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The SDL Assessment: Surface Water Technical Methods

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Acknowledgement of the Traditional Owners of the Murray–Darling Basin
We acknowledge the Traditional Owners and Custodians of Country throughout the Murray–Darling Basin and their continuing connection to land, waters and community. We offer our respects to the people, the cultures and the Elders past and present.

Aboriginal people should be aware that this publication may contain images, names or quotations of deceased persons.

Glossary

Basin Plan Review (BPR) - under the *Water Act 2007* (Cth) (**Water Act**) the MDBA is required to review the *Basin Plan 2012* (the **Basin Plan**) in 2026.

Basin Wide Strategy (BWS) - an acronym representing the Basin-wide Environmental Watering Strategy. The BWS, first published by the MDBA in 2014 and updated in 2019, and in 2025, and builds on the overall environmental objectives in the Basin Plan by setting expected environmental outcomes for four ecological themes (flows and connectivity, native vegetation, waterbirds and native fish). The strategy guides environmental water decisions at sites across the Basin.

Climate change - a change in the state of the climate identified (e.g. through statistical tests) by changes or trends in the mean and/or the variability of its properties, and that persists for an extended period, typically decades to centuries. Includes natural internal climate processes or external climate forcings such as modulations in solar cycles, volcanic eruptions and persistent anthropogenic changes in the atmosphere or in land use[1].

Drivers – refers to the identified cause of performance (either positive or negative) against observed findings. The SDL Assessment will prioritise the identification of drivers of poor environmental outcomes in order to mitigate these risks however may also interrogate the drivers of good performance in order to identify actions that are effective.

Ecosystem functions - the interactions (events, reactions or operations) among biotic (living) and abiotic (non-living) elements of ecosystems.

Environmental Water Requirements (EWRs) - represent the water requirements of priority environmental assets and priority ecosystem functions to support their environmental objectives. These are developed consistent with the Environmental Watering Plan (EWP) by Basin state governments and included in their long-term watering plans (LTWPs), Environmental Water Management Plans (EWMPs) and Flow Studies in Victoria.

Environmentally Sustainable Level of Take (ESLT) - is defined by the Water Act, for a water resource means the level at which water can be taken from that water resource which, if exceeded, would compromise:

(a) key environmental assets of the water resource; or

(b) key ecosystem functions of the water resource; or

(c) the productive base of the water resource; or

[1] IPCC (Intergovernmental Panel on Climate Change) (2022) 'Climate Change 2022: Impacts, Adaptation, and Vulnerability. Contribution of Working Group II to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change' [H-O, Pörtner, DC, Roberts, M, Tignor, ES, Poloczanska, K, Mintenbeck, A, Alegría, M, Craig, S, Langsdorf, S, Löschke, V, Möller, A, Okem, B, Rama (eds.)], Cambridge University Press. Cambridge University Press, Cambridge, UK and New York, NY, USA, doi:10.1017/9781009325844.

(d) key environmental outcomes for the water resource[2]

Evaluation (Basin Plan Evaluation) - refers to the Evaluation of the Basin Plan undertaken consistent with Chapter 13 of the Basin Plan. The 2025 Basin Plan Evaluation[3] assessed the performance and impact of the Basin Plan.

Groundwater - refers to: (a) water occurring naturally below ground level (whether in an aquifer or otherwise); or (b) water occurring at a place below ground that has been pumped, diverted or released to that place for the purpose of being stored there; but does not include water held in underground tanks, pipes or other works[2].

Lines of enquiry (Surface Water) - three approaches to assessing the effectiveness of the Basin Plan in achieving its environmental objectives (i.e. do the SDLs reflect an ESLT?) under current and full implementation settings and under current and future climate scenarios.

Line of Enquiry 1 (Surface Water) - represents settings at the commencement of the review (June 2024). This is an assessment combining current monitoring and observational reporting (supported through the 2025 SRA, 2025 Basin Plan Evaluation and Basin Plan environmental outcomes reporting) with modelling of EWRs over the historical climate sequence.

Line of Enquiry 2 (Surface Water) - represents a fully implemented Basin Plan (constraints not relaxed) under the historical climate. This is a modelled assessment of EWR performance using the historical climate sequence with model parameters representing a fully implemented Basin Plan.

