predicting low flows, which is important to improve health of ecosystem functions existing at low flows (T2.6).

Further evidence came from the policy group (5 responders) who were asked if "MD-WERP research outputs and outcomes are valuable for policy development." Of these, 80% agreed or strongly agreed, while 20% were neutral as they didn't feel qualified to answer. The positive themes that emerged were that the co-design structure worked to ensure that the research was fit for purpose and responsive to changes in the policy landscape. Ultimately, some research outputs can clearly be adopted into policy development (e.g. T4.14.1, T4.14.2, T4.14.3, T4.14.4), while some others need more work before they can (e.g. T4.12.1 and T4.12.2). One constructive comment relating to those outputs that weren't immediately fit for policy was that "I think it is very difficult for external consortia to know what policy we are struggling with and what we require, and therefore they may think of valuable knowledge gaps, but not the imminent and most relevant to what we require. Therefore, future programs should have more of a focus of getting project ideas from APS/EL level staff and building from the bottom up (anonymous)." Specific examples of research that help policy development included:

- Scrolling stories (T4.14.3)
- SDL assessment and climate change (T1.FS) - this body of work included assessment of climate change impacts relevant to SDL under the Basin Plan.
- Systematic conservation planning prioritisation project (A data atlas for conservation prioritisation, T3.10.1) - this was the Basin-wide systematic conservation prioritisation and planning project.

Similarly, in response to the survey question "outputs and outcomes from MD-WERP will have an enduring influence on research in the Basin, all respondents agreed or strongly agreed, noting that the projects address knowledge gaps, were produced using credible methods, and are easily discoverable and accessible through the Knowledge Hub. It was also noted that "this program generated a lot of new research and new relationships, and hopefully these will morph into business as usual or new projects and new opportunities that otherwise would not have occurred."

Lessons learned workshop

Questions regarding the value to water reform and management were also posed to the Lessons learned workshop attendees. Again, the perception was overwhelmingly positive. Key feedback regarding successes and limitations are outlined in below.

Perceived Successes	Description
Applied research was delivered	Multiple participants noted that the research outputs were relevant, high-quality, and aligned with MDBA needs.
Better informed decisions	Outputs like the HydroBOT and improved modelling tools were cited as examples already informing the Basin Plan Review (BPR).
Social science contributions	Theme 4 research was highlighted for increasing understanding of social and economic drivers, with potential for future policy impact.
Flexibility and responsiveness	The Program adapted to emerging needs, which helped ensure relevance to environmental water management.

Perceived Successes	Description
Making research accessible	Setting up Knowledge Hub as an enduring science library to facilitate ongoing adoption and engagement post-program was viewed positively.

Limitation / Challenge	Description
Timeframe for impact	Many noted that while the research informs decisions, actual improved outcomes for communities may take years to materialize—especially for policy adoption.
Policy uptake	Despite general agreement that the Program was designed and executed in a way that would maximise opportunities/likelihood of uptake, there were concerns about whether the research would be used effectively, particularly given the long policy cycles and varying priorities across jurisdictions.
First Nations engagement	This was identified as an area where the Program fell short of its potential, lessening the broader community outcomes. Regardless, the Program was viewed as formative in this area and an important first step from which lessons will inform future research programs.

Objective 5: Be a platform from which to launch a more enduring research program

This objective is interpreted to mean that MD-WERP should be developed in a way that makes it a suitable platform for continuing research; one that could be extend/built upon. The value of the new knowledge generated by the Program would be demonstrated by ensuring outputs or research are applied in decision making. Success of the Program, and achievement against the four other program objectives would provide justification for support of further investment in a similar program. An overall positive perception of the Program from its members would also provide evidence that this objective has been met.

Evaluation of evidence

General Response, Including Literature

The overall impression gathered through the literature, workshop, surveys, and interviews is that the MD-WERP has laid the groundwork for a more enduring research program by:

- Building strong partnerships and co-investment models (e.g. MDBA/CEWH - Researcher relationships, successful use of EUAGs).
- Delivering applied, policy-relevant research (examples provided throughout this report).
- Creating mechanisms for synthesis, adoption, and legacy (e.g. CATE activities, Symposia, Knowledge Hub).
- Embedding evaluation and improvement cycles (e.g. the MERI and Risk Management Plan).
- Positioning itself within broader national water research frameworks (e.g. Flow-MER).

Evidence supporting the positive view of program members regarding the success and legacy of the MD-WERP came through the surveys and interviews with the governing body.

Surveys

The surveys provided evidence for this objective, mainly through the question posed to all groups, *On a scale of 1 to 10, how likely are you to participate or recommend to others a similar research program again? (1 = very unlikely, 10 = very likely) Why/why not?* All groups responded positively, including Policy (median 8, range 8-10), Research (median 10, range 8-10), and Water Management (median 8, range 6-10). Reasons for the positivity included:

- The pathway to impact for research output was clear from the outset.
- It was a highly impactful research-to-operations adoption program.
- It was well supported (funded and organised) to allow the research to be conducted and achieve its aims.

Areas for improvement suggested included:

- Integration should have been forced earlier by having the reporting themes be focussed on policy making needs, rather than themes based on realm of science. For example, the reporting themes should have been low flows, floodplains, climate risk & adaptation, etc; rather than hydrology, environmental etc.
- The CATE put a lot of time pressure on our internal team and the researchers, and a lot of overlap in the information being asked.
- The timeframes were tight, and it was a large burden (for the MDBA).
- Roles and the responsibilities across the Program weren't clear from the start.

Interviews

During the interviews, the governing body who were asked *Do you think the Program will provide a platform for a more enduring research Program?* The responses strongly suggested that the objective has been met. For instance, one said "… the Programme is a great model for how we can do similar research programmes into the future. There's a few tweaks here and there that I'd make, but overall, I'd give it an 8 out of 10 as a model that should be adopted." They pointed to the adoption work, the CATE framework, and the knowledge hub as examples of the Program's legacy. They went further to suggest that "The Programme has done its bit and it's done the science investment. It's then made it accessible through the communications adoption process. But there's now a requirement for MDBA to demonstrate we're applying this, that it's not just a nice thing that's sitting on the shelf." That is to say, the success/value of the Program will only be fully realised if the findings are applied through policy and water management. Another replied to the question "Absolutely" and pointed to the groundbreaking work done in Theme 4 to explore relationships between humans and the living environment. This was an early precedent for the social science domain to demonstrate its relevance to water management with rigorous science. The perception across the

interviews, surveys, and the lessons learned workshop was that it did this and assuming the lessons learned through the experience are adopted, it provided a suitable framework for similar programs in the future.

Another interviewee was also of the opinion that the Program was executed well and said it provides "a great example of how to do research", but noted that there has never been an enduring, stable research funding program in the MDB and there has been no traction with the federal government to make the MD-WERP an enduring program. So, their opinion is that while the MD-WERP does provide a platform for a more enduring research program, there has been no evidence of a commitment to an enduring program at this point in time. When asked *Would you support similar research Programs in the future?* they indicated that in general, they do not support short-term programmatic funding as it is highly inefficient. That is, too much time and money is spend on setting the Program up. Also, the socio-economic and political landscape in the Basin changes over time which means research questions need to as well. It follows that a base-funded long-term program would be a more impactful and efficient use of research funding.

Areas for improvement included:

- Research and governance approaches should be co-developed to make the process more efficient.
- First Nations projects need more thinking around the contracting and funding arrangements that are generally made for traditional science projects.
- Need to create an approach that includes built-in flexibility for First Nations partners.

Surveys

Through the surveys, respondents were asked, *Which features or lessons learned from this research program are you likely to use in the future?* The following examples were given:

- We learned a lot about First nations engagement and the issues experienced by First Nations in regard to water in the Basin.
- Models, datasets and modelling tools.
- The research co-design process was good and could be improved even further in the future
- Close integration of managers and researchers in project teams
- Strong partnership with technical people and organisations (like MDBA, CEWH) that can adopt the research knowledge, tools and datasets.
- Experience around governance, co-design, First Nations collaboration, research-policy linking
- Lots of lessons about engagement with end-users and design of research projects
- The use of oral history interviews and careful selection of quote to illustrate a range of themes in a scrolling story.

- Early collaboration with First Nations from the onset and involve First Nations across all themes and not specifically into a Theme 4 category.

Sub-KEQ2 How did the Program meet the needs of emerging issues and react flexibly to changing research priorities within the Program structure?

This question speaks to the governance structure of the Program and the ability for the Program team to address emerging issues and changing research priorities within that structure. We address it in this context.

Evaluation of evidence

Literature

Based on the closure reports, annual progress reports, synthesis documents, and governance materials the MD-WERP met emerging issues and responded flexibly to changing priorities within its structure in a number of ways.

1. Governance and Program Oversight
   - The MD-WERP Governance Framework (i.e. through streamlined oversight) and Risk Management Plans (i.e. through adoption of adaptive management principles) for the most part supported agile decision-making, enabling the Program to approve scope changes quickly, re-allocate resources to priority areas, and maintain alignment with Basin Plan Review timelines and objectives
2. Responsive Design and Adaptive Management
   - The governance structure of the Program appeared to be able to accommodate evolving environmental, social, and policy contexts with acceptable speed thanks to there being clear hierarchy to escalate issues, and regular meetings and reviews to identify issues.
   - Several projects (e.g. T3.11.1, T3.11.2, T3.11.3) adapted their modelling approaches mid-project to incorporate new hydrological data, climate scenarios, or stakeholder feedback.
   - Theme 4 projects (e.g. T4.14.2, T4.14.3) shifted focus and methods in response to community sensitivities, cultural impacts, and the failed Voice referendum, demonstrating flexibility in engagement and ethics.
3. Strategic Variations and Project Extensions
   - Numerous Project Variation Requests (PVRs) were approved to adjust timelines, deliverables, and scopes, for example due to delays from flooding or drought, shifts in stakeholder availability, and integration opportunities across themes (e.g. T4.14.2 and T4.14.3 shared data and contacts).
   - The T4.14.4 ARC Top-Up project extended its timeline due to COVID-19 disruptions, with MDBA support for continued collaboration and knowledge exchange.
   - Some projects (T1.TK, T2.6, T2.7, T2.8a, and T2.8b) reported that PVRs and modification approvals slowed research adaptation.

4. Integration Across Themes and Projects

Some projects were coordinated across themes to reduce duplication and enhance impact for instance:

- Theme 3 ecological modelling informed Theme 4 social and cultural research (e.g. habitat suitability models were used in community resilience planning).
- Theme 4 projects incorporated findings from ecological studies to contextualise community responses to environmental change.

5. Stakeholder-Driven Adjustments

Engagement with End User Advisory Groups (EUAG) and community stakeholders led to:

- Adjustments in research focus (e.g. inclusion of youth perspectives in T4.14.2)
- Reframing of deliverables (e.g. replacing podcasts with culturally appropriate sand stories in T4.13.2a)
- Enhanced communication strategies tailored to local needs

Lesson Learned Workshop

The subject was dealt with directly during the lessons learned workshop. The opinion of the group was overwhelmingly positive. The successful management of 27 Strategic projects and 14 Tactical projects all of which had different teams and focuses was seen as testament to the success of the approach to Program governance. The day-to-day running of the Program is thought to have been managed well by the MDBA's small MD-WERP Implementation Team, which provided clear communication of expectations and timelines and supported project teams with time management issues, all of which improved project outputs, budgeting and financial forecasting.

The Program structure and project approval process enabled the research teams a degree of autonomy to 'get on' with the scientific research and adapt the scope of the projects as learnings occurred. Although the degree of project flexibility was constrained to an extent by the requirements for milestones and deliverables, the scope of some components of the projects (e.g., case studies conducted for Theme 1) was made intentionally flexible at the outset of the Program, so the research could adapt to meet the needs (and answer the evolving questions) of key stakeholders such as river operators.

Key benefits mentioned

- The structure of the governance model included different levels of authority and clear responsibilities for each level, which had multiple benefits, including (as quoted):
    - The Governing Panel was required for high level issues and decision making
    - The Science Leadership Team enabled researchers to share progress, issues, support each other
    - Theme Leads and Program Delegate ensured high quality outputs

    - Centralised contract management meant MDBA theme leads and coordinators could focus on the research content'
    - Having a formal and layered governance structure enabled timely identification and escalation of risks, which enhanced the management of sensitive relationships and project variations/issues in a timely manner
- The model created space for research to occur over five years without a lot of micro-management
- The MD-WERP Implementation Team used good processes and record-keeping practices and was great to work with. The fortnightly deliverables reviews with the Implementation Team were excellent, as was their patient support and help with reporting
- Regular, focussed theme-level discussions and progress updates
- The Governing Panel and Executive Leadership Team were supportive of the research teams and prepared to work out-of-session when needed to ensure progress was not hampered. Their endorsements were felt as strongly supportive of the work

Suggestions for improvement

- Minimise changes to the approach to Program management to reduce inconsistencies
- Reduce and streamline the approval process for project extensions and project deliverables (particularly research outputs). This includes:
    - Removing the EUAGs from the approval process for deliverables
    - Increasing the number of delegates who can approve project deliverables
- Having more diverse Governing Panel members and including Theme leads in GP meetings when relevant
- Clarify the role and responsibilities of the EUAGs and requirements for meeting with them
- Minimise changes to templates towards the end of the Program, particularly when the work has been done/signed off
- Ensure policy perspectives and requirements are included early in the Program, and are properly understood by research team members, to help shape the project scope and objectives. This should be led by the MDBA and CEWO teams.
- Review the role and responsibilities of the Communication and Engagement Steering Group and include oversight of Communication and Engagement at the beginning of the Program
- Improve communication with the research teams about overarching Program deliverables, such as the CATE component, which have implications for the theme planning and outputs
- Improve communication about the results of decisions from GP meetings
- Review requirements for approvals to publish reports.

Interviews

While not directly questioned on the subject, two interviewees provided some important insights during their interview. They were of the opinion that the governance structure was quite resource intensive, for instance a team of 5 people was required to support administration, but it was worthwhile. In fact, they believed the MDBA management committee were key to the structures effectiveness. They created the expectation for the research team which then did a great job delivering on those expectations. They noted that it can be difficult as a project manager to manage researchers and academics, but they did an excellent job which is evidenced by most projects being delivered on time, on budget. If issues with delivery were raised for projects, it was brought to the governing panel that discussed solutions but were able to maintain the deliverables in all cases. Further to this they thought the inclusion of an independent chair (Rob Vertessy) was particularly effective as they could provide guidance and advice when issues arose from a perspective that was independent of the organisations conducting the research. They noted that not just the role is important, but having the right person in that role.

Through the surveys the Research groups were asked whether they agreed that *The Program enabled sufficient flexibility to respond to changes in research priorities based on emerging issues and opportunities*. The responses were mixed with 50% (6) agreed or strongly agreed, while 42% (5) were neutral, and 8% (1) disagreed. Of those that agreed, one noted that "we were able to tailor our approach in the wake of devastating floods that affected some communities." Another noted that the tactical project facilitated this flexibility. Those that were neutral or disagreed indicated that "we were contracted to deliver the co-designed research projects. There was limited opportunity or impetus to respond to changing research priorities based on emerging issues and opportunities". Another noted that "changes to the Program were cumbersome when they involved altering deliverables which made flexibility difficult."

Sub-KEQ3 Was the collaboration between researchers and policy makers maintained successfully throughout the Program?

Evaluation of Evidence

Literature

Based on the MD-WERP literature, collaboration between researchers and policy makers was maintained in many areas, but with notable variability across themes and projects.

Where collaboration worked well

Theme 1 – Climate Adaptation

Science Applications & Assessment Toolkit (T1.TK): Collaboration with MDBA policy and modelling teams was reported to be strong throughout, with business owners engaged from

inception to closure. Outputs (toolkit, modelling improvements) were integrated into the Basin Plan Review (BPR) as quality assurance evidence. Researchers worked directly with policy teams to ensure recommendations were aligned with BPR needs.

Showcasing Adaptability and Pilots (T1.SA) and Climate Adaptation Foundational Science (T1.FS): Policy–research integration was built into the design. MDBA staff participated in modelling workshops and scenario co-design and these projects reported that co-development ensured model outputs could feed directly into policy tools and Basin state planning.

Theme 2 – River Operations & Forecasting

Various hydrological projects (T2.6, T2.7, T2.8a, T2.8b) reported active engagement with MDBA operations staff and Basin states during development and validation of models. Feedback loops were established through testing phases, so models matched policy and operational needs (e.g. T2.6, T2.7, and T2.8). For example, T2.8a's optimisation tools were refined based on operations team feedback.

Theme 3 – Aquatic Ecology & Water Quality

For various projects in this theme (e.g. T3.9.1, T3.9.2, T3.10.2, T3.11.1–T3.11.4) policy teams were involved early to ensure model scenarios matched Basin Plan priorities (e.g., fish kill mitigation, climate change vulnerability). T3.11.3 explicitly notes that outputs were designed for direct uptake into the BPR, with MDBA GitHub code transfer. T3.11.4 maintained collaboration via a Shiny app developed with MDBA input, ensuring policy-relevant access to biodiversity vulnerability models.

Theme 4 – Social, Cultural & Community Resilience

For the Navigating Change project (T4.14.3; T4.14.2, T4.14.4) collaboration with policy makers took place, but more at the communication of results stage than during method design. T4.14.2 noted limited integration into MDBA processes post-project, despite interest from business owners. T4.14.4 was a strategic investment project that was also partially funded under an ARC grant. Due to its 'hybrid' nature there was governance confusion over its place in the MD-WERP, which weakened direct policy engagement mid-project and made the policy pathway less direct.

Where collaboration faced challenges

- Social research (e.g. T4.13.2a, T4.14.2) reported slow ethics, governance, and sign-off processes, which reduced the ability to iterate with policy stakeholders.
- While most projects delivered high-quality insights, uptake into policy cycles was largely still pending at closure, particularly for Theme 4. This may suggest collaboration was more episodic than continuous.

- Flooding, COVID, and political sensitivities sometimes shifted projects from participatory to more observational approaches (T4.14.2), which reduced two-way engagement during research.

Lessons Learned Workshop

Feedback from the lessons learned workshop indicated that collaboration between researchers and policymakers was generally maintained throughout the Program, though with some caveats and areas for improvement. We summarise what worked, challenges that were raised, and suggestions provided for improvement below.

What Worked Well

- Structured engagement: Regular meetings (monthly, quarterly), workshops, symposiums, and collaboration sessions helped maintain momentum and relationships.
- Embedded collaboration: Researchers worked closely with MDBA staff, including technical leads and coordinators, which supported uptake of research outcomes.
- Respect for independence: Researchers retained autonomy in methods and interpretation, while fulfilling Research Implementation Plans (RIPs).
- Theme-level coordination: Theme Leads and Coordinators played a key role in bridging research and policy.

Challenges Noted

- EUAG dynamics: End-User Advisory Groups (EUAGs) were sometimes challenging due to differing expectations between MDBA and state-based members.
- Policy uptake lag: Some research outputs (e.g. hydrology models) may take 5–15 years to be adopted into policy due to complex approval processes across Basin states.
- Staff turnover: Changes in MDBA personnel and leadership created discontinuities in collaboration and program management.
- Limited cross-theme integration: Collaboration across themes was weaker than expected, limiting interdisciplinary benefits.
- First Nations engagement: Collaboration in First Nations projects faced delays due to capacity and clarity issues early in the Program.

Suggestions for improvement

- Earlier and clearer engagement with policy teams.
- More consistent involvement of all potential end users.
- Dedicated engagement leads and clearer EUAG roles.
- Streamlined approval processes and better communication of decisions.

Workshop attendees were also questioned about the success of cooperation with end-users, and the response was positive in each instance. Several comments were made that the Program led to greatly strengthened relationships between the research consortia and the MDBA in particular, and another comment mentioned strengthened relationships with community and other stakeholders (undefined). One comment stated, "The research was relevant to MDBA needs and was flexible to meet these as understanding increased."

The feedback was more mixed on the subject of coordination between researchers across the Program. Positive comments included that there was effective collaboration between consortia partners and the Science Symposium was effective for research coordination and collaboration. However, there were multiple comments indicating that collaboration between the Themes was not as strong as it could have been due to the design of the Program. Specifically, the early determination of the study questions meant that there was limited co-design across themes despite there being clear opportunities. This was also highlighted and discussed in detail in the Synergies of Outcomes Report (CATE Delivery Partner, 2024).

Interviews

The governing panel were questioned about whether collaboration between researchers and policy makers was maintained successfully throughout the Program. The responses were positive on the whole, although the success of the collaboration varied to a degree between themes. The main points were:

- Researchers worked together very closely and in a genuine way
- the EUAGs were committed to making the research better for the purpose of policy improvements.
- The level of success varied between Themes. For instance, Themes 1 and 2 had clear links between the science and a group of policy makers that apply such findings, but the link in Theme 4 was less clear. Theme 3 was not mentioned.
- While use of the EUAGs was helpful in achieving this program objective, more could have been done to engage with water managers from the Basin State governments. One noted that the Program was postured as Commonwealth Government program for achieving Commonwealth needs with the MDBA clearly in charge and the Basin States being invited to join. It followed that basin States weren't strongly involved early in the co-design process or represented in the EUAGs. Given that they strongly represent the water managers on the ground, better engagement with the State governments would likely have driven more adoption. Theme 1 was considered particularly successful as it included a project that was a collaboration with one of the basin state governments (NSW). So, this project had a strong link between the researchers, the EUAGs (which are predominantly MDBA staff), and the basin state water managers. There was only one example of this though.
- One suggested that greater investment could allow for improved interactions with end users. For instance, end-users (e.g. from MDBA or CHEW) could be embedded in

the projects leading to more, regular and considered engagement rather than end-users "commenting from the outside".

Surveys

Evidence for the achievement of this objective also came from the surveys. All groups were asked if they agree that "Advice from EUAGs (and CoP) was used to improve project objectives and approaches to ensure fit-for-purpose outcomes and outputs". 61% (11 respondents) agreed or strongly agreed, with 28% (5) being neutral. Examples of positive feedback included "Participants were very appreciative of the opportunity to review the content of scrolling stories prior to publication. They felt heard and respected." Also, "Yes, as the Theme coordinator, I provided comment opportunities to the EUAG on deliverables. Their feedback was sent to the researchers, and the researchers were required to address the EUAGs feedback in their final deliverables." 11% (2) of respondents, both of whom were involved in Theme 4, disagreed. This conforms with the interview comments discussed above about EUAG engagement for that Theme specifically. One of the survey responders noted that "The end user advisory group for Theme 4 was limited to economic rather than social policy membership. This was useful for T4.12.1 and T4.12.2 which each had an opportunity to present twice to the CoP, however because T4.14.2 and T4.14.3 were delayed due to floods and slow governance decisions delaying project start by a year, these projects were not presented to the CoP and no advice was provided." Another relevant question asked was whether respondent agreed that "MD-WERP's approach to engagement has advanced cooperation between users and researchers, leading to improved adoption of research outcomes." 78% (14) agreed or strongly agreed, 17% (3) were neutral, and 6% (1) disagreed. The respondent that disagreed was again from Theme 4. They commented that "There has only been one presentation to the CEWH for T4.12.1 and T4.12.2 and no other engagement with departmental end users, and no engagement for T4.14.2 and T4.14.3 each with significant implications for quadruple bottom line outcomes from policy and regulation, and approaches to community engagement, communications and co-research." Finally, respondents were asked whether they agreed that "Collaboration between researchers, policy makers and/or river operators/water managers was productive and beneficial to all concerned." 83% (15 agreed or strongly agreed), while 17% (3) were neutral. An example of a positive comment was "In my role I have been a conduit between the research and policy makers and water managers, so have seen first-hand how people are interacting with the science and tools developed from the Program."

Sub-KEQ4 Has MD-WERP research produced fit-for-purpose products or tools to enhance adoption and achieve benefits?

Evaluation of Evidence

Literature

Across the Program documents we found evidence that the MD-WERP has produced a substantial number of fit-for-purpose products and tools, especially in technical and modelling streams, with clear adoption pathways into Basin Plan Review (BPR), operational decision-making, and Basin state planning. That said, the evidence also shows variation in readiness for implementation. Some tools are already in MDBA operational use, while others (particularly in social, cultural, and community resilience research) require additional steps before full adoption. Examples of fit-for-purpose products and tools by theme and their adoption status include the following:

Theme	Key Outputs	Adoption Status
Theme 1 – Climate Adaptation	• Enhanced climate–hydrology modelling frameworks for Basin-scale water supply/demand projections which have been Integrated into BPR scenario planning (T1.FS) • Regional and Basin-wide adaptation models feeding directly into ESLT method refinement (T1.SA) • A structured "science adoption toolkit" embedded in MDBA QA processes; now part of BPR evidence base (T1.TK).	All Theme 1 products are already in MDBA workflows and being applied in current planning.
Theme 2 – River Operations & Forecasting	• Produced operational hydrology tools for low-flow prediction, floodplain inundation mapping, optimisation of water delivery, and integration of groundwater in planning (T2.6, T2.7, T2.8a, T2.8b). These were designed with operations team input to ensure outputs match real-world decision timelines.	These tools are considered operational-ready, with handover to Basin operations staff complete.
Theme 3 – Aquatic Ecology & Water Quality	• Predictive fish movement and water quality risk models (TUFLOW FV simulations for hypoxia risk) (T3.9.1, T3.9.2). • Water quality forecasting integrated with environmental watering planning (T3.10.2). • Spatial population models, habitat availability projections, and species vulnerability mapping (T3.11.1–T3.11.4). • T3.11.4 includes a Shiny app for biodiversity risk visualisation, developed with MDBA input for policy use.	Most products have been transferred to MDBA GitHub/MDBOK; uptake into environmental water planning and BPR is ongoing.
Theme 4 – Social,	• Navigating Change – Oral history–based values typology for community engagement (T4.14.3).	The theme provided fit-for-purpose for

Theme	Key Outputs	Adoption Status
Cultural & Community Resilience	• Pathways to Community Resilience – Youth engagement frameworks and resilience benefit mapping (T4.14.2). • Water Cultures – Cultural research outputs, network, and publications in progress (T4.14.4).	engagement and cultural insight, but adoption will depend on integration into MDBA communications and engagement strategies.

Cross-program fit-for-purpose features

- Most technical outputs were co-developed with end-users (MDBA staff, Basin states) to ensure relevance and usability.
- Business owners identified for nearly all projects, with BAU handover plans.
- Products tied to clear Basin Plan or operational decisions have the highest adoption rates.

Limitations

- In social/cultural research, the "product" is often a framework, typology, or engagement process. These require translation into policy/operational practice, which is still in progress for some projects.
- Some adoption was delayed by slow governance processes, IP clearances, or the need for additional communications resources.

Surveys

Evidence for the achievement of this objective came through the surveys, where all respondents were asked whether they agree that *Advice from EUAGs (and CoP) was used to improve project objectives and approaches to ensure fit-for-purpose outcomes and outputs*. 67% (12) agreed or strongly agreed, 22% (4) were neutral, and 11% (2) disagreed. The responses to this question have been discussed in above in KEQ2/Sub-KEQ3. Generally speaking, the feedback suggested that the engagement with the EUAGs was effective in ensuring that the research and tools developed in the Program with fit-for-purpose and increased the change of the outputs being adopted and the benefits achieved. That said the EUAG for Theme 4 did not include appropriate social policy members to help co-development of fit-for-purpose research and increase likelihood of adoption.

The policy group was asked whether they agree that, *Products (e.g., Knowledge hub, Climate adaptation toolkit) developed through MD-WERP are appropriate and useful for informing improved evidence-based policy development*. 60% (3) agreed or strongly agreed, while 40% (2) were neutral. Those that agreed cited Knowledge Hub and the Climate Adaptation Toolkit as examples. The neutral responders hadn't engaged with any products. One respondent noted that, regarding social science products (Theme 4), "agencies need to develop their capabilities for using qualitative data and sociological understandings of social structures and

drivers as evidence for policy development. Social science needs to be recognised as "science" by decision makers for it to be used as "evidence".

The policy group were also asked, *To what extent have the outputs and outcomes from MD-WERP met your needs for the development and/or modification of strategies or policy?* This would potentially provide further evidence to support the sub-question, but four of the five respondents indicated that it was too early to respond to this question. Regardless, one indicated that "most of our needs are met".

Similarly, the water manager group were asked if they agreed that *Products/tools (e.g., Knowledge hub, Climate adaptation toolkit) developed through MD-WERP are appropriate and useful for river operators and/or water managers*. Both respondents agreed or strongly agreed, also citing Knowledge Hub and the Climate Adaptation Toolkit as examples.

The water manager group were also asked if they agreed that *The outputs and outcomes from MD-WERP met your expectations in respect to their ability to help develop and/or modify management plans and approaches* Both respondents agreed or strongly agreed. They commented that:

- modelling and data improvements were integrated into ESLT method via toolkit/HydroBOT that will feed into BPR.
- There has been a significant shift in knowledge and method development which is already being incorporated into BPR. Some of the tools can be considered for use in operational planning.

Lessons Learned Workshop

There were no discussions in the workshop the spoke directly to this objective.

Surveys

There were no discussions in the surveys the spoke directly to this objective.

KEQ3: To what extent has the program improved our water policy, capacity to manage risks and river operations/water management outcomes?

Sub-KEQ1 Has the Program enhanced our understanding of the Basin across the quadruple bottom line?

Evaluation of evidence

Literature

The MD-WERP program literature indicated that the program has clearly enhanced understanding of the Basin across all Quadruple Bottom Line (QBL) dimensions

(environmental, social, cultural, and economic) though the depth of improvement varies by theme and by type of research.

1. Environmental

Environmental understanding was strengthened by:

- Theme 1 & 2 projects (e.g. T1.FS, T1.SA, T2.6, T2.7, T2.8a/b, T2.H) that refined climate–hydrology projections, flow optimisation, and floodplain inundation mapping.
- Theme 3 fish ecology and water quality studies (T3.9.1, T3.9.2, T3.10.2, T3.11.1–T3.11.4) that linked hydrology, climate change, and habitat condition.

Specific examples include:

- Improved predictive capacity for hypoxia events using TUFLOW FV modelling, giving MDBA and Basin states tools to anticipate fish kills (T3.9.2).
- Vulnerability assessments for species and ecological communities under future climate/flow scenarios, supporting environmental watering and biodiversity policy (T3.11.4).

Research impact:

The impact of such research is evidenced through direct integration of environmental modelling into Basin Plan Review (e.g. T1.TK, T3.11.4, T3.9.2).

2. Social Understanding

Social understanding was strengthened by:

- Theme 4 community resilience and change projects (T4.14.3, T4.14.2) documenting lived experiences of change, community adaptation pathways, and youth perspectives.
- Annual Progress Reports and the Mid-Term Evaluation show how social data was embedded into engagement strategies.

Specific examples include:

- T4.14.3 – Values typology for tracking community priorities in water planning.
- T4.14.2 – Methods for youth engagement in climate adaptation discussions.

Research impact:

- MDBA engagement plans can now incorporate evidence-based social values mapping.

3. Cultural Understanding

Cultural understanding was strengthened by:

- Winaga-Li Gunimaa embedding First Nations' knowledge into environmental flows and producing engagement protocols and the Sandstory output (T4.13.2a).
- Work exploring water cultures, knowledge systems, and their implications for Basin governance (T4.14.4).

Specific examples include:

- Documented cultural benefits from environmental watering in the Gwydir Wetlands.
- Identified barriers to First Nations participation in water management decision-making.

Research impact:

- Foundation for MDBA and Basin states to integrate cultural outcomes into planning and monitoring.

4. Economic Understanding

Economic understanding was strengthened by:

- Theme 1 & 2 modelling of climate change impacts on water availability, which provides clear economic benefits like improved efficiency of water use, reduced economic risks and enhanced security for irrigators, towns, and industries.
- Theme 3 fish and habitat modelling informing long-term fisheries sustainability, with downstream economic benefits.
- Theme 4 Pathways to Resilience, Voices From the Basin, and Water Cultures gave direct insight into the economic wellbeing of communities and their adaptive capacity under reform.

Examples:

- T1.FS – Modelled climate–policy interactions affecting Basin-wide water supply/demand, supporting more economically resilient water allocation decisions.
- T2.8a – Optimisation tools for water delivery can reduce operational costs and improve resource efficiency.

Research impact:

- Evidence was provided that highlights the importance of balancing environmental objectives with agricultural and regional economic needs.
- Research findings improved efficiency of water use and also reduced economic risks and enhanced security for irrigators, towns, and industries.

Interviews

Evidence for this question mainly comes from interviews with the governing body who were asked, *To what extent do you think the knowledge generated through the Program has enhanced our understanding of the Basin across the quadruple bottom line?* All responses strongly indicated that it had. For instance, one replied "This program has done more than any other large program to cover the quadruple bottom line". They went on to say that the broadening of research to cover the quadruple bottom line done through MD-WERP is a huge step forward that has changed the foundations for future programs. Also, the research has made strong incremental advances, but science is inherently iterative and continuous learnings and improvement are needed.

All interviewees broadly agreed that the work produced through Themes 1, 2, and 3 has led to substantial enhancements in knowledge across the whole Basin, although their thoughts on Theme 4 were more mixed. One commented that the Theme faced challenges regarding first nations engagement stemming from having to engage with a large number of nations (60+) across the Basin with varying knowledge and experience with western style of resource management. The process was more time consuming and difficult than anticipated which led to some projects being discontinued (e.g. T4.13.1 and T13.2 activities 3 and 4). An interviewee indicated that, despite some excellent research being done, the program didn't really enhance the whole of basin understanding of First Nations cultural issues. Regarding the social and economic side of the theme, one believed that the work has provided great, great strides forward on the social side, but not much on the economic side as the balance of research was tilted that way. They've ended up in a good space regarding the economics work, but that's because of other programmes which came along.

One interviewee answered that in every theme there's been a lot of new insight or a valuable tool developed that will allow the planning and management process to run better.

- Better appreciation of hydrology and Climate Change
- Better appreciation of flow on effect of Climate change to ecology
- Better appreciation of water security to users
- Better understanding of cultural, economic and social impacts and how that flows on - just scratching the surface in this space, but we are in a much stronger position than 5 years ago because of this program.

Another interviewee was also positive citing the following examples:

- Significantly improved knowledge around the impacts of climate.
- First Nations water sovereignty has been raised very strongly
- Community-centred policy development has progressed and there are good opportunities for it to be enhanced.

Lessons Learned Workshop

There were no discussions in the workshop the spoke directly to this objective.

Surveys

There were no discussions in the surveys the spoke directly to this objective.

Sub-KEQ2 Does the Program meet the needs of end users?

Evaluation of evidence

Literature

Where the needs of end-users were met strongly

Theme 1 – Climate Adaptation

T1.FS, T1.SA, and T1.TK were co-designed with MDBA staff members to directly support the Basin Plan Review (BPR) and water resource planning. Products produced from this research are already in business-as-usual workflows (e.g. modelling frameworks, adaptation scenarios, QA toolkits).

Theme 2 – River Operations & Forecasting

Tools from T2.6, T2.7, T2.8a, T2.8b, and T2.H were built in collaboration with MDBA operational teams and Basin state representatives. Reports for T2.6 and T2.8a highlight successful uptake into operational models, scenario testing, and water delivery optimisation.

Theme 3 – Aquatic Ecology & Water Quality

Models for fish population projections, hypoxia forecasts, and biodiversity vulnerability mapping were developed with end-user input and transferred to MDBA systems like MDBOK and GitHub (T3.9.2, T3.11.3, T3.11.4). The shiny app from T3.11.4 for species vulnerability is a direct, user-facing product that was requested by policy staff.

Where the needs of end-users were partially met

Theme 4 – Social, Cultural & Community Resilience

- Youth engagement frameworks and resilience mapping tools were produced, but uptake will depend on integration of the findings into MDBA engagement strategies (T4.14.2).
- The project T4.14.4 produced valuable cultural research outputs, but governance uncertainty mid-project reduced alignment with end-user planning cycles. As such there has been no uptake yet.

Whole-program perspective

Co-design and embedded MDBA/states engagement ensured most technical projects directly addressed operational and policy needs (Engagement Adoption Plan Apr 2025; Governance Oct 2024). Furthermore, end-users were involved throughout in testing and refining products (Mid-Term Evaluation; Annual Progress 2023–24).

Limitations:

- There is an unavoidable time-lag between the production of some of the research and its uptake by end-users. In many cases this is unavoidable.
- Projects requiring complex governance, cultural clearances, or heavy community engagement were more vulnerable to delays and shifting policy contexts (T3.13.2a, T4.14.4).
- Some Theme 4 outputs depend on follow-up work beyond project closure for full adoption (T4.14.2, T4.14.4).

Surveys

Evidence for this evaluation question came from the surveys to policy and water manager groups and has been discussed as part of KEQ2/Sub-KEQ1 (Has the program met its objectives?). The is summarised here and some additional lines of evidence are added. The water manager group (two respondents) responded to the following prompts in a largely positive way:

1. MD-WERP has provided valuable research outputs and outcomes (improved knowledge) for adoption by river operators and/or water managers (agreed/strongly agreed).
2. MD-WERP has provided valuable research outputs and outcomes (improved knowledge) for adoption by river operators and/or water managers (agreed/strongly agreed).
3. Knowledge generated through the Program has improved our ability to evaluate the effectiveness of management approaches (agreed/strongly agreed).
4. Research outcomes from MD-WERP have improved management actions, strategies and outcomes for the environment (agreed/strongly agreed).
5. Research conducted through MD-WERP has resulted in better informed environmental water management decisions by Commonwealth agencies (neutral/agreed).
6. Research conducted through MD-WERP has resulted in better informed environmental water management decisions and improved outcomes for communities (neutral/neutral).

The neutral responses stemmed from the fact that the program is just ending and needs time to be incorporated into decision making and shared among the basin communities.

While the responses indicated that, generally speaking, information gained from the program has significantly improved MDBA capability in the Basin Plan Review, specific examples of valuable research outputs and outcomes given included:

- Modelling and data improvements were integrated into ESLT method via the climate change toolkit/hydrobot that feeds into Basin Plan Review (T1.FS, T1.SI).
- Basin states and the MDBA are currently working collaboratively to improve the science and knowledge on runoff dams in the Basin through the SDL accounting improvement strategy and ongoing state engagement processes (Mid-Term Evaluation 2023).
- Predictive model outputs of species responses to climate change that are being utilised in decision making (including outside MDBA) (Theme 3; T3.11.1, T3.11.2, T3.11.3, T3.11.3).
- Various projects working with local communities across the Basin that are leading to a more sophisticated understanding of the relationships community members have with water and with rivers and wetlands, and how that shapes questions about policy outcomes (Theme 4; T4.14.2, T4.14.3).

The policy group were asked the following questions that are relevant to this sub-KEQ. Two of these questions sought to draw out areas for improvement:

1. To what extent have the outputs and outcomes from MD-WERP met your needs for the development and/or modification of strategies or policy?
    - Four of the five respondents indicated that it was too early to respond to this question. Regardless, one indicated that "most of our needs are met".
2. Where outputs and outcomes from MD-WERP have not met your needs, please explain why that is the case. There was general support for the following answers:
    - It would have been good to do a conflict mapping strategy to support 14.2 and 14.3. There are multiple methodologies to do this, which we researched, but at the time of codesign there was no awareness of the significance of this issue amongst decision makers, and little understanding of how conflict mapping works and serves decision making. This ongoing capacity links qualitative and quantitative date, is ongoing, and informs risk across all agency domains. it is also essential to identify thresholds of community vulnerability.
    - The major gap is economics, specifically modelling economic impacts of water planning changes.
3. Please provide brief examples of improvements to evidence-based policy and/or risk management that have resulted from MD-WERP outcomes and outputs

- In response to this question, all indicated that it was too early to provide examples.

Interviews

Through the interviews the governing panel were asked, *Are you pleased with the Program's outputs and achievements? To what extent do you think the knowledge generated through the Program has led to or will lead to better informed environmental water management decisions by Commonwealth agencies and improved outcomes for communities?* The responses were overwhelmingly positive. For example, one interviewee said "The highlights for me… was the communication, adoption, transparency, engagement work which summarised all the science to make it accessible for non-science people." Following on from this another noted "I've received really positive feedback from authority members about that (the CATE activities), because they can better determine which outputs they want to read… I know from experience that the authority members are reading more of the papers than perhaps they may otherwise have done so." One made the point that some aspects of the program that were more formative (e.g. Theme 4) which was understood and the program enabled this. For the other themes, which are were developed, the program enabled much-needed research which would have a more direct impact on policy and management decisions. They also made a distinction between agency (e.g. MDBA) and community (e.g. irrigators) end-users. Regarding the impact on communities, they considered that if the agencies are better equipped with knowledge and tools, they will be better equipped to address community concerns and needs. But they went further by also interacting with the community (e.g., Community members were invited to the Symposium). There are more community-facing actions coming up in the next year that will draw on the research from this program. He noted that at the start of the program the MDBA's relationship with the community was at an all-time low (off the back of the Basin Plan). This program helped to lift the public trust, in part because it wasn't just the MDBA telling the story, it was researchers from respected organisations telling the story. We see this as further evidence of the program meeting the needs of end users, albeit in an indirect way.

Sub-KEQ3 Are the outputs well utilised and being effectively used to inform evidence-based policy development, risk management and river operation/water management?

Evaluation of evidence

Literature

Research Theme utilisation

In many technical and modelling projects (Themes 1–3), outputs are already embedded in MDBA systems and workflows and being used to inform evidence-based policy, risk assessment, and operational decisions. However, for some social, cultural, and community

resilience projects (Theme 4), utilisation is still emerging, with several outputs pending integration or broader uptake.

1. Evidence-based policy development

Strong utilisation

- Climate adaptation models, adaptation pilots, and the QA toolkit are in use for Basin Plan Review scenario testing and policy drafting (T1.FS, T1.SA, T1.TK).
- Vulnerability assessment tools (including Shiny app) has been used to prioritise species and ecological communities for policy focus (T3.11.4).
- Hypoxia risk models have been used to inform fish kill mitigation planning in Basin Plan environmental watering policy (T3.9.2).

Partial utilisation

- Social and cultural frameworks researched are relevant to policy engagement but require formal integration into MDBA policy guidance (e.g. T4.13.2a, T4.14.2).
- Similarly, T4.12.1 (wellbeing), T4.12.2 (tourism/recreation), T4.14.2 (community resilience), and T4.14.3 (navigating change) show that Theme 4 outputs report slow uptake. The main reasons stated were lack of clear institutional owners, poor alignment with MDBA reporting systems, and weak representation in EUAGs.

2. Risk management

Strong utilisation

- The MD-WERP Risk Management Plan v2.9 identifies direct application of multiple project outputs in the program's risk mitigation strategies.
- Tools for predicting extreme low flows are now incorporated into MDBA risk planning (T2.6).
- Optimisation models are being used to help assess risks to water delivery efficiency and environmental watering outcomes (T2.8a).
- Forecasting tools for water quality (e.g., low dissolved oxygen risk) have been embedded in operational planning (T3.10.2).

Partial utilisation

- Cultural research offers insight for managing reputational and engagement risks, but practical application in MDBA's risk framework is not yet documented (T4.14.4).

3. River operations / water management

Strong utilisation

- Inundation mapping tools are in active use by operations teams for water ordering and delivery (T2.7).

- Groundwater integration outputs have been used to improve river operations modelling (T2.H).
- Ecological models have been applied in environmental flow planning to optimise outcomes (T3.11.1–T3.11.3).

Partial utilisation

- Social data has potential to inform water management engagement processes but uptake into operational decision-making is still emerging (e.g. T4.14.3, T4.14.2).

Whole-program utilisation

Strengths

- Most technical outputs were co-designed with MDBA staff members, ensuring compatibility with existing systems (e.g., MDBOK, MDBA GitHub) and decision timelines (Engagement Adoption Plan Apr 2025;Mid-Term Evaluation).
- Multiple outputs directly linked to BPR evidence requirements, ensuring policy relevance from inception (CATE Framework Oct 2024; e.g. T1.FS).

Limitations

- Cultural and social outputs require additional translation into operational or policy frameworks before full utilisation (e.g. T4.13.2a; T4.14.4).
- In some cases, outputs were delivered late in the program, limiting time for integration before BPR milestones (Annual Progress 2023–24).

Surveys

A great deal of evidence for this evaluation question overlaps with KEQ3/Sub-KEQ2 (Does the Program meet the needs of end users?) and more detail can be found there. In brief, the perception of water managers, policy makers, and the governing panel was that research produced through the program was largely fit-for-purpose for use in policy development, risk management and river operation/management given that the study questions were co-designed with EUAGs, engagement with the EUAGs was maintained throughout the program, and the research has been made easily available through the Knowledge Hub thus enhancing potential for uptake. There was also a number of mentions of helpful tools developed for use in risk and water management, in particular the Climate Adaptation Toolkit/HydroBot.

Understandably, some research is likely to impact of longer-term environmental water guidance and planning documents that are part of the Basin Plan and their effective use would not be expected to be immediately apparent. In the lesson learned workshop it was noted that "for some of the work from the hydrology theme it could take up to 5 years before it is accepted as being worth implementing in policy. It could then take another 10

years before the States integrate the work into policy". That said, some examples which are taken from across all groups surveyed include:

- Modelling and data improvements were integrated into ESLT method via the climate change toolkit/hydrobot that feeds into Basin Plan Review (e.g. T1.TK).
- Basin states and the MDBA are currently working collaboratively to improve the science and knowledge on runoff dams in the Basin through the SDL accounting improvement strategy and ongoing state engagement processes (e.g. T1.FS).
- River operations for the Murray River and Naran Lakes (e.g. T2.8a)
- Predictive model outputs of species responses to climate change that are being utilised in decision making (including outside MDBA) (e.g. T3.11.4)
- Project 11.2 (Theme 3) - Long-term persistence and connectivity of in-channel refuge waterbodies in the Darling (Baaka) River
- Scrolling stories (T4.14.3)
- Production of Voices from the Basin will alleviate the risk of conflict within and across the Basin as they provide insight into other people's concerns and perspectives on water management, thus moving away from a tightly held dominant narrative that is often portrayed as a collective narrative (T4.14.3).
- Forecasting work related to reservoir inflows (T2.8a)
- Development of tool in predicting better low flows, which is important to improve health of eco--system functions existing at low flows (T2.6).

Lessons Learned Workshop

There were no discussions in the workshop the spoke directly to this objective.

Interviews

There were no discussions in the interviews the spoke directly to this objective.

Sub-KEQ4 Is there a clear pathway for benefits realisation in the future?

Evaluation of evidence

Literature

This question was answered based on the program literature only, because there was no additional information added by the surveys, workshop, and interviews. The pathway for benefits realisation is laid out in the CATE framework (MD-WERP 2024b) and Engagement and Adoption Plan (MDBA 2025h).

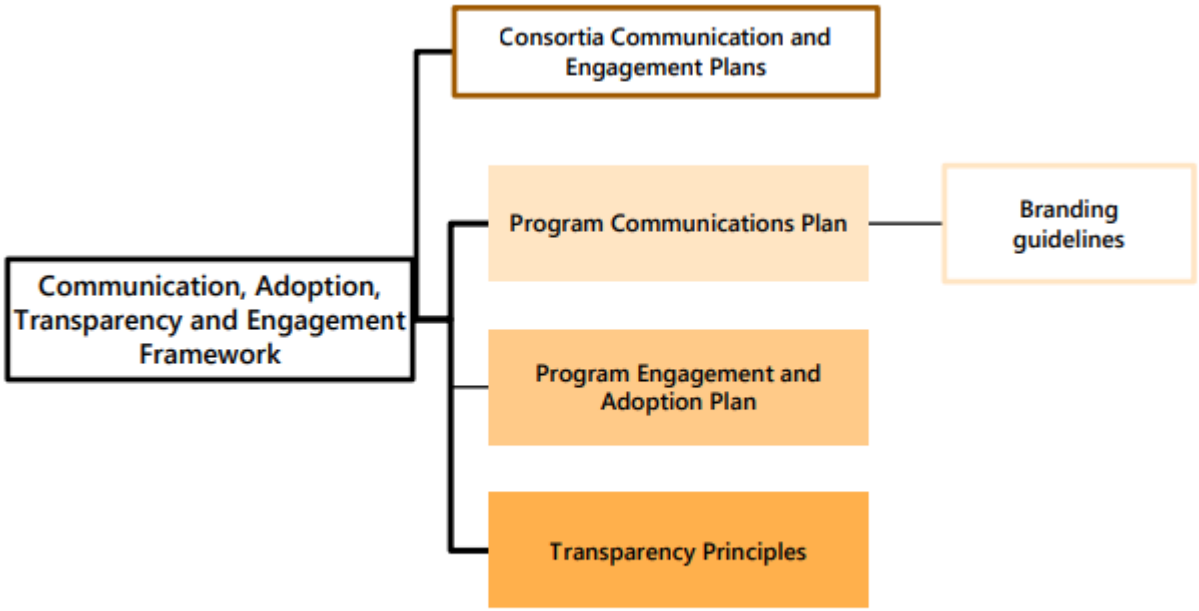

Figure 1. Where this Engagement and Adoption Plan sits within the context of the CATE Framework.

The Engagement and Adoption Plan (MDBA 2025h) is summarised as follows:

1. Co-Design Approach
   - End-user involvement from inception: Government policy makers and other stakeholders were included throughout the research lifecycle to ensure relevance and usability.
   - Three-phase co-design process:
     - Discovery – Establish shared understanding of scope and objectives.
     - Analysis & Planning – Develop and prioritise research questions with stakeholder input.
     - Refinement – Finalise Research Implementation Plans with clear impact pathways.
2. End User Advisory Groups
   - Established for each of the four research themes.
   - Comprised of representatives from Commonwealth agencies, state governments, and the research sector.
   - Provide ongoing input to ensure research aligns with user needs and is ready for adoption.
3. Communication, Engagement & Adoption Framework
   - Guides all communication and engagement activities.
   - Ensures alignment with program objectives and clarity of roles.
   - Includes:
     - Annual end-user forums
     - Theme workshops
     - Briefings across jurisdictions

    - Project-level communication plans

4. Impact Pathways

Impact pathways are structured frameworks that map the journey from research inputs to real-world outcomes, ensure that research is aligned with end-user needs, and provide a clear logic for how research will lead to change in policy, practice, or understanding. Each research theme included defined pathways outlining:

- Inputs - Resources such as funding, expertise, and partnerships.
- Activities - Research design, data collection, analysis, and stakeholder engagement.
- Outputs - Tangible products like models, tools, reports, and datasets.
- Expected outcomes - Changes in knowledge, attitudes, skills, or practices among end users.
- Expected impacts - Long-term benefits such as improved water management, ecological resilience, or community wellbeing.

Evidence of the pathway working

Examples of research benefits being adopted by end-users have been provided throughout this report. In short, we note the following.

- Many Theme 1–3 outputs are already embedded in Basin Plan Review modelling, MDBA operational decision-support systems, and risk planning frameworks (e.g. T1.FS, T2.6, T3.11.4, T3.10.2).
- Many technical products have:
    - Documented BAU adoption plans in closure reports.
    - Handover to specific MDBA operational or policy teams.
    - Storage in MDBOK, MDBA GitHub, or state data systems to ensure long-term accessibility.

Because these outputs were co-developed with end-users and tied to concrete BPR or operational decisions, the benefit pathways are both clear and already in motion.

Partial evidence of the pathway working

From the program perspective, the main challenges are in Theme 4:

- Social and community resilience frameworks (e.g., youth engagement tools, values typologies) are fit-for-purpose but require translation into operational engagement strategies and dedicated resources for rollout (T4.14.2, T4.14.3).

For these projects, the pathway exists but is conditional on actions beyond the program's current scope.

Risks to future benefit realisation

Timing – Several outputs were delivered late in the program, reducing the pre-BPR adoption window (Annual Progress 2023–24, Mid-Term Evaluation).

Approvals & governance – Cultural/social projects face external dependencies (e.g., ICIP approval, cross-agency coordination) (T4.13.2a, T4.14.4).

Resourcing – Continued benefits require ongoing technical maintenance, user training, and data updates, which rely on future MDBA budgets and staffing (Mid-Term Evaluation).

Dependency on champions – Some adoption relies heavily on the continued engagement of specific MDBA staff members or state representatives identified during the project (Engagement Adoption Plan Apr 2025).

Surveys

There was no feedback from the surveys the spoke directly to this objective.

Lessons Learned Workshop

There were no discussions in the workshop the spoke directly to this objective.

Interviews

There were no discussions in the interviews the spoke directly to this objective.

Sub-KEQ5 Has the Program influenced enduring research in the Basin?

Evaluation of evidence

Literature

There is evidence in the program literature indicates that the MD-WERP program has influenced enduring research in the Murray–Darling Basin. The main evidence themes are discussed below.

1. Evidence of Enduring Research Capacity

Long-term research networks - Multiple closure reports (e.g. T1.SI Synthesis and Implementation, T1.FS Climate Adaptation Foundational Science, T3.10.2, T3.11.2, T4.14.3) show that MD-WERP projects created or strengthened collaborations between research organisations, MDBA staff members, state agencies, and community stakeholders. These partnerships are continuing beyond the funded period, with researchers integrating findings into ongoing basin monitoring and modelling programs.

Institutional embedding of methods & tools - The MD-WERP Synthesis Report V1.3 and Synergies of Outcomes Report highlight that models, datasets, and analytical frameworks

developed under MD-WERP have been embedded in ongoing MDBA and state programs. For example, climate adaptation decision-support tools and environmental flow assessment methods are now part of operational practice.

2. Strategic Signals of Enduring Influence

CATE Framework October 2024 – the framework establishes a clear pathway for maintaining capability in climate adaptation science and water management beyond MD-WERP, ensuring that tools and methods remain relevant for future Basin planning cycles.

MERI Plan (May 2025 revision) - Includes measures to track ongoing use of research outputs and to support further application in policy and management contexts, signalling a shift from short-term project deliverables to a culture of long-term knowledge stewardship.

3. Continuing Research Lines

Follow-on research proposals and integration

Several annual reports (2019–20 through 2023–24) note that MD-WERP outputs have been taken up in new research proposals, either through direct continuation of MD-WERP topics or as foundational inputs to other Basin research programs. Examples of this include:

- Climate adaptation & resilience modelling expanded under Basin Plan evaluation work.
- Fish movement & ecology studies incorporated into state water management planning.
- Hydrologic and hydraulic modelling carried forward into floodplain and wetland restoration assessments.

4. Cultural and Knowledge Legacy

Lessons from WERP – It was stated through an unpublished 'lessons learned' communication for the program that MD-WERP's approach to co-design, open data sharing, and multi-disciplinary integration has altered expectations for Basin research, moving towards programs that deliberately combine science, management, and community perspectives.

Mid-Term Evaluation Report (Nov 2023) - concludes that MD-WERP created "a platform for enduring science capability in the MDB" through improved researcher–policy–community linkages and cross-jurisdictional coordination.

<u>Lessons learned workshop, surveys and interviews</u>

Across the lessons learned workshop, surveys and interviews, all participants agreed that MD-WERP was a highly successful program that delivered valuable research and fostered strong collaboration. The main theme that emerged from this data collection are as follows.

What Worked Well

1. High-Quality, Impactful Research
    - The program produced strategically relevant science, especially in hydrology, climate adaptation, and ecological resilience.
    - It addressed previously underexplored areas, such as First Nations water sovereignty and community expectations for co-management.
2. Collaborative Design and Delivery
    - The co-design process was praised for aligning research with agency needs.
    - End-user advisory groups and the symposium helped bridge research and policy.
    - The Knowledge Hub was widely seen as a key legacy tool for accessibility and future use.
3. Policy Influence
    - Outputs have and are expected to further inform the Basin Plan Review and MDB Outlook.
    - Agencies are better equipped to respond to community concerns and environmental challenges.

The Independent Chair described the program as a model for collaborative research, noting that it helped restore public trust and provided a platform for future reforms.

Opportunities for enduring impact

1. Embedding Research in Policy and Practice

Applying MD-WERP outputs in the Basin Plan Review is seen as critical to demonstrating value and securing future investment.

2. Building Relationships and Trust

Interviewees emphasised the importance of ongoing engagement, especially with First Nations and regional communities. Also, that research should be place-based and relational, not transactional.

3. Governance Reform

Several interviewees suggested that future programs should include co-development of governance frameworks from the outset. A model like Land & Water Australia was cited as a potential vehicle for enduring research.