Stage 1 Report: Appendix B

KEY EVALUATION, SURVEY AND INTERVIEW QUESTIONS FOR THE END OF PROGRAM OUTCOME EVALUATION OF THE LTIM AND EWKR PROJECTS

September 2020

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Environmental Management and Aquatic Sciences

Document history
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Issue date   September 2020
Issued to   Commonwealth Environmental Water Office (CEWO)
Description: Key evaluation, survey and interview questions for the LTIM and EWKR projects

Contents

1   INTRODUCTION

This document forms Appendix B of the end of program outcome evaluation of the Long Term Intervention Monitoring (LTIM) and Environmental Water Knowledge and Research (EWKR) projects (Butcher et al. 2020).

The evaluation addressed the following six focal areas in line with the CEWO's *Monitoring, Evaluation, Reporting and Improvement* (MERI) Framework (CEWO 2013):

- the extent to which the projects' objectives were achieved
- the extent to which the projects supported the CEWO's legislative reporting requirements
- how well the environmental outcomes were either demonstrated (LTIM) or supported the achievement of environmental outcomes (EWKR)
- how well findings were communicated to all stakeholders
- the extent to which the projects were fit for purpose
- opportunities for improvement to support the CEWO's future monitoring, evaluation, and research activities.

This document provides the key evaluation questions (KEQs) addressed by the expert evaluators for each of the projects.

Three lines of evidence were used to answer these KEQs: a large range of documents (45 documents listed in Appendix C in Boulton and Davies 2020 and 249 documents listed in Appendix B in Hart et al. 2020) and surveys and interviews (Butcher and Fenton 2020 a, b). The survey and interview questions are also provided in this document.

2   KEY EVALUATION QUESTIONS

Key evaluation questions (KEQs) were prepared for each focal area in line with Step 4 of the approach outlined in the evaluation strategy guiding this evaluation (Butcher and Schreiber 2020). The KEQs were worded in such a way that they could directly address the evaluative criteria of effectiveness, appropriateness, impact and efficiency used.

The KEQs were nested, with two or three levels as appropriate (high-level, mid-level, micro-level), to ensure evaluative reasoning at the high level could be justified in appropriate detail as required. Not all high-level KEQs required micro-level KEQs. A total of 150 KEQs were developed for the evaluation of the LTIM project and 150 KEQs for the EWKR project.

2.1   KEY EVALUATION QUESTIONS FOR THE LTIM PROJECT

2.1.1   EVALUATIVE CRITERION: EFFECTIVENESS – ACHIEVED OBJECTIVES

Five high-level KEQs were used to address this criterion. Twenty-nine mid-level KEQs and 30 micro-level KEQs were nested below this high-level KEQ. All 64 KEQs for this criterion are provided in the table below:

Table. LTIM Key Evaluation Questions for Effectiveness – achieved objectives.

KEQ Code	KEQ Level	Key Evaluation Question
KEQ 1	High- level	How effective was the LTIM project in planning, reporting, and collaborating to support adaptive management?
KEQ 1.1	Mid-level	How effectively did the LTIM project undertake and report on the Pilot Basin Evaluation in 2014-15 to test the proposed Basin-scale evaluation process and methodology as described in Gawne et al. (2014c, Section5) (from Head contract B2.1 (a))?
KEQ 1.1.1	Micro-level	To what extent were the objectives of the Pilot Basin Evaluation achieved (from Basin Evaluation Plan Part B, Section 5): to synthesise the outcomes of past Commonwealth environmental watering actions using the Outcomes Framework and, to the extent possible, the Basin Matter evaluation methods?

KEQ Code	KEQ Level	Key Evaluation Question
KEQ 1.1.2	Micro-level	To what extent were the objectives of the Pilot Basin Evaluation achieved (from Basin Evaluation Plan Part B, Section 5): 2. where possible, to assess the information available in the context of the Basin Matter evaluation methods, which would include testing the likelihood of being able to successfully implement the Basin Evaluation methods as described in this plan?
KEQ 1.1.3	Micro-level	To what extent were the objectives of the Pilot Basin Evaluation achieved (from Basin Evaluation Plan Part B, Section 5): 3. to test and refine the integrated evaluation approach based on existing data?
KEQ 1.2	Mid-level	How effectively has the LTIM project Annual Forum been organised, convened and reported on each year of the project as described in Gawne et al. (2014a, Section 6.1) (from Head contract B2.1 (e))?
KEQ 1.3	Mid-level	How effective was the technical review at the final year of the project, as described in Gawne et al. (2014a, Section 6.2) (from Head contract B2.1 (f))?
KEQ 1.4	Mid-level	How effective was consultation with monitoring and evaluation providers prior to the finalisation of the Basin Evaluation Plan and Basin Matter Foundation Reports (from Head contract B2.1 (g))?
KEQ 1.5	Mid-level	How effective was the technical review processes undertaken by the technical advisors (MDFRC/LaTrobe) of the draft Selected Area Evaluation Reports (from Head contract B2.1 (h))?
KEQ 1.6	Mid-level	How effectively did the LTIM project staff collaborate and/or participate in collaboration with other parities (from Head contract B2.1 (i))?
KEQ 1.7	Mid-level	How effective were the data management tasks as specified in Gawne et al. (2014d), to support the evaluation and reporting on outcomes as per B.2.1 (from Head contract B2.1 (j))?
KEQ 1.8	Mid-level	How effective was the LTIM project in supporting the adaptive management of Commonwealth environmental water (objective 4 Gawne et al. 2014)?
KEQ 1.8.1	Micro- level	How effectively did the LTIM project support adaptive management of CEW in each Selected Area?
KEQ 1.8.2	Micro- level	How effectively did the LTIM project support adaptive management of CEW at the Basin-scale?
KEQ 1.8.3	Micro- level	How effective has the reporting of adaptive management by Selected Areas been (i.e. annual evaluation report and Quarterly reports)?
KEQ 1A	High- level	How effective has the LTIM project been in monitoring the ecological response to Commonwealth environmental watering at each of the seven Selected Areas (objective 5 Gawne et al. 2014)?
KEQ 1A.1	Mid-level	How effective has the LTIM project been in monitoring the ecological response to Commonwealth environmental watering at the Warrego Darling Selected Area?
KEQ 1A.2	Mid-level	How effective has the LTIM project been in monitoring the ecological response to Commonwealth environmental watering at the Gwydir Selected Area?
KEQ 1A.3	Mid-level	How effective has the LTIM project been in monitoring the ecological response to Commonwealth environmental watering at the Murrumbidgee Selected Area?
KEQ 1A.4	Mid-level	How effective has the LTIM project been in monitoring the ecological response to Commonwealth environmental watering at the Lachlan Selected Area?
KEQ 1A.5	Mid-level	How effective has the LTIM project been in monitoring the ecological response to Commonwealth environmental watering at the Goulburn River Selected Area?
KEQ 1A.6	Mid-level	How effective has the LTIM project been in monitoring the ecological response to Commonwealth environmental watering at the Edward-Wakool Selected Area?
KEQ 1A.7	Mid-level	How effective has the LTIM project been in monitoring the ecological response to Commonwealth environmental watering at the Lower Murray Selected Area?
KEQ 2	High- level	How effectively did the LTIM project evaluate Basin-scale contribution of CEW to the Basin Plan objectives using the CEWO Outcomes Framework and following the process and methodology outlined in Gawne et al. (2014a, Section 2.4) (from Head contract B2.1 (b)) (objective 1 Gawne et al. 2014: evaluate the contribution of Commonwealth

KEQ Code	KEQ Level	Key Evaluation Question
		environmental watering to the objectives of the Murray– Darling Basin Authority's (MDBA) Environmental Watering Plan)?
KEQ 2.1	Mid-level	How effectively did the CEWO Outcome Framework align to the Basin Plan Environmental Water Plan (EWP) and Water Quality and Salinity Plan objectives?
KEQ 2.1.1	Micro- level	How effectively did the LTIM project align to the Basin Plan EWP objectives in S8.05 (labelled 'biodiversity')?
KEQ 2.1.2	Micro- level	How effectively did the LTIM project align to the Basin Plan EWP objectives in S8.06 (labelled 'ecosystem function')?
KEQ 2.1.3	Micro- level	How effectively did the LTIM project align to the Basin Plan EWP objectives in S8.07 (labelled 'resilience')?
KEQ 2.1.4	Micro- level	How effectively did the LTIM project align to the Basin Plan objectives in S9.04 (labelled 'water quality')?
KEQ 2.2	Mid-level	How effectively did the LTIM project evaluate the contribution of CEW to the Basin Plan objectives (includes Chapter 8 and 9 objectives)?
KEQ 2.2.1	Micro- level	How effectively did the LTIM project evaluate Basin-scale contribution of CEW to Basin Plan EWP objectives S8.05 - 'biodiversity'?
KEQ 2.2.2	Micro- level	How effectively did the LTIM project evaluate Basin-scale contribution of CEW to Basin Plan EWP objectives in S8.06 - 'ecosystem function'?
KEQ 2.2.3	Micro- level	How effectively did the LTIM project evaluate Basin-scale contribution of CEW to Basin Plan EWP objectives in S8.07 - 'resilience'?
KEQ 2.2.4	Micro- level	How effectively did the LTIM project evaluate Basin-scale contribution of CEW to Basin Plan objectives relating to water quality?
KEQ 2.3	Mid-level	How effectively did the LTIM project document and report annually on the cumulative evaluation of the contribution of CEW at a Basin-scale as described in Gawne et al. (2014b, Section 6.3)?
KEQ 2.3.1	Micro- level	How well did the annual Basin Evaluation Report meet the reporting requirements as specified in Gawne et al. (2014b, Section 6.3)?
KEQ 2.3.2	Micro- level	How effectively did the LTIM project report on annual evaluation of the contribution of CEW at the Basin-scale?
KEQ 2.3.3	Micro- level	How effectively did the LTIM project report on the cumulative evaluation of the contribution of CEW at the Basin-scale?
KEQ 2.4	Mid-level	How effectively did the LTIM project undertake annual evaluation of CEW on the six specified Basin Matters as described in Gawne et al. (2014a, Section 3 and 2014b Section 2.2)?
KEQ 2.4.1	Micro- level	How effective was the annual evaluation of hydrology?
KEQ 2.4.2	Micro- level	How effective was the annual evaluation of ecosystem diversity?
KEQ 2.4.3	Micro- level	How effective was the annual evaluation of vegetation?
KEQ 2.4.4	Micro- level	How effective was the annual evaluation of fish?
KEQ 2.4.5	Micro- level	How effective was the annual evaluation of stream metabolism and water quality?
KEQ 2.4.6	Micro- level	How effective was the annual evaluation of generic diversity?
KEQ 3	High- level	How effectively did the LTIM project evaluate the ecological outcomes of Commonwealth environmental water at the seven Selected Areas (objective 2 Gawne et al. 2013)?
KEQ 3.1	Mid-level	How effectively did the Warrego Darling Selected Area evaluate the ecological outcomes of CEW?
KEQ 3.2	Mid-level	How effectively did the Gwydir Selected Area evaluate the ecological outcomes of CEW?
KEQ 3.3	Mid-level	How effectively did the Murrumbidgee Selected Area evaluate the ecological outcomes of CEW?
KEQ 3.4	Mid-level	How effectively did the Lachlan Selected Area evaluate the ecological outcomes of CEW?
KEQ 3.5	Mid-level	How effectively did the Goulburn River Selected Area evaluate the ecological outcomes of CEW?

KEQ Code	KEQ Level	Key Evaluation Question
KEQ 3.6	Mid-level	How effectively did the Edward-Wakool Selected Area evaluate the ecological outcomes of CEW?
KEQ 3.7	Mid-level	How effectively did the Lower Murray Selected Area evaluate the ecological outcomes of CEW?
KEQ 3.8	Mid-level	How effectively were the Selected Area outcomes incorporated into the Basin-scale synthesis reports?
KEQ 4	High- level	To what extent did the LTIM project infer ecological outcomes of Commonwealth environmental water to areas in the Basin not monitored (objective 3 Gawne et al. 2013)?
KEQ 4.1	Mid-level	How effectively did Selected Area services providers extrapolate their findings from reach to whole of Selected Area scale?
KEQ 4.1.1	Micro- level	How well did the Warrego Darling Selected Area infer ecological outcomes of CEW to areas not monitored?
KEQ 4.1.2	Micro- level	How well did the Gwydir Selected Area infer ecological outcomes of CEW to areas not monitored?
KEQ 4.1.3	Micro- level	How well did the Murrumbidgee Selected Area infer ecological outcomes of CEW to areas not monitored?
KEQ 4.1.4	Micro- level	How well did the Lachlan Selected Area infer ecological outcomes of CEW to areas not monitored?
KEQ 4.1.5	Micro- level	How well did the Goulburn River Selected Area infer ecological outcomes of CEW to areas not monitored?
KEQ 4.1.6	Micro- level	How well did the Edward-Wakool Selected Area infer ecological outcomes of CEW to areas not monitored?
KEQ 4.1.7	Micro- level	How well did the Lower Murray Selected Area infer ecological outcomes of CEW to areas not monitored?
KEQ 4.2	Mid-level	How effectively did the LTIM project infer ecological outcome of CEW from Selected Area to areas in the basin not monitored?

2.1.2 EVALUATIVE CRITERION: EFFECTIVENESS – COMMUNICATED FINDINGS

A single high-level KEQ was used to address this criterion. Two mid-level KEQs and nine micro-level KEQs were nested below this high-level KEQ. All 12 KEQs for this criterion are provided in the table below:

Table. LTIM Key Evaluation Questions for Effectiveness – communicated findings.

KEQ Code	KEQ Level	Key Evaluation Question
KEQ5	High-level	How effective was the LTIM project at communicating key findings?
KEQ5.1	Mid-level	How effectively were the outputs and key findings of the LTIM project communicated to end users such as the MDBA, CEWO water delivery teams, other collaborators in the LTIM project?
KEQ5.1.1	Micro-level	To what extent did planned outputs (reports) meet CEWO reporting requirements (see reporting template) and timelines?
KEQ5.1.2	Micro-level	To what extent were planned outputs targeted at key audiences (both in terms of providing relevant information and in a format useful to the end-user)?
KEQ5.1.3	Micro-level	To what extent did the project identify and make use of existing communication channels and networks used by key stakeholders?
KEQ5.1.4	Micro-level	To what extent were end users aware of the key findings from the LTIM project relating to Basin Matters and Selected Areas?
KEQ5.1.5	Micro-level	To what extent were the communication and engagement activities captured in a Communications Plan?

KEQ5.1.6	Micro-level	How effective were the cause and effect diagrams (CED) in communicating key relationships between environmental watering and ecological outcomes?
KEQ5.1.7	Micro-level	How effective were the Basin Matter synthesis workshops in communicating to key stakeholders (Basin Matter leaders, M&E Provider leaders, M&E Partners and other key individuals) the evaluation approach being undertaken (Gawne et al. 2014b, p 23)?
KEQ5.2	Mid-level	How effectively were key findings conveyed to inform adaptive management?
KEQ5.2.1	Micro-level	How effectively were key findings conveyed to inform adaptive management at the Basin-scale?
KEQ5.2.2	Micro-level	How effectively were key findings conveyed to inform adaptive management at the Selected Area scale?

2.1.3 EVALUATIVE CRITERION: EFFECTIVENESS – ACHIEVING OUTCOMES

A single high-level KEQ was used to address this criterion. Seven mid-level KEQs and four micro-level KEQs were nested below this high-level KEQ. All 12 KEQs for this criterion are provided in the table below:

Table. LTIM Key Evaluation Questions for Effectiveness – achieving outcomes.

KEQ Code	KEQ Level	Key Evaluation Question
KEQ6	High-level	How effectively has the LTIM project demonstrated its outcomes?
KEQ6.1	Mid-level	How effectively has the LTIM project demonstrated the contribution of CEW to achieving Basin Plan objectives (note this includes Chapter 8 and 9 objectives)?
KEQ6.1.1	Micro-level	How effectively has the LTIM project demonstrated the contribution of CEW to each of the Basin Matters?
KEQ6.1.2	Micro-level	How effectively has the LTIM project demonstrated the contribution of CEW to achieving outcomes in Selected Areas?
KEQ6.2	Mid-level	How effectively has the LTIM project demonstrated it outcomes where the expected outcome is monitored and provides information on the condition of the system with the watering action (Evaluation Plan, p7)?
KEQ6.3	Mid-level	For areas where the expected outcome is not monitored, how effectively have multiple lines of evidence, including predictions based on conceptual or quantitative models, been used to demonstrate potential outcomes (Evaluation Plan, p7)?
KEQ6.4	Mid-level	How effectively has the LTIM project compared and contrasted the expected, observed and no flow predicted outcomes to inform an evaluation of the overall outcome of the watering action (Evaluation Plan, p7)?
KEQ6.5	Mid-level	To what extent have critical success factors been identified to improve future management of CEW (Evaluation Plan, p7)?
KEQ6.6	Mid-level	How effectively the LTIM project improved capacity to predict outcomes of environmental flow allocations and their management over 1–5 years?
KEQ6.6.1	Micro-level	How effectively were the outcomes related to the six specified matters incorporated into the environmental water adaptive management process (Selected Area, Basin-scale)?
KEQ6.6.2	Micro-level	How effectively have the predictive tools or processes developed or refined as part of the LTIM project informed environmental watering regimes (Selected Area and Basin- scale)?
KEQ6.7	Mid-level	How effectively has the LTIM project demonstrated that short term, less than 1-year outcomes, contribute to longer term outcomes?

2.1.4 EVALUATIVE CRITERION: APPROPRIATENESS – STRATEGIC RELEVANCE

A single high-level KEQ was used to address this criterion. Two mid-level KEQs and six micro-level KEQs were nested below this high-level KEQ. All 10 KEQs for this criterion are provided in the table below:

Table. LTIM Key Evaluation Questions for Appropriateness – strategic relevance.

KEQ Code	KEQ Level	Key Evaluation Question
KEQ7	High-level	How well has the LTIM project contributed to the CEWO's ability to meet their legislative reporting requirements?
KEQ7.1	Mid-level	To what extent has the information provided by the LTIM project contributed to the CEWH delivering on its Water Act reporting requirements?
KEQ7.1.1	Micro-level	How appropriate was the information provided by the LTIM project in meeting the CEWH annually reporting requirements to the Commonwealth Water Minister, and relevant State Ministers for each of the Basin States (section 114(1)) which includes information on achievements against the objectives of the Basin Plan's Environmental Watering Plan (section 114(2a))?
KEQ7.2	Mid-level	How appropriate was the information provided by the LTIM project for contributing to the CEWH delivering on its Basin Plan reporting requirements?
KEQ7.2.1	Micro-level	How appropriate was the LTIM project for supporting the annual reporting requirements to the MDBA on the identification of environmental water and the monitoring of its use (Basin Plan Schedule 12, item 9)?
KEQ7.2.2	Micro-level	How appropriate was the LTIM project for supporting the annual reporting requirements to the MDBA on the extent to which local knowledge and solutions inform implementation of the Basin Plan (Basin Plan Schedule 12, item 6)?
KEQ7.2.3	Micro-level	How appropriate was the LTIM project for supporting the annual reporting requirements to the MDBA in relation to the implementation of the Environmental Management Framework (Basin Plan Schedule 12, item 10)?
KEQ7.2.4	Micro-level	How appropriate was the LTIM project for supporting the annual reporting requirements to the MDBA in relation to the implementation of the Water Quality and Salinity Plan (Basin Plan Schedule 12, item 14)?
KEQ7.2.5	Micro-level	How appropriate were the LTIM project synthesis reports in meeting the 5 yearly reporting requirements to the MDBA on the achievement of environmental outcomes at a Basin-scale by reference to the targets to measure progress towards the environmental objectives in Schedule 7 (Basin Plan Schedule 12, item 7)?

2.1.5 EVALUATIVE CRITERION: APPROPRIATENESS – FIT FOR PURPOSE

A single high-level KEQ was used to address this criterion. Eight mid-level KEQs and nine micro-level KEQs were nested below this high-level KEQ. All 18 KEQs for this criterion are provided in the table below:

Table. LTIM Key Evaluation Questions for appropriateness – fit for purpose.

KEQ Code	KEQ Level	Key Evaluation Question
KEQ8	High-level	How appropriate was the LTIM project design, in terms of being fit for purpose in meeting the CEWO's strategic requirements?
KEQ8.1	Mid-level	How appropriate was a program logic, being fit for purpose and including specifying measurable (SMART) objectives and outcomes, to be adopted by the LTIM project?
KEQ8.1.1	Micro-level	At the Basin-scale and for Basin Matters?
KEQ8.2	Mid-level	How appropriate was the program logic as specified in the foundation documents, was it fit for purpose?
KEQ8.2.1	Micro-level	How appropriate was the program logic in terms of its alignment to the Basin Plan objectives (Chapter 8 and 9, BWS and reporting requirements?
KEQ8.3	Mid-level	To what extent did the project design consider complementary recent, ongoing, or planned projects in the same area during the planning phase?
KEQ8.3.1	Micro-level	At the Basin-scale and at the Selected Area scale?

KEQ8.4	Mid-level	To what extent did the cause and effect diagrams include best available knowledge (including scientific, local, and cultural knowledge)?
KEQ8.5	Mid-level	To what extent were the best practice scientific methods employed in the LTIM project?
KEQ8.5.1	Micro-level	For each Basin Matter?
KEQ8.5.2	Micro-level	How appropriate were the Standard Methods, were they fit for purpose and consistently applied at the Selected Areas?
KEQ8.5.3	Micro-level	How appropriate were the category III methods for addressing CEWOs strategic requirements?
KEQ8.5.4	Micro-level	How appropriate were the predictive modelling approaches adopted to predict outcomes of environmental watering in areas not monitored for each Basin Matter?
KEQ8.6	Mid-level	To what extent was best available knowledge (including scientific, local and cultural knowledge), evidence and analysis incorporated into monitoring and evaluation findings? For Basin Matters and Selected Areas?
KEQ8.7	Mid-level	How appropriate was the LTIM Basin-scale Evaluation Plan, was it fit for purpose?
KEQ8.8	Mid-level	How appropriate were data management arrangements in supporting capture and making available data generated by the LTIM project?
KEQ8.8.1	Micro-level	At the Basin-scale?
KEQ8.8.2	Micro-level	At the Selected Area scale?

2.1.6 EVALUATIVE CRITERION: IMPACT

Two high-level KEQs were used to address this criterion. Four mid-level KEQs and two micro-level KEQs were nested below the high-level KEQs. All eight KEQs for this criterion are provided in the table below:

Table. LTIM Key Evaluation Questions for impact.

KEQ Code	KEQ Level	Key Evaluation Question
KEQ9	High-level	To what extent has the LTIM project had an impact in terms of improving water management practices?
KEQ9.1	Mid-level	What level of impact has the LTIM project had on the adaptive management of environmental water?
KEQ9.2	Mid-level	How impactful has knowledge gained through the LTIM project been in informing and improving Basin Plan implementation and/or outcomes?
KEQ10	High-level	How impactful have the LTIM project been in fostering improved collaboration?
KEQ10.1	Mid-level	What impact has the LTIM project had on partnership mechanisms and initiatives to build stronger coherence and collaboration between participating organisations?
KEQ10.1.1	Micro-level	At the Basin-scale?
KEQ10.1.2	Micro-level	At the Selected Area scale?
KEQ10.2	Mid-level	To what extent has the LTIM project raised awareness of the CEWO's aims and approach across the communities of the Basin?

2.1.7 EVALUATIVE CRITERION: EFFICIENCY

Four high-level KEQs were used to address this criterion. Seven mid-level KEQs and 15 micro-level KEQs were nested below the high-level KEQs. All 26 KEQs for this criterion are provided in the table below:

Table. LTIM Key Evaluation Questions for efficiency.

KEQ Code	KEQ Level	Key Evaluation Question
KEQ11	High-level	How efficiently has the LTIM project achieved its objectives and outcomes?
KEQ11.1	Mid-level	How efficiently were the funds and time allocated to address the LTIM project objectives?
KEQ11.1.1	Micro-level	At the Basin-scale and by Basin Matter?
KEQ11.1.2	Micro-level	At the Selected Area scale?
KEQ11.2	Mid-level	How technically efficiently was the LTIM project implemented - were the optimal methods of producing the outputs adopted?
KEQ11.2.1	Micro-level	At the Basin-scale and by Basin Matter?
KEQ11.2.2	Micro-level	At the Selected Area scale?
KEQ11.2.3	Micro-level	To what extent were the intended quality and quantity of deliverables, achieved within the available resources for each Basin Matter?
KEQ11.2.4	Micro-level	To what extent is there evidence that the LTIM project has continued/attempted to improve, by finding better or lower cost ways to deliver outcomes?
KEQ12	High-level	How efficient was the collaborative process within the LTIM project?
KEQ12.1	Mid-level	How efficient was the LTIM project in taking up opportunities for joint activities, pooling of resources and mutual learning with other organisations and networks?
KEQ12.1.1	Micro-level	At the Basin-scale and by Basin Matter?
KEQ12.1.2	Micro-level	At the Selected Area scale?
KEQ12.2	Mid-level	How efficient was the Annual Forum in improving collaborative processes?
KEQ12.2.1	Micro-level	To what extent did the Basin Matter and Selected Area teams engage with the process?
KEQ12.2.2	Micro-level	To what extent did the Annual Forum lead to improved efficiency over time (e.g., innovating, learning, adaptive management)?
KEQ13	High-level	How efficient was the LTIM project in managing and sharing data?
KEQ13.1	Mid-level	How efficient have data management arrangements been in systematically capturing data generated by the LTIM project?
KEQ13.1.1	Micro-level	How efficiently has Selected Areas data been managed to inform Basin-scale analysis?
KEQ13.2	Mid-level	How efficient have data management arrangements been?
KEQ13.2.1	Micro-level	How efficiently has the data sharing between Selected Area and Basin Matter teams been?
KEQ13.2.2	Micro-level	How efficiently have end-users been able to access LTIM data?
KEQ14	High-level	How efficient was the LTIM project in generating the agreed outputs?
KEQ14.1	Mid-level	To what extent did the LTIM project represent the best possible use of available resources to achieve results of the greatest possible value to participants, CEWO and end users?
KEQ14.1.1	Micro-level	At the Basin-scale and by Basin Matter?
KEQ14.1.2	Micro-level	At the Selected Area scale?

2.2   KEY EVALUATION QUESTIONS FOR THE EWKR PROJECT

2.2.1   EVALUATIVE CRITERION: EFFECTIVENESS – ACHIEVED OBJECTIVES

A single high-level KEQ was used to address this criterion. Seven mid-level KEQs and 34 micro-level KEQs were nested below this high-level KEQ. All 42 KEQs for this criterion are provided in the table below:

KEQ code	KEQ level	Key Evaluation Question
KEQ 1	High- level	How well has EWKR achieved its objectives?
KEQ 1.1	Mid-level	How effectively did the EWKR project improve understanding of how environmental flow management influences ecosystem function and thereby sustains biodiversity?
KEQ 1.1a	Micro-level	How effectively did the EWKR food web theme outputs answer the following question and subsidiary research question posed in the Multi-year Research Plan: 1. What flow regimes best support food webs that transfer energy to support recruitment of native fish? 1A What are the main energy sources contributing to larval fish biomass in the field?
KEQ 1.1b	Micro-level	How effectively did the EWKR food web theme outputs answer the following question and subsidiary research question posed in the Multi-year Research Plan: 1. What flow regimes best support food webs that transfer energy to support recruitment of waterbirds? 1A What are the main energy sources contributing to waterbird recruitment in the field?
KEQ 1.1c	Micro-level	How effectively did the EWKR food web theme outputs answer the following question and subsidiary research question posed in the Multi-year Research Plan: 1. What flow regimes best support food webs that transfer energy to support recruitment of native fish and waterbirds? 1B Are there clear spatial patterns in the importance of different energy sources for fish?
KEQ 1.1d	Micro-level	How effectively did the EWKR food web theme outputs answer the following question and subsidiary research question posed in the Multi-year Research Plan: 1. What flow regimes best support food webs that transfer energy to support recruitment of native fish and waterbirds? 1B Are there clear spatial patterns in the importance of different energy sources for waterbirds?
KEQ 1.1e	Micro-level	How effectively did the EWKR food web theme outputs answer the following question and subsidiary research question posed in the Multi-year Research Plan: 1. What flow regimes best support food webs that transfer energy to support recruitment of native fish and waterbirds? 1C Are there clear temporal patterns in the importance of different energy sources for fish?
KEQ 1.1f	Micro-level	How effectively did the EWKR food web theme outputs answer the following question and subsidiary research question posed in the Multi-year Research Plan: 1. What flow regimes best support food webs that transfer energy to support recruitment of native fish and waterbirds? 1C Are there clear temporal patterns in the importance of different energy sources for waterbirds?
KEQ 1.1g	Micro-level	How effectively did the EWKR food web theme outputs answer the following question and subsidiary research question posed in the Multi-year Research Plan: 1. What flow regimes best support food webs that transfer energy to support recruitment of native fish and waterbirds? 1D Is there evidence of 'energy bottlenecks' preventing passage of energy to higher trophic levels for fish?

KEQ code	KEQ level	Key Evaluation Question
KEQ 1.1h	Micro-level	How effectively did the EWKR food web theme outputs answer the following question and subsidiary research question posed in the Multi-year Research Plan: 1. What flow regimes best support food webs that transfer energy to support recruitment of native fish and waterbirds? 1D Is there evidence of 'energy bottlenecks' preventing passage of energy to higher trophic levels for waterbirds?
KEQ 1.1i	Micro-level	How effectively did the EWKR food web theme outputs answer the following question and subsidiary research question posed in the Multi-year Research Plan: 1. What flow regimes best support food webs that transfer energy to support recruitment of native fish? 1E How does provision of flow affect any patterns detected in 1.1A–D?
KEQ 1.1j	Micro-level	How effectively did the EWKR food web theme outputs answer the following question and subsidiary research question posed in the Multi-year Research Plan: 1. What flow regimes best support food webs that transfer energy to support recruitment of waterbirds? 1E How does provision of flow affect any patterns detected in 1.1A–D?
KEQ 1.2	Mid-level	How effectively did the EWKR project improve understanding of how the major drivers of system condition (e.g. environmental flow, land use, invasive species etc.) interact to affect biodiversity, ecosystem function, resilience and water quality?
KEQ 1.2a	Micro-level	How effectively did the EWKR project improve understanding of how the major drivers of system condition (e.g. environmental flow, land use, invasive species etc.) interact to affect biodiversity based on all research activities of the project?
KEQ 1.2b	Micro-level	How effectively did the EWKR project improve understanding of how the major drivers of system condition (e.g. environmental flow, land use, invasive species etc.) interact to affect ecosystem function based on all research activities of the project?
KEQ 1.2c	Micro-level	How effectively did the EWKR project improve understanding of how the major drivers of system condition (e.g. environmental flow, land use, invasive species etc.) interact to affect resilience based on all research activities of the project?
KEQ 1.2d	Micro-level	How effectively did the EWKR project improve understanding of how the major drivers of system condition (e.g. environmental flow, land use, invasive species etc.) interact to affect water quality based on all research activities of the project?
KEQ 1.2e	Micro-level	How effectively did the EWKR project improve understanding of how the major drivers of system condition (e.g. environmental flow, land use, invasive species etc.) interact to affect food webs?
KEQ 1.3	Mid-level	How effectively did the EWKR project improve understanding of how threats (hydrological, aquatic and terrestrial) may reduce or prevent the ecological improvement expected through the application of environmental water?
KEQ 1.3a	Micro-level	How well did the EWKR food web theme outputs answer the following question and subsidiary research questions posed in the Multi-year Research Plan: 2. How do other stressors (e.g. land use change, invasive species) impact on food web processes and the achievement of native fish and waterbirds outcomes? 2A Is there evidence for energy being diverted away from native fish (e.g. by carp)?
KEQ 1.3b	Micro-level	How well did the EWKR food web theme outputs answer the following question and subsidiary research questions posed in the Multi-year Research Plan: 2. How do other stressors (e.g. land use change, invasive species) impact on food web processes and the achievement of native fish and waterbirds outcomes? 2A Is there evidence for energy being diverted away from waterbirds (e.g. by carp)?
KEQ 1.3c	Micro-level	How well did the EWKR food web theme outputs answer the following question and subsidiary research questions posed in the Multi-year Research Plan: 2. How do other stressors (e.g. land use change, invasive species) impact on food web processes and the achievement of native fish and waterbirds outcomes? 2B Is there evidence that productivity in the channel is limited by other factors (e.g. water turbidity, availability of productive substrates)?
KEQ 1.4	Mid-level	How effectively did the EWKR project improve understanding of how management or delivery of environmental flow influences environmental outcomes achieved over time?

KEQ code	KEQ level	Key Evaluation Question
KEQ 1.4a	Micro-level	How effective were the EWKR theme outputs and their synthesis in improving understanding of how management influences environmental outcomes achieved over time?
KEQ 1.4b	Micro-level	How effective were the EWKR theme outputs and their synthesis in improving understanding of how delivery of environmental flow influences environmental outcomes achieved over time?
KEQ 1.4c	Micro-level	How effective was the EWKR project in improving understanding of how management influences environmental outcomes achieved over the period of the project (i.e. 5 years)?
KEQ 1.4d	Micro-level	How effective was the EWKR project in improving understanding of how delivery of environmental flow influences environmental outcomes achieved over the period of the project (i.e. 5 years)?
KEQ 1.5	Mid-level	How effectively did the EWKR project improve understanding of the links between ecosystem responses to watering regimes (e.g. natural and/or managed events) and incremental changes in ecological condition?
KEQ 1.5a	Micro- level	How well did the EWKR project, in the vegetation theme, identify incremental changes in ecological condition and link them with ecosystem responses to watering regimes (natural and/or managed events)?
KEQ 1.5b	Micro-level	How well did the EWKR project, in the native fish theme, identify incremental changes in ecological condition and link them with ecosystem responses to watering regimes (natural and/or managed events)?
KEQ 1.5c	Micro-level	How well did the EWKR project, in the waterbird theme, identify incremental changes in ecological condition and link them with ecosystem responses to watering regimes (natural and/or managed events)?
KEQ 1.5d	Micro-level	How well did the EWKR project, in the food web theme, identify incremental changes in ecological condition and link them with ecosystem responses to watering regimes (natural and/or managed events)?
KEQ 1.5e	Micro-level	How well did the EWKR project, overall, in its synthesis, identify incremental changes in ecological condition and link them with ecosystem responses to watering regimes (natural and/or managed events)?
KEQ 1.6	Mid-level	How effectively did the EWKR project improve understanding of how complementary water management and natural resource management enhance the outcomes of environmental water management?
KEQ 1.6a	Micro-level	How effective was the EWKR project in improving understanding of how complementary water management and natural resource management enhance the outcomes of environmental water management over the period of the project (i.e. 5 years)?
KEQ 1.6b	Micro-level	How effective was the EWKR project in improving understanding of how complementary water management and natural resource management enhance the outcomes of environmental water management by inferring from the project results to longer time periods?
KEQ 1.7	Mid-level	How effectively did the EWKR project improve understanding of the links between ecosystem responses to management interventions (water management and natural resource management) and incremental changes in ecological condition?
KEQ 1.7a	Micro-level	How well did the EWKR project, in the vegetation theme, identify incremental changes in ecological condition and link them with ecosystem responses to management interventions (water management and natural resource management)?
KEQ 1.7b	Micro-level	How well did the EWKR project, in the fish theme, identify incremental changes in ecological condition and link them with ecosystem responses to management interventions (water management and natural resource management)?
KEQ 1.7c	Micro-level	How well did the EWKR project, in the waterbirds theme, identify incremental changes in ecological condition and link them with ecosystem responses to management interventions (water management and natural resource management)?
KEQ 1.7d	Micro-level	How well did the EWKR project, in the food web theme, identify incremental changes in ecological condition and link them with ecosystem responses to management interventions (water management and natural resource management)?

KEQ code	KEQ level	Key Evaluation Question
KEQ 1.7e	Micro-level	How well did the EWKR project, in its synthesis, identify incremental changes in ecological condition and link them with ecosystem responses to management interventions (water management and natural resource management)?

EVALUATIVE CRITERION: EFFECTIVENESS – COMMUNICATED FINDINGS

A single high-level KEQ was used to address this criterion. Two mid-level KEQs and six micro-level KEQs were nested below this high-level KEQ. All nine KEQs for this criterion are provided in the table below:

KEQ code	KEQ level	Key Evaluation Question
KEQ 2	High-level	How well have the projects communicated findings to all stakeholders?
KEQ 2.1	Mid-level	How effective was the EWKR project communication and adoption strategy?
KEQ 2.1a	Micro-level	How well did the EWKR project communications and adoption strategy develop the approach to communicating key findings?
KEQ 2.1b	Micro-level	How effectively did the EWKR project share research outcomes to enhance environmental water management, complementary NRM, and environmental watering outcomes?
KEQ 2.1c	Micro-level	How effectively did the EWKR project share research outcomes and emerging knowledge gaps, and associated research priorities to provide direction for future investment in research?
KEQ 2.2	Mid-level	How effective was the information produced by the EWKR project in supporting the CEWO in presenting achievements toward Basin Plan objectives to relevant stakeholders?
KEQ 2.1a	Micro-level	To what extent were the communication products of the EWKR project fit for CEWO's purpose?
KEQ 2.1b	Micro-level	To what extent did the information produced by each theme of the EWKR project and its synthesis encourage stakeholders to strive to maintain and improve their contributions to Basin Plan environmental objectives?
KEQ 2.1c	Micro-level	How effectively did the information produced by the EWKR project build and support collaboration?

2.2.2   EVALUATIVE CRITERION: EFFECTIVENESS – ACHIEVING OUTCOMES

A single high-level KEQ was used to address this criterion. Seven mid-level KEQs and eighteen micro-level KEQs were nested below this high-level KEQ. All 26 KEQs for this criterion are provided in the table below:

KEQ code	KEQ level	Key Evaluation Question
KEQ 3	High-level	To what extent has the EWKR project improved understanding of how management or delivery of environmental flow influences environmental outcomes achieved over time?
KEQ 3.1	Mid-level	How well has the EWKR project improved environmental water effectiveness through the application of science to the development and operation of environmental works and measures (Note: outcome in Multi-year Research Plan only, not in Grant Guidelines)
KEQ 3.1a	Micro-level	How well has the EWKR project demonstrated improved environmental water effectiveness through the application of science to the development and operation of environmental works and measures?
KEQ 3.2	Mid-level	How effectively have the research activities in each theme improved capacity to predict outcomes of environmental flow allocations and their management over 1–5 years?
KEQ 3.2a	Micro-level	How effectively have the research activities in the fish theme improved capacity to predict outcomes of environmental flow allocations and their management over 1–5 years?
KEQ 3.2b	Micro-level	How effectively have the research activities in the waterbirds theme improved capacity to predict outcomes of environmental flow allocations and their management over 1–5 years?

KEQ 3.2c	Micro-level	How effectively have the research activities in the vegetation theme improved capacity to predict outcomes of environmental flow allocations and their management over 1–5 years?
KEQ 3.2d	Micro-level	How effectively have the research activities in the food web theme improved capacity to predict outcomes of environmental flow allocations and their management over 1–5 years?
KEQ 3.3	Mid-level	How well has the EWKR project developed predictive tools, conceptual models and frameworks to inform environmental watering regimes?
KEQ 3.3a	Micro-level	How well has the EWKR project developed predictive tools, conceptual models and frameworks to inform environmental watering regimes for vegetation?
KEQ 3.3b	Micro-level	How well has the EWKR project developed predictive tools, conceptual models and frameworks to inform environmental watering regimes for fish?
KEQ 3.3c	Micro-level	How well has the EWKR project developed predictive tools, conceptual models and frameworks to inform environmental watering regimes for waterbirds?
KEQ 3.3d	Micro-level	How well has the EWKR project developed predictive tools, conceptual models and frameworks to inform environmental watering regimes for food webs?
KEQ 3.4	Mid-level	How effectively has the EWKR project improved water management and complementary natural resource management?
KEQ 3.4a	Micro-level	How effectively have the EWKR project's vegetation theme research activities demonstrated a link between changes in water management and complementary natural resource management and measures of vegetation?
KEQ 3.4b	Micro-level	How effectively have EWKR's fish theme research activities demonstrated a link between changes in water management and complementary natural resource management and measures of fish?
KEQ 3.4c	Micro-level	How effectively have EWKR's waterbirds theme research activities demonstrated a link between changes in water management and complementary natural resource management and measures of waterbirds?
KEQ 3.4d	Micro-level	How effectively have EWKR's food web theme research activities demonstrated a link between changes in water management and complementary natural resource management and measures of food webs?
KEQ 3.4e	Micro-level	How effective has the EWKR project been in building capacity to set realistic objectives and targets for water management and complementary natural resource management?
KEQ 3.5	Mid-level	How well did the EWKR project address climate change in its research activities?
KEQ 3.6	Mid-level	How effectively has the EWKR project improved the information to support reporting on progress toward the Basin Plan environmental objectives and targets?
KEQ 3.6a	Micro-level	How effectively has the EWKR project linked the outcomes of research activities to reporting on progress towards Basin Plan Environmental objectives?
KEQ 3.6b	Micro-level	How effectively has the EWKR project linked the outcomes of research activities to reporting on progress towards Basin Plan Environmental targets?
KEQ 3.7	Mid-level	How effectively has the EWKR project built capacity to report against Basin Plan environmental objectives and targets?
KEQ 3.7a	Micro-level	How effectively has the EWKR project built capacity to report against Basin Plan environmental objectives?
KEQ 3.7b	Micro-level	How effectively has the EWKR project built capacity to report against Basin Plan environmental targets?

EVALUATIVE CRITERION: APPROPRIATENESS – STRATEGIC RELEVANCE

A single high-level KEQ was used to address this criterion. One mid-level KEQs and four micro-level KEQs were nested below this high-level KEQ. All six KEQs for this criterion are provided in the table below:

KEQ code	KEQ level	Key Evaluation Question
KEQ 4	High-level	How well has the EWKR project supported CEWO in meeting their legislative requirements?

KEQ 4.1	Mid-level	How appropriate is the information provided by the EWKR project for supporting the CEWH in meeting its Water Act and Basin Plan reporting requirements (including annual reporting to Commonwealth Minister, annual reporting to MDBA, 5-yearly reporting to MDBA)?
KEQ 4.1a	Micro-level	To what extent has the EWKR project supported CEWO to be able to "....include in the report particulars of the following: (a) achievements against the objectives of the environmental watering plan" (Sec 114(2a)) of the Water Act?
KEQ 4.1b	Micro-level	To what extent has the EWKR project supported CEWO to annually report to the MDBA on Schedule 12, item 6: the extent to which local knowledge and solutions inform the implementation of the Basin Plan?
KEQ 4.1c	Micro-level	To what extent has the EWKR project supported CEWO to be able to annually report to the MDBA on Schedule 12, item 10: the implementation of the environmental management framework (part 4 of Ch. 8 of the Basin Plan)?
KEQ 4.1d	Micro-level	To what extent has the EWKR project supported CEWO for five yearly reporting to MDBA on the contribution of Commonwealth environmental water to environmental outcomes at a Basin-scale, by reference to the targets that measure progress towards the environmental objectives in Schedule 7: there is no loss or degradation in the following: river, floodplain and wetland types including the condition of priority env assets and priority ecosystem functions?

2.2.3   EVALUATIVE CRITERION: APPROPRIATENESS – FIT FOR PURPOSE

A single high-level KEQ was used to address this criterion. Seven mid-level KEQs and twenty micro-level KEQs were nested below this high-level KEQ. All 28 KEQs for this criterion are provided in the table below:

KEQ code	KEQ level	Key Evaluation Question
KEQ 5	High-level	To what extent is the EWKR project design fit for purpose?
KEQ 5.1	Mid-level	To what extent was alignment with Basin Plan objectives taken into consideration during planning?
KEQ 5.1a	Micro-level	To what extent are the research questions for the vegetation theme aligned with either Basin Plan objectives and or the Basin-wide Environmental Watering Strategy Quantitative Expected Environmental Outcomes (BEWS QEEOs)?
KEQ 5.1b	Micro-level	To what extent are the research questions for the fish theme aligned with either Basin Plan objectives and or the Basin-wide Environmental Watering Strategy Quantitative Expected Environmental Outcomes (BEWS QEEOs)?
KEQ 5.1c	Micro-level	To what extent are the research questions for the waterbird theme aligned with either Basin Plan objectives and or the Basin-wide Environmental Watering Strategy Quantitative Expected Environmental Outcomes (BEWS QEEOs)?
KEQ 5.1d	Micro-level	To what extent are the research questions for the food web theme aligned with either Basin Plan objectives and or the Basin-wide Environmental Watering Strategy Quantitative Expected Environmental Outcomes (BEWS QEEOs)?
KEQ 5.2	Mid-level	How relevant were the priority research questions for food webs to the first Grant Guideline objective and the 3 Basin Plan objectives?
KEQ 5.2a	Micro-level	How well did the EWKR project establish the relationship between (and hence relevance of) the high priority research questions for food webs below, this first objective of the grant guidelines and the 3 Basin Plan objectives (protect and restore water dependent ecosystems, protect and restore ecosystem functions, ensure water dependent ecosystems are resilient): High priority food web research questions: 1. What flow regimes best support food webs that contribute to positive outcomes for native fish and waterbirds?
KEQ 5.2b	Micro-level	How well did the EWKR project establish the relationship between (and hence relevance of) the high priority research question for food webs below, this first objective of the grant guidelines and the 3 Basin Plan objectives (protect and restore water dependent ecosystems, protect and restore ecosystem functions, ensure water dependent ecosystems are resilient):

		High priority Food web research questions: 2. How do other stressors impact on food web processes and the achievement of native fish and waterbirds outcomes?
KEQ 5.3	Mid-level	How relevant were the lowest level research question for food webs to the priority research questions?
KEQ 5.3a	Micro-level	How effectively did the EWKR project establish the relationship for food webs between the lowest level of food web research questions and the higher-level food web questions?
KEQ 5.4	Mid-level	How relevant was the EWKR project to improving understanding of how the major drivers of system condition (e.g. environmental flow, land use, invasive species etc.) interact to affect biodiversity, ecosystem function, resilience and water quality?
KEQ 5.4a	Micro-level	How well did the EWKR project establish the relationship between the following objective from the Grant Guidelines: "How the major drivers of system condition (e.g. environmental flow, land use, invasive species etc.) interact to affect biodiversity, ecosystem function, resilience and water quality" and the EWKR theme of vegetation, the relevant Basin Plan objectives and the priority research questions?
KEQ 5.4b	Micro-level	How well did the EWKR project establish the relationship between the following objective from the Grant Guidelines: "How the major drivers of system condition (e.g. environmental flow, land use, invasive species etc.) interact to affect biodiversity, ecosystem function, resilience and water quality" and the EWKR theme of Fish, the relevant Basin Plan objectives and the priority research questions?
KEQ 5.4c	Micro-level	How well did the EWKR project establish the relationship between the following objective from the Grant Guidelines: "How the major drivers of system condition (e.g. environmental flow, land use, invasive species etc.) interact to affect biodiversity, ecosystem function, resilience and water quality" and the EWKR theme of Waterbirds, the relevant Basin Plan objectives and the priority research questions?
KEQ 5.4d	Micro-level	How well did the EWKR project establish the relationship between the following objective from the Grant Guidelines: "How the major drivers of system condition (e.g. environmental flow, land use, invasive species etc.) interact to affect biodiversity, ecosystem function, resilience and water quality" and the EWKR theme of Food Webs, the relevant Basin Plan objectives and the priority research questions?
KEQ 5.5	Mid-level	To what extent was the program logic and associated conceptual models fit for purpose?
KEQ 5.5a	Micro-level	How appropriate was the vegetation theme program logic?
KEQ 5.5b	Micro-level	How appropriate was the fish theme program logic?
KEQ 5.5c	Micro-level	How appropriate was the waterbird theme program logic?
KEQ 5.5d	Micro-level	How appropriate was the food webs theme program logic?
KEQ 5.6	Mid-level	How well has the EWKR project improved environmental water effectiveness through the application of science to the development and operation of environmental works and measures (Note: outcome in Multi Year Research Plan only, not in Grant Guidelines)?
KEQ 5.6a	Micro-level	How well has the EWKR project demonstrated the relevance and significance of the additional outcome in the Multi-year research plan (in addition to the outcomes specified in the Grant Guidelines)?
KEQ 5.7	Mid-level	How appropriate were the research and evaluation plans for each research theme?
KEQ 5.7a	Micro-level	To what extent were objectives SMART?
KEQ 5.7b	Micro-level	Were evaluation methods clear and well-articulated for each theme?
KEQ 5.7c	Micro-level	To what extent were the scientific methodologies adopted in the EWKR project the most appropriate?
KEQ 5.7d	Micro-level	How well did the EWKR project, either at design stage or during the project implementation, consider/align with ongoing and planned initiatives implemented by other agencies that addressed similar needs?

2.2.4   EVALUATIVE CRITERION: IMPACT

A single high-level KEQ was used to address this criterion. One mid-level KEQ and five micro-level KEQs were nested below this high-level KEQ. All seven KEQs for this criterion are provided in the table below:

KEQ code	KEQ level	Key Evaluation Question
KEQ 6	High-level	How impactful has the EWKR project been in supporting adaptive management in the basin?
KEQ 6.1	Mid-level	To what extent have the environmental outcomes from the EWKR project had an impact on the CEWO's adaptive management of environmental water?
KEQ 6.1a	Micro-level	To what extent has the information provided by the vegetation theme had an impact on the adaptive management of environmental water?
KEQ 6.1b	Micro-level	To what extent has the information provided by the fish theme had an impact on the adaptive management of environmental water?
KEQ 6.1c	Micro-level	To what extent has the information provided by the waterbirds theme had an impact on the adaptive management of environmental water?
KEQ 6.1d	Micro-level	To what extent has the information provided by the food web theme had an impact on the adaptive management of environmental water?
KEQ 6.1e	Micro-level	To what extent has the information provided by the synthesis across all themes had an impact on the adaptive management of environmental water?

EVALUATIVE CRITERION: EFFICIENCY

Four high-level KEQs were used to address this criterion. Six mid-level KEQs and twenty-two micro-level KEQs were nested below this high-level KEQ. All 32 KEQs for this criterion are provided in the table below:

KEQ code	KEQ level	Key Evaluation Question
KEQ 7	High-level	How efficiently has the EWKR project achieved its objectives?
KEQ 7.1	Mid-level	How efficiently, in terms of value for money, did the EWKR project improve understanding of incremental changes in ecological condition in response to multiple management interventions?
KEQ 7.1a	Micro-level	How efficiently did the EWKR project improve understanding of how environmental flow management influences ecosystem function and thereby sustains biodiversity?
KEQ 7.1b	Micro-level	How efficiently did the EWKR project improve understanding of how the major drivers of system condition (e.g. flow, land use, invasive species etc.) interact to affect biodiversity?
KEQ 7.1c	Micro-level	How efficiently did the EWKR project improve understanding of how the major drivers of system condition (e.g. flow, land use, invasive species etc.) interact to affect ecosystem function?
KEQ 7.1d	Micro-level	How efficiently did the EWKR project improve understanding of how the major drivers of system condition (e.g. flow, land use, invasive species etc.) interact to affect resilience?
KEQ 7.1e	Micro-level	How efficiently did the EWKR project improve understanding of how the major drivers of system condition (e.g. flow, land use, invasive species etc.) interact to affect water quality?
KEQ 7.1f	Micro-level	How efficiently did the EWKR project improve understanding of how management influences environmental outcomes achieved over time?
KEQ 7.1g	Micro-level	How efficiently did the EWKR project improve understanding of how delivery of environmental flow influences environmental outcomes achieved over time?
KEQ 7.1h	Micro-level	How efficiently did the EWKR project improve understanding of the links between ecosystem responses to watering regimes (e.g. natural and/or managed events) and incremental changes in ecological condition?
KEQ 7.1i	Micro-level	How efficiently did the EWKR project improve understanding of the links between ecosystem responses to management interventions (water management) and incremental changes in ecological condition?

KEQ code	KEQ level	Key Evaluation Question
KEQ 7.1j	Micro-level	How efficiently did the EWKR project improve understanding of the links between ecosystem responses to management interventions (natural resource management) and incremental changes in ecological condition?
KEQ 8	High-level	How efficient was the EWKR project in managing and sharing data?
KEQ 8.1	Mid-level	How efficient was the EWKR project in sharing data?
KEQ 8.1a	Micro-level	To what extent were data shared with collaborators between research themes?
KEQ 8.1b	Micro-level	How efficiently were data shared with end users such as the MDBA?
KEQ 8.2	Mid-level	How efficient was the EWKR project in managing data?
KEQ 8.2a	Micro-level	How efficient were the data management protocols within the EWKR project?
KEQ 8.2b	Micro-level	How accessible is the data generated by the EWKR project to end users?
KEQ 9	High-level	How efficient was the collaborative process within the EWKR project?
KEQ 9.1	Mid-level	To what extent was collaboration undertaken outside the EWKR project?
KEQ 9.1a	Micro-level	How efficiently did the vegetation theme use its resources/inputs to collaborate with other water managers/researchers external to the EWKR project?
KEQ 9.1b	Micro-level	How efficiently did the waterbird theme use its resources/inputs to collaborate with other water managers/researchers external to the EWKR project?
KEQ 9.1c	Micro-level	How efficiently did the fish theme use its resources/inputs to collaborate with other water managers/researchers external to the EWKR project?
KEQ 9.1d	Micro-level	How efficiently did the food webs theme use its resources/inputs to collaborate with other water managers/researchers external to the EWKR project?
KEQ 10	High-level	How efficiently generated were the outputs from the EWKR project?
KEQ 10.1	Mid-level	How efficiently were the outputs for each theme generated? Were they value for money and or any evidence of pooling of resources?
KEQ 10.1a	Micro-level	How efficiently did the vegetation theme use its resources/inputs to produce effective outputs relevant to stakeholder needs?
KEQ 10.1b	Micro-level	How efficiently did the waterbird theme use its resources/inputs to produce effective outputs relevant to stakeholder needs?
KEQ 10.1c	Micro-level	How efficiently did the fish theme use its resources/inputs to produce effective outputs relevant to stakeholder needs?
KEQ 10.1d	Micro-level	How efficiently did the food webs theme use its resources/inputs to produce effective outputs relevant to stakeholder needs?
KEQ 10.2	Mid-level	How timely were the outputs from each theme and the synthesis output from the EWKR project?

3   SURVEY QUESTIONS

The documents listed in Appendix C in Boulton and Davies (2020) and Appendix B in Hart et al. (2020) were the first of three lines of evidence provided to the expert evaluators for addressing the KEQs.

Online surveys of three stakeholder groups (Group 1 = client, Group 2 = service providers and Group 3 = end users) were carried out as the second line of evidence. The results of the surveys were analysed by the core team and provided to the expert evaluators (Butcher and Fenton 2020a, b). In both surveys a series of basic questions relating to consent, provision of contact details and level of experience were asked. These data were not supplied to the expert evaluators – all data from the surveys were presented anonymously. The survey participants were not be required to provide private information if they did not wish to do so; however, some personal information, including participant name and contact details, was requested so that results could be linked to research themes and the core team could follow up any clarifications required.

Given the difference of relevance of the EWKR project findings to the three different stakeholder groups, not all questions were relevant to each group. This was taken into account in the analysis of the survey responses (Butcher and Fenton 2020a). For the LTIM project the same set of 36 survey questions were asked of each stakeholder group (Butcher and Fenton 2020b).

3.1   SURVEY QUESTIONS FOR THE LTIM PROJECT

In total 36 questions were included across the surveys and interviews. Discussion of the structured survey results mostly described the responses broken down by the three stakeholder groups, while the sentiment analysis interrogated the free form interview responses for additional insights (Butcher and Fenton 2020b).

Survey question number	LTIM project survey question
	Effectiveness – achieved objectives
6	How familiar are you with the LTIM project objectives?
7	To what extent do you think the LTIM project achieved its objectives?
8	How effective were the data management processes in aiding evaluation and reporting on outcomes?
9	How effectively did the LTIM project support adaptive management of Commonwealth Environmental Water (CEW) in each Selected Area (including reporting of adaptive management)?
10	How effective has the LTIM project been in monitoring and evaluating the ecological response to CEW at each of the seven Selected Areas?
11	How effectively did the CEWO Outcomes Framework align to the Basin Plan Environmental Watering Plan (EWP) and Water Quality and Salinity Plan?
12	How effectively has the LTIM project demonstrated the contribution of CEW to achieving Basin Plan objectives (includes Chapter 8 and 9 objectives)?
13	How effectively did the LTIM project document and report on the evaluation of the contribution of CEW at a Basin-scale?
14	How effectively did the LTIM project undertake annual evaluation of CEW on the six specified Basin Matters?
15	To what extent did the LTIM project infer ecological outcomes of CEW to areas in the Basin not monitored?
16	How effectively was Selected Area data extrapolated from reach to whole of Selected Area scale Remove Basin-scale?
	Effectiveness - communicated findings
17	How effective was the LTIM project at communicating key findings to stakeholders (CEWO, MDBA, other members of the LTIM project, etc.), including to inform adaptive management?
	Effectiveness - demonstrated outcomes
18	How effectively has the LTIM project improved capacity to predict outcomes of environmental flow allocations and their management over 1–5 years?
19	How effectively has the LTIM project demonstrated that short term, less than 1-year outcomes, contribute to longer term outcomes?
	Appropriateness – strategic relevance - Basin Plan
20	How well has the LTIM project contributed to the CEWO's ability to meet their legislative reporting requirements?
	Appropriateness - design was fit for purpose
21	To what extent was the LTIM project design fit for purpose in meeting the CEWO's strategic requirements?
22	To what extent did the cause and effect diagrams include best available knowledge (including scientific, local and cultural knowledge)?
23	To what extent were the best practice scientific methods employed in the LTIM project?
24	To what extent were the Standard Methods fit for purpose and consistently applied at the Selected Areas?

Survey question number	LTIM project survey question
25	How appropriate was the predictive modelling in predicting outcomes of environmental watering in areas not monitoring for each Basin Matter?'
26	To what extent have data management arrangements supported systematic capture and making available data generated by the LTIM project?
	Impact – leads to changed management behaviour
27	What level of impact has the LTIM project had on the adaptive management of environmental water?
28	How impactful has knowledge gained through the LTIM project been in informing and improving Basin Plan implementation and/or outcomes?
29	How impactful has the LTIM project been in fostering improved collaboration?
30	What impact has the LTIM project had on partnership mechanisms and initiatives to build stronger coherence and collaboration between participating organisations?
	Efficiency – value for money
31	How efficiently were the funds and time allocated to address the LTIM project objectives?
32	How efficient was the collaborative process within the LTIM project?
33	To what extent did the LTIM project take up opportunities for joint activities, pooling of resources and mutual learning with other organisations and networks?
34	How efficient was the LTIM project in managing data?
35	How efficient was the LTIM project in sharing data?
	Moving forward – what should be changed, what can be improved
36	What, if any, improvements could be made to the LTIM project moving forward?

3.2   SURVEY QUESTIONS FOR THE EWKR PROJECT

Survey questions for the EWKR project were grouped under their relevant evaluative criteria, as indicated in the table below (survey questions 1 to 5 were background setting only and did not contribute to the evaluative judgements):

Survey question number	EWKR project survey questions grouped under evaluative criteria
	Effectiveness – achieved objectives
6	How familiar are you with the EWKR project objectives?
7	To what extent do you think the EWKR project achieved its objectives? On what basis?
8	How effectively did the EWKR project improved water managers' understanding of how environmental water management influences ecosystem function and thereby sustains biodiversity?
9	How effectively do you think the EWKR project identified incremental changes in ecological condition and linked them with ecosystem responses to watering regimes (natural and/or managed events) in each of the themes?
	Effectiveness - demonstrated outcomes
10	To what extent do you think the EWKR project has improved water managers' understanding of how management of environmental water influences environmental outcomes over time? On what basis?
	Effectiveness - communicated findings
11	Which of the following products from the EWKR project are you aware of?

Survey question number	EWKR project survey questions grouped under evaluative criteria
12	For those products you have encountered (see Q9), how well were they targeted to appropriate audiences?
13	To what extent could the targeting of products to specific audience needs be improved?
14	For the products you have encountered (Q9 above), have they influenced your water management practices? How?
15	To what degree did each of the EWKR themes enable you to share resources, knowledge, lessons learnt and avoid overlap?
	Appropriateness – strategic relevance - Basin Plan
16	To what extent do you think the EWKR project will contribute to Basin Plan objectives? Why?
17	How clearly has the EWKR project established that the outcomes from each theme are relevant to the Basin-wide Environmental Watering Strategy expected outcomes and the Basin Plan EWP objectives?
18	To what extent did the EWKR project take into account other ongoing and planned initiatives/projects related to Basin Plan implementation? How?
	Appropriateness - design was fit for purpose
19	How appropriately designed do you think the EWKR project was in supporting water managers to manage environmental water?
20	To what extent do you think the planning process (Phase 1) and final set of research questions adequately reflected manager needs?
21	How confident are you in the science undertaken in the EWKR project and its relevance to the needs of environmental water managers within the framework of adaptive water management in the Murray-Darling Basin?
22	How appropriate do you think the EWKR project design was to deliver findings which built the capacity of water managers and complimentary natural resource managers to be able to more confidently set realistic objectives? Do you think capacity has been improved?
23	To what extent was the design of the EWKR project integrated with complementary recent, ongoing or planned interventions in the project area or on the same problem/issue?
	Efficiency – value for money
24	How efficient was the EWKR project, in each theme, in meeting its objectives? Consider more broadly than just cost
25	Do you consider the expenditure worthwhile? Question is specifically about cost.
26	Do you think EWKR project processes encourage participants to collaborate, share resources and lessons learnt?
27	How efficiently do you think the EWKR project conveyed lessons learnt to improve adaptive management of environmental water?
28	To what extent do you feel confident that adequate funds were allocated and utilised in communication findings to appropriate audiences?
	Impact – leads to changed management behaviour
29	How impactful have the outcomes from each theme been on providing new knowledge for water managers to better inform achievement of environmental outcomes from the use of environmental water?
30	To what extent do you think the EWKR project has led to improved understanding by water managers' of medium- and long- term changes in ecological condition, including the effects of threats (hydrological, aquatic and terrestrial) which may reduce or prevent the ecological improvement expected?
31	How likely do you think the EWKR project findings will influence, if at all, your future water management practices?

Survey question number	EWKR project survey questions grouped under evaluative criteria
32	To what extent, if any, has your interaction with other agencies changed as a result of the EWKR project?
33	To what extent has the EWKR project improved your capacity to predict outcomes of environmental flow allocations and management over 1-5 years?
34	To what extent have you adopted or used knowledge/guidance/tools generated by the project?
	Moving forward – what should be changed, what can be improved
35	What, if any, improvements could be made to the EWKR project moving forward?

4   INTERVIEW QUESTIONS

Interviews were the third of three lines of evidence used to assess performance against the KEQ. Interview recordings were transcribed using software-assisted manual transcription. All transcripts were imported into NVivo and the responses were coded to individual nodes relating to focal areas (e.g. achieved objectives, communicated findings etc.).

Expert evaluators were provided both with redacted transcripts of all interviews and a sentiment analysis of responses by stakeholder groups 2 (service providers) and 3 (end users).

All interview transcripts, across al three groups were included in the sentiment analysis for the LTIM project.

4.1   INTERVIEW QUESTIONS FOR THE LTIM PROJECT

A single set of interview questions were developed for the LTIM project evaluation. There were 18 primary questions relating to a subset of the KEQs and a further 38 prompts which address many mid-level and micro-level KEQs. Not all prompts were asked as participants often addressed the questions without being asked.

Interview question number	LTIM interview questions and prompts
	Effectiveness – achieved objectives
1	To what extent do you think the LTIM project achieved its objectives? On what basis?
2	How effectively did the LTIM project evaluate the contribution of CEW to the Basin Plan objectives, noting that this includes Chapter 8 and 9 objectives?
3	To what extent did the LTIM project infer ecological outcomes of Commonwealth environmental water to areas in the Basin not monitored?
	Effectiveness - demonstrated outcomes
4	How effectively has the LTIM project demonstrated that short term, less than 1 year outcomes, contribute to longer term outcomes?
5	How effectively the LTIM project improved capacity to predict outcomes of environmental flow allocations and their management over 1–5 years?
	Effectiveness - communicated findings
6	How well did the LTIM project communicate the key findings to stakeholders?
7	How effective were the cause and effect diagrams (CED) in communicating key relationships between environmental watering and ecological outcomes?
	Appropriateness – strategic relevance - Basin Plan

Interview question number	LTIM interview questions and prompts
8	To what extent do you think the overall LTIM project was aligned to Basin Plan objectives?
9	To what extent did the LTIM project consider other ongoing and planned initiatives/projects related to Basin Plan implementation? How?
	Appropriateness - design was fit for purpose
10	To what extent was the LTIM project design fit for purpose in meeting the CEWO's strategic requirements?
11	To what extent were the best practice scientific methods employed in the LTIM project?
12	To what extent have data management arrangements supported systematic capture and making available data generated by the LTIM project?
	Efficiency – value for money
13	Do you consider the expenditure worthwhile? Question is specifically about value for money.
14	To what extent do you think LTIM project processes encouraged participants to collaborate, and share resources and lessons learnt?
15	How technically efficiently was the LTIM project implemented - were the optimal methods of producing the outputs adopted?
	Impact – leads to changed management behaviour
16	What level of impact has the LTIM project had on the adaptive management of environmental water?
17	How impactful has knowledge gained through the LTIM project been in informing and improving Basin Plan implementation and/or outcomes?
	Moving forward – what should be changed, what can be improved
18	What, if any, improvements could be made to the LTIM project moving forward?

4.2   INTERVIEW QUESTIONS FOR THE EWKR PROJECT

Interview questions used to address the evaluative criteria differed slightly between stakeholder groups. Prompts were used by interviewers to ensure all information was sourced that was relevant to the question. Not every prompt was necessarily used as it depended on the conversation and comments made by the participants

Interview question number	EWKR interview questions grouped under evaluative criteria (in brackets the stakeholder group that was asked that question)
	Effectiveness – achieved objectives
7	To what extent do you think the EWKR project achieved its objectives? On what basis? (All)
9	How effectively do you think the EWKR project identified incremental changes in ecological condition and linked them with ecosystem responses to watering regimes (natural and/or managed events) in each of the themes? (Group 2)
	Effectiveness - demonstrated outcomes
10	To what extent do you think the EWKR project has improved water managers' understanding of how management of environmental water influences environmental outcomes over time? On what basis? (All)
	Effectiveness - communicated findings — targeted, quality, process, usefulness
11	Which of the products generated by the EWKR project are you aware of and how well were they targeted to their audience? (Group 3)
13	How well did the EWKR project communicate the key findings to stakeholders? What opportunities do you see for better targeting of products to specific audience needs? (Group 1)

14	Have the products you have encountered that influenced your water management practices? How? (Group 3)
15	To what degree did each of the EWKR themes enable you to share resources, knowledge and lessons learnt, and avoid overlap or duplication? (Group 2)
	Appropriateness – strategic relevance - Basin Plan
17	To what extent do you think the overall EWKR project and individual themes were relevant to Basin Plan EWP objectives? (Groups 1 and 3)
18	To what extent did the EWKR project consider other ongoing and planned initiatives/projects related to Basin Plan implementation? How? (All)
	Appropriateness - design was fit for purpose
19	How appropriately designed do you think the EWKR project was in supporting water managers to manage environmental water? (All)
20	To what extent do you think the planning process (Phase 1) and final set of research questions adequately reflect manager needs? (All)
21	How confident are you in the science undertaken in the EWKR project and its relevance to the needs of environmental water managers within the framework of adaptive water management in the Murray-Darling Basin? (Groups 2 and 3)
23	To what extent was the design of the EWKR project integrated with complementary recent, ongoing or planned interventions in the project area or that address the same problem/issue? (Group 2)
	Efficiency – value for money
24	How efficient was the EWKR project, in each theme, in meeting its objectives and conveying lessons learnt to improve adaptive management of environmental water? Consider more broadly than just cost (Group 2)
25	Do you consider the expenditure worthwhile? Question is specifically about value for money. (Groups 1 and 2)
26	To what extent do you think EWKR project processes encouraged participants to collaborate, and share resources and lessons learnt? (Groups 1 and 2)
27	How efficiently do you think the EWKR project conveyed lessons learnt to improve adaptive management of environmental water? Question is not just about value for money (Group 3)
28	To what extent do you feel confident that adequate time and resources were allocated and utilised in communication findings to appropriate audiences and in adaptive management of environmental water? (Group 3)
	Impact – leads to changed management behaviour
29	To what extent have the outcomes from each theme had an impact in providing new knowledge for water managers to better inform achievement of environmental outcomes from the use of environmental water? (All)
30	To what extent do you think the EWKR project has led to improved understanding by water managers' of medium- and long- term outcomes from environmental watering and changes in ecological condition, including the effects of threats (hydrological, aquatic and terrestrial) that may reduce or prevent the ecological improvement expected with environmental water delivery? (All)
31	How likely do you think the EWKR project findings will influence, if at all, your future water management practices? (Group 3)
32	To what extent, if any, has your interaction with other agencies changed as a result of the EWKR project? (2
33	To what extent has the EWKR project improved your capacity to predict outcomes of environmental flow allocations and management over 1-5 years? (Group 3)
34	To what extent have you adopted or used knowledge/guidance/tools generated by the EWKR project? (Group 3)
	Moving forward – what should be changed, what can be improved
35	What, if any, improvements could be made to the EWKR project moving forward? (All)

5   REFERENCES

Boulton, A.J., and Davies, P.E.D. (2020). Independent expert evaluators' assessment of the outputs and outcomes of the Environmental Water Knowledge and Research (EWKR) Project. Report to the Commonwealth Environmental Water Office.

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