Line of Enquiry 3 (Surface Water) - represents a fully implemented Basin Plan (constraints not relaxed) under six plausible climate scenarios from Sustainable Yields modelling. This is a modelled assessment of EWR performance under the six scenarios.

Long-term watering plans (LTWPs) - are prepared by Basin states governments consistent with Part 4 of Chapter 8 of the Basin Plan. LTWPs outline the long-term objectives and strategies to (a) inform decisions on how water recovered under the Basin Plan should be prioritised and delivered, and (b) meet the watering requirements of environmental assets and functions. They also ensure water for the environment delivery aligns with the Murray–Darling Basin Authority (MDBA) Environmental Watering Strategy and the Environmental Watering Plan (EWP). Note, LTWP may also be referred to as Long Term Environmental Watering Plans (LTEWP).

Matter reports - reports prepared in accordance with Schedule 12 of the Basin Plan[4].

Matter 2 report - prepared by the MDBA every 5 years on the *protection and restoration of water-dependent ecosystems and ecosystem functions in the Murray–Darling Basin, including for the purposes of strengthening their resilience in a changing climate*.

[2] Section 4 of the *Water Act 2007* (Cth)
[3] MDBA (Murray–Darling Basin Authority) (2025a) 2025 Basin Plan Evaluation MDBA website, accessed 14 January 2026.
[4] MDBA (Murray–Darling Basin Authority) (2012) Basin Plan 2012.

Matter 7 report - prepared by the MDBA and the Commonwealth Environmental Water Holder every 5 years on the *achievement of environmental outcomes at a Basin-scale by reference to targets in Schedule 7*.

Matter 8 reports - prepared by Basin state governments every 5 years, on *the achievement of environmental outcomes at an asset scale*.

Pilots - a short-hand term for the pilot application of the SDL Assessment method which demonstrates the use of a draft version of the SDL Assessment method primarily for the purpose of gathering early feedback on the method.

Scenario - refers to an individual modelled scenario that is a combination of particular management and climate settings.

Surface water- includes: (a) water in a watercourse, lake or wetland; and (b) any water flowing over or lying on land: (i) after having precipitated naturally; or (ii) after having risen to the surface naturally from underground[2].

Sustainable Diversion Limit (SDL) - the maximum long-term annual average quantity of water that can be taken, on a sustainable basis, from the Basin water resources as a whole, and the water resources, or particular parts of the water resources, of each water resource plan area.

Sustainable Diversion Limit (SDL) Assessment - the process of assessing whether the SDLs reflect an ESLT and, ultimately, their effectiveness in supporting the environmental outcomes of the Basin Plan.

Sustainable Diversion Limits Assessment and Response Framework - the document that explains the process which has informed the initial SDL Assessment.

Sustainable Rivers Audit (SRA) - a trend and current condition assessment of the Murray–Darling Basin across environmental, social, economic, and First Nations cultural themes, mostly relative to Basin Plan objectives and outcomes.

Water Resource Plans (WRP) - are a key tool for implementing the Basin Plan. These plans are prepared by Basin state governments in accordance with Water Act and Basin Plan requirements. They outline how community, environmental, economic and Cultural outcomes will be met and resolve state water management rules that meet the Basin Plan requirements. They set rules on how much water can be taken from the system, inform accounting settings and ensure the SDL is not exceeded over time.

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Foreword

The Basin Plan sets long-term average sustainable diversion limits (Sustainable Diversion Limits or SDLs) which determine how much surface and groundwater can be taken by towns and communities, farmers and industries in the Murray–Darling Basin, while keeping the rivers and environment healthy. Each SDL resource unit in the Basin has its own limit on water take.

As part of the statutory review of the Basin Plan, the Murray–Darling Basin Authority (the MDBA) is assessing whether the SDLs continue to reflect an environmentally sustainable level of take (ESLT). The technical methods for conducting the SDL Assessments are described in several documents (refer Figure 1 below) and the broader *Sustainable Diversion Limit Assessment and Response Framework* (the Framework).

This document describes the ***technical methods for surface water*** that enabled an initial assessment of the 29 surface water SDLs. Technical methods were developed and applied to three Lines of Enquiry (Lines of Enquiry or LoE) that supported the initial surface water SDL assessment. Line of Enquiry 1 considers the potential risks of current use to the achievement of the ESLT, while Lines of Enquiry 2 and 3 consider those same risks assuming full use of the SDL, under historical and a range of possible future climates, respectively. Best available science and knowledge is used in the surface water technical method, including modelling informed by climate science; monitoring and reporting sources; scientific knowledge, and expert elicitation.

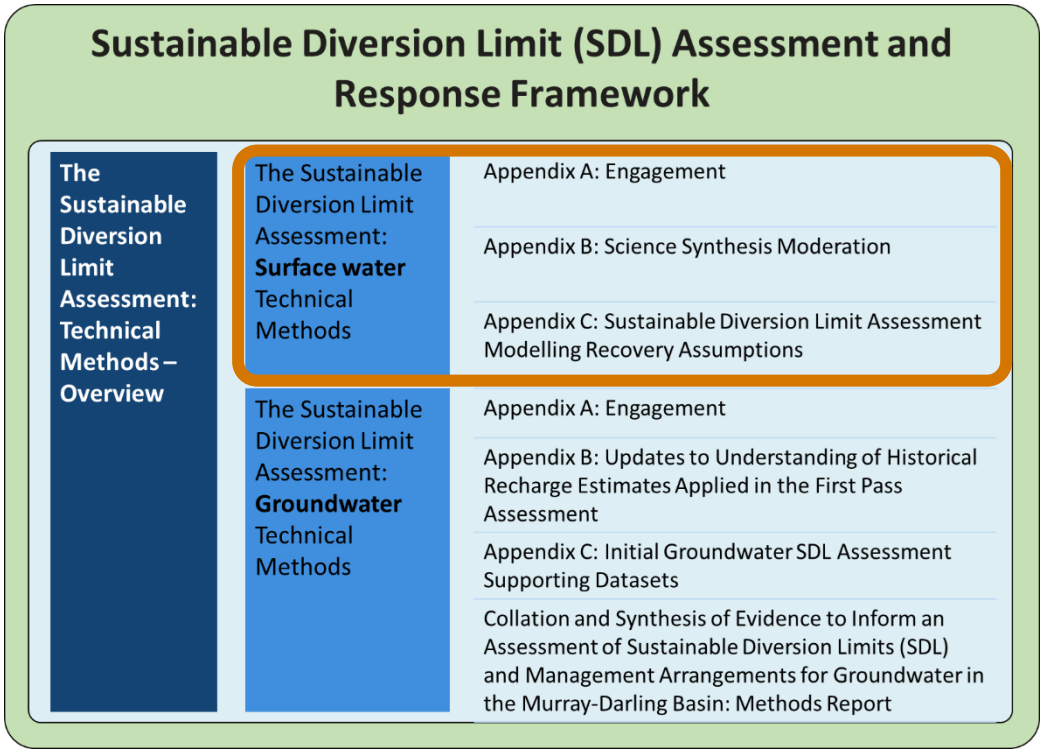

Figure 1. Structure of the SDL Technical Assessment Methods Reports

Other reports that provide further context relevant to this report are:

- Sustainable Diversion Limit Assessment and Response Framework[5]
- The Basin Plan Review: Early Insights Paper[6]
- The Sustainable Rivers Audit (SRA)[7]
- The Sustainable Yields (SY) Report/s[8]

[5] MDBA (Murray–Darling Basin Authority) (2026a) *Sustainable Diversion Limit Assessment and Response Framework: An approach developed for the Basin Plan Review.*
[6] MDBA (Murray–Darling Basin Authority) (2024) Early Insights Paper | Murray–Darling Basin Authority MDBA website, accessed 8 January 2026.
[7] MDBA (Murray–Darling Basin Authority) (2025b) Sustainable Rivers Audit | Murray–Darling Basin Authority MDBA website, accessed 8 January 2026.
[8] MDBA (Murray–Darling Basin Authority) (2025c) 2025 Sustainable Yields | Murray–Darling Basin Authority MDBA website, accessed 8 January 2026.

1 Introduction

The Environmentally Sustainable level of Take (ESLT) is an integral part of setting Sustainable Diversion Limits (SDLs) within the Basin Plan. The ESLT is defined in the Water Act, it requires that the level of take (surface and ground water) from the Basin's river systems are sustainable.

The Basin Plan Review (BPR) includes an updated assessment of the original ESLT method based on contemporary science. This includes the best available knowledge, updated models and assessment methods to provide the MDBA with robust information to consider as part of the 2026 BPR.

An Environmentally Sustainable Level of Take (ESLT) is defined in the Water Act as*:*

"The level at which water can be taken from that water resource which, if exceeded, would compromise:

a) key environmental assets of the water resource; or
b) key ecosystem functions of the water resource; or
c) *the productive base of the water resource; or*
d) *key environmental outcomes for the water resource.*"

In conducting the Basin Plan Review (BPR) the MDBA is leveraging updated science, including new modelling, to support an assessment of the ongoing appropriateness of the SDLs that were determined at the setting of the Basin Plan in 2012.

1.1 Background

There is a strong relationship between the active and adaptive management of water resources and the capacity to achieve environmental outcomes across the Basin. The Basin Plan recognises this connection, through an established hierarchy of environmental objectives, outcomes and targets.

The concept of the ESLT and the requirement that the SDLs reflect an ESLT is central to the scheme of the Water Act, and the sustainable management of the Basin's water resources and water dependent ecosystems. These limits are established to balance the competing demands for water and support the sustainable management of these systems over the long-term.

In approaching the SDL Assessment, the MDBA has used the best available science and knowledge to understand and assess the water requirements of Basin Plan environmental outcomes. These outcomes are based on the priority environmental assets and ecosystem functions as identified in the long-term watering plans (LTWPs) developed by Basin state governments. They are developed to ensure the ecological sustainability of key environmental assets (including wetlands, rivers, and floodplains), key ecosystem functions (the processes that underpin the maintenance of ecosystems), the productive base (the ecosystems support services) and key environmental outcomes (as broadly described in Chapter 5 of the Basin Plan, recognising the achievement of these outcomes is a product of supporting key environmental assets and key ecosystem functions).

The approach provides a structured way to assess whether these critical components are being met, drawing on:

- on-ground monitoring results (such as native fish breeding, ecosystem health maintenance, or vegetation growth and recovery), which provide an indication of progress towards overall environmental objectives over the short-term, and
- modelled assessment of the achievement of Environmental Watering Requirements (EWRs), to indicate the outcomes that are likely to be achieved over the longer-term.

Combining the on-ground monitoring results of the Basin's environmental assets and ecosystem functions with modelled EWR assessments enables an assessment of the risk of compromise to Basin Plan environmental outcomes, and ultimately an assessment of whether the SDLs continue to support an ESLT.

This approach, alongside implementation of the Basin Plan, helps to protect the Basin's biodiversity and ecosystem services while also supporting long-term water security for communities, creating healthy and resilient ecosystems, improving water quality, and ensuring a strong, functioning river system for future generations. It also supports adaptive management, allowing for adjustments based on new scientific data, knowledge and tools.

Important points of reference

The SDL Assessment draws on the elements of the Basin Plan which support the expression and assessment of environmental objectives and outcomes. Some of the key elements for in the SDL Assessment include:

- **Objectives:** The Environmental Watering Plan (Basin Plan Chapter 8) sets out broad environmental objectives for the Basin's water-dependent ecosystems and guides development of the Basin-wide environmental watering strategy (BWS) and LTWPs.
- **Outcomes:** The BWS describes the expected outcomes for four environmental themes - flows and connectivity, native vegetation, waterbirds and native fish.
- **Environmental assets and ecosystem functions:** LTWPs identify the priority environmental assets and ecosystem functions for environmental water planning at the Water Resource Plan area scale, in accordance with criteria specified in the Basin Plan.
- **Environmental watering requirements (EWRs):** Defined in LTWPs, EWMP's and Flow Studies, EWRs are the specific amounts, timing, duration and frequency of water needed to maintain or improve the health of native vegetation, animals and ecological functions in a river system. In assessing the surface water SDLs, it is assumed that by meeting the EWRs of a subset of key environmental assets and key ecosystem functions, the productive base will also be supported and outcomes maintained.

It is important however to recognise that there are factors other than water availability that can influence achievement of Basin Plan outcomes, such as vegetation clearing, loss of floodplain connectivity, infrastructure, over-harvesting of biota, introduced species and chemical pollution. For this reason, the SDL Assessment will aim to identify the major drivers of risk to these environmental outcomes, and engage with Basin state governments, experts, First Nations and communities to understand the full range of measures and actions needed.

Understanding the causal relationships between stressors (such as levels of water extraction) and ecological responses (including the trend and condition of environmental assets and functions) is

essential for evaluating the effectiveness of Basin Plan settings, including the SDLs. Establishing these relationships in natural systems is inherently difficult due to high natural variability, limited opportunities for controlled experimentation, insufficient replication, and the influence of multiple confounding factors. Consequently, even robust study designs may be unable to disentangle the relative strength of all causal linkages with confidence.

Under the MDBA's approach to science and knowledge[9], multiple 'lines of evidence' (MLE) are drawn together to build a robust foundation of complementary information to overcome and navigate decision-making under uncertainty. The approach to SDL Assessment has therefore systematically assessed available evidence, built informative narratives, and allowed for robust grading of environmental condition, risk and likelihood. The application of this approach is described in the following Chapter.

[9] MDBA (Murray–Darling Basin Authority) (2025d) Our science and knowledge approach | Murray–Darling Basin Authority MDBA Website, accessed 21 January 2026.

2 Environmental Outcomes Assessment Approach

Environmental assessments are complex, where the questions posed are not easily answered by any one individual piece of evidence. Most situations have a many-to-many mapping of drivers to impacts, making individual links and their combined influence difficult to understand. This challenge reflects the broader issue of relative weak inference in environmental sciences (compared to other scientific fields), where observational studies are constrained by the inability to randomly allocate treatments, the absence of before-development data, limited replication, and confounding environmental gradients[10]. Because of these limitations, individual studies rarely provide conclusions required for strong inference.

Instead, conclusions must be drawn from causal criteria and multiple lines of evidence[11]. This includes combining evidence across different study designs, environments, scales, modelling, surveys and integrating statistical evidence with ecological plausibility. Individually, these types of evidence may not be persuasive, but together they can provide multiple lines of evidence that amount to a powerful argument for the findings that they collectively support[10].

As such, the MDBA has adopted an aggregative approach to synthesis, allowing the consideration of multiple lines of evidence (MLE) to build informative narratives and support robust grading approaches. The SDL Assessment is guided by an overarching Environmental Outcomes Assessment Approach (Figure 2), adapted from the Eco Evidence framework (Norris et al 2012)[10].

[10] Norris, R, Webb, JA, Nichols, SJ, Stewardson, MJ and Harrison, ET (2012) 'Analyzing cause and effect in environmental assessments: using weighted evidence from the literature', Freshwater *Science*, *31*(1): 5-21, doi.org/10.1899/11-027.1

[11] Norris, R, Liston, P, Mugodo, J and Nichols, S, Quinn, G, Cottingham, P, Metzeling, L, Perriss, S, Robinson, D, Tiller D and Wilson, G (2005) 'Multiple lines and levels of evidence for detecting ecological responses to management intervention', AGU Spring Meeting Abstracts, 2: NB44B-02.

Figure 2. A seven-step Environmental Outcomes Assessment Approach adapted from the Eco Evidence framework by Norris et al [10]

2.1 Step 1. Question Framing

There is a key broad question: **Are SDLs reflecting an Environmentally Sustainable Level of Take (ESLT) under the current and future climate?**

Answering this question requires an understanding of the current condition and the likelihood that flows will support outcomes over the long-term. The outcomes assessed relate to the key environmental assets (KEAs), key ecosystem functions (KEFs) and key environmental outcomes (KEOs) for the water resources of the Basin. It is assumed that by meeting the requirements for the KEAs and KEFs, the productive base and KEOs will also be supported.

To understand the likelihood that surface water flows are sufficient to support the hydrology needs of these key assets and functions under current conditions as well as various policy and climate settings, the MDBA used multiple lines of evidence. These lines of evidence included the Sustainable River Audit[7] as well as Basin state governments and Commonwealth based Matter reporting on the current condition of a sub-set of KEAs and KEFs, and have been used to inform the condition of ecological themes central to the assessment approach.

To explore the likelihood that surface water flows are sufficient to support the hydrology needs of key assets and functions, a detailed eco-hydrology assessment was undertaken for most SDL resource units. This assessment considered the hydrology needs of Priority Environmental Assets (PEAs) and Priority Ecosystem Functions (PEFs) using EWRs drawn from LTWPs in NSW, SA, QLD, and from Environmental

Water Management Plans (EWMPs) and FLOWS studies in Victoria. The MDBA considers that the flow needs of the PEAs and PEFs sufficiently represent the flow needs of KEAs and KEFs.

2.2 Step 2. Context Identification

To understand the current condition of priority environmental assets and priority ecosystem functions, six representative environmental themes were assessed as shown below. These are drawn from LTWPs and the BWS to ensure all relevant themes are assessed. These themes are generally consistent with available monitoring sources such as the Sustainable Rivers Audit[7], Basin Plan Schedule 12 Matter Reporting, and the Commonwealth Environmental Water Holder's Flow-MER program.

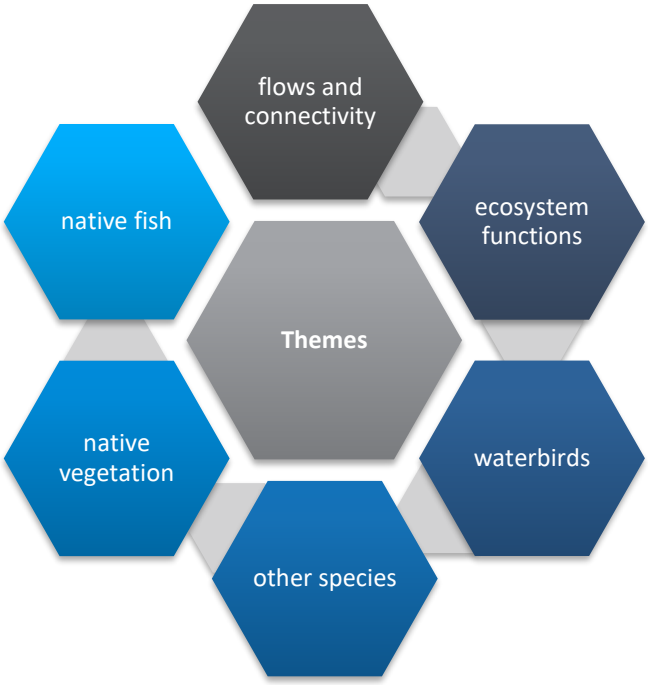

Figure 3. The six themes (informed by the LTWPs and BWS) used to assess the current ecological condition of SDL resource units. other species include frogs, turtles, algae, macroinvertebrates and other biota.

As part of a detailed eco-hydrology assessment, EWRs were used to assess the likelihood that surface water flows are sufficient to support ecological themes at both an asset and SDL resource unit scale. The detailed assessment was not applied to 10 Resource Units assessments (Paroo, Warrego, Nebine, Moonie, Ovens, Kiewa, Marne-Saunders, Eastern Mount Lofty Ranges, SA Non-Prescribed Area and ACT). These units underwent a simplified assessment due to either of the following conditions:

- The influence that water take has on the SDL resource unit's flow regime is relatively low. This does not imply that these SDL resource units have low ecological risk overall, rather, their ecological condition is primarily determined by other non-SDL drivers.
- One or more of the required lines of evidence were not readily available to allow completion of the detailed assessment.

The EWRs represent the best available science for assessing the water needs of assets and functions described above. The EWRs are mapped to the ecological objectives and then grouped by ecosystem themes to which they contribute. These themes are established in the BWS and LTWPs. These themes

are appropriate for SDL Assessment as they are measurable, representative indicators of broader ecosystem health at the Basin-scale, they are responsive to environmental watering, and they are widely valued by communities of the Basin[12]. Further detail on the values and objectives that relate to the EWRs is available in the state LTWPs and are specific to the areas within those LTWPs. Figure 4 shows the relationship between Murray–Darling Basin policy instruments and their objectives.

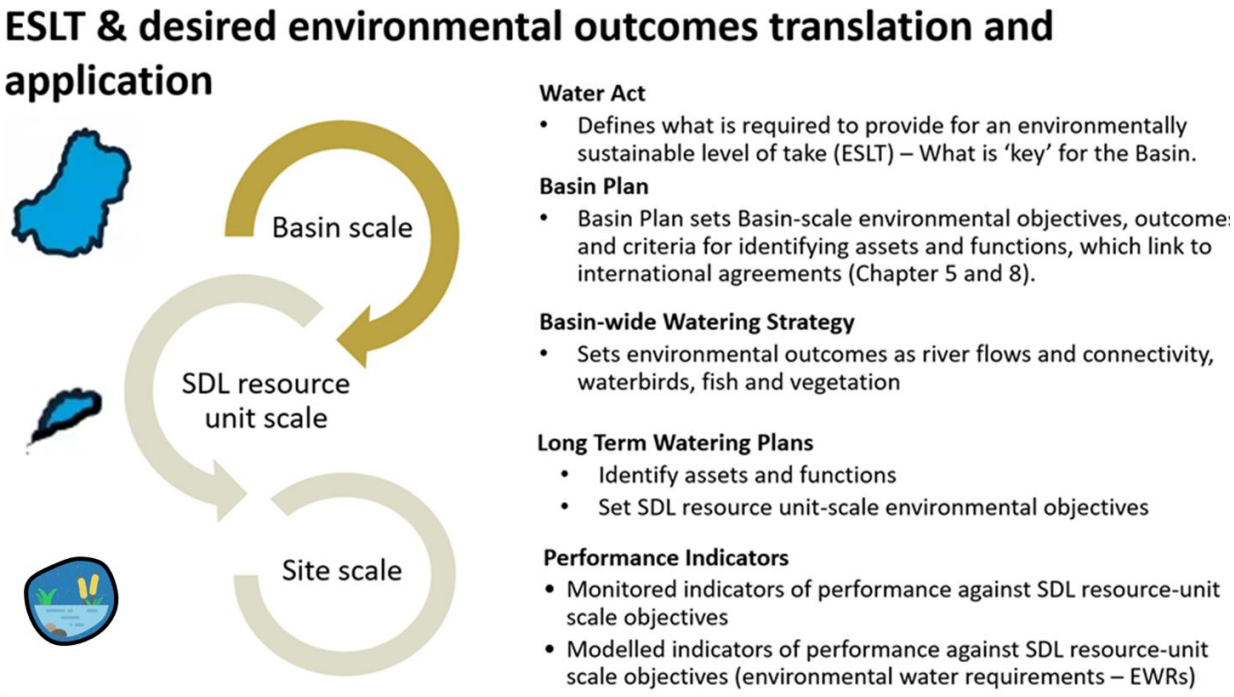

Figure 4. ESLT translation of outcomes

The asset/reach scale performance indicators are represented by the assessment of EWRs. Assessed EWR's are then aggregated to assess the effectiveness of flows in supporting ecological themes at an SDL resource unit scale.

EWRs improve upon the site-specific flow indicators (SFIs) that were used to develop SDLs for the Basin Plan 2012. They provide increased resolution, an updated knowledge base and an ability to map to ecological objectives. Key improvements to the method and how they align with recommendations from the 2011 CSIRO review can be found in Chapter 4.8.

Each EWR is comprised of a specific set of flow metrics that are related to a suite of associated objectives and targets. EWRs were developed by the Basin state governments. The implementation of EWRs in analysis and EWR refinements were then developed by the MDBA in collaboration with Basin state governments. The methods for analyses are implemented with the EWR tool python package and the EWR Analysis Pipeline python repository (see Chapter 4.3).

EWRs are developed using the best available science on flow–ecology relationships, drawing on empirical data, ecological modelling and expert knowledge. However, it is acknowledged that current EWRs may not remain appropriate for supporting desired ecological outcomes into the future under

[12] MDBA (Murray–Darling Basin Authority) (2025e) *The Basin-wide environmental watering strategy,* Murray–Darling Basin Authority Canberra, 2025, CC BY 4.0.

potentially hotter and drier climate conditions, as ecosystem responses to flow regimes will likely change under hotter climates. Additional lines of evidence, including insights from the 2025 Sustainable Yields project, provide additional evidence to support decision making around the adequacy of SDLs in supporting an ESLT, both now and under a range of plausible climate futures.

The EWRs are represented by a range of hydrological metrics, usually including flow, level or volume thresholds, duration, timing, frequency of event achievement and maximum interevent spells. The Basin Plan requires EWRs to be supported by relevant information relating to the underlying physical geomorphic processes driving the flow-ecology relationship.

A range of information may be used to build an EWR, including but not limited to: peer-reviewed scientific studies, grey literature, expert knowledge, species specific life stage and/or life cycle requirements, spatial data, monitoring/observational data, river channel geomorphology and hydraulics, inundation and habitat mapping and modelling, satellite imagery, observed and modelled flow time series data.

2.3 Step 3. The Lines of Enquiry

Scenario exploration is a standard tool to explore a range of possible futures and response options, especially given that one of the primary influencers of riverine condition (i.e. climate) is changing, but the specific changes that will occur are uncertain[13]. Embedded in scenario thinking[14], three Lines of Enquiry (LoE) were developed to assess the effectiveness of the SDLs in supporting an ESLT (Figure 5). The three Lines of Enquiry have been constructed in response to three specific questions (see Appendix C for further detail) which support answering of the overarching key question 'Are SDLs reflecting an Environmentally Sustainable Level of Take (ESLT) under the current and future climate?':

- What is the current condition of environmental themes at the SDL resource unit scale?
- Is the pattern and volume of flow likely to support environmental themes at the SDL resource unit scale under existing management arrangements and a fully implemented Basin Plan, assessed under historical climate conditions?
- Is the pattern and volume of flow likely to support environmental themes at the SDL resource unit scale under a fully implemented Basin Plan in a future climate?

[13] Macedo, N, Cunha, A and Guimarães, T, (2015) Exploring scenario exploration, In *International Conference on Fundamental Approaches to Software Engineering* (301-315). Berlin, Heidelberg: Springer Berlin Heidelberg.
[14] Wu, W, Eamen, L, Dandy, G, Maier, HR, Razavi, S, Kwakkel, J, Huang, J and Kuczera, G (2025) 'Beyond the traditional paradigm of water resources management: scenario thinking to address deep uncertainty', *Journal of Hydrology*, 661:133-547.

Three lines of enquiry to support narrative

Lines of enquiry	1. At time of the review (as at June 2024)	2. BP fully implemented	3. What does the future hold? (to the next review & beyond to 2050)
	Are there any areas of immediate risk where we lack confidence in the achievement of BP environmental outcomes? If so, why?		What are the risks to the achievement of BP environmental outcomes under possible future climates?
Exploratory questions	• What is current environmental condition and trend? • What are the drivers? • Have any significant risks emerged since 2012?	• How effective is the SDL in supporting BP desired environmental outcomes when BP is fully implemented? • What are the drivers? • Are any new risks emerging? • How urgently do we need to respond?	• What are the drivers? • What new risks might emerge? • How urgently do we need to respond?

Figure 5. The three Lines of Enquiry used to assess the effectivness of SDLs in supporting an ESLT under current and potential future management and climate scenarios.

The three Lines of Enquiry are:

- **Line of Enquiry 1 – Current implementation of the Basin Plan (and level of use) as at June 2024** – to explore the outcomes of Basin Plan implementation to date, recognising implementation is ongoing. Data and modelling scenarios used in this Line of Enquiry include conditions up to and including 30 June 2024. A combination of observed environmental condition (including trend) and flow (gauged) information are considered alongside an analysis of EWR achievement over 129 years (1895 – 2024) of modelled flow data (using historical climate). This enquiry recognises that the Basin Plan implementation is ongoing and provides important context for the review.

- **Line of Enquiry 2 – Full Basin Plan implementation (and full use of the SDL) –** to assess whether, under a fully implemented Basin Plan, the SDLs continue to reflect an ESLT and support the Basin Plan environmental outcomes. This draws on a fully implemented Basin Plan model scenario to determine the likely achievement of EWRs under a fully implemented Basin Plan, drawing on 129 years (1895 – 2024) of modelled flow data (using historical climate).

- **Line of Enquiry 3 – Full implementation under a range of plausible future hydroclimates –** to provide a view of potential long-term impacts of climate change under full Basin Plan implementation. The achievement of EWRs were analysed for the modelled scenario of full implementation with full use of the SDL and plausible future hydroclimate scenarios, through to the next Basin Plan (2036 using hydroclimate sequences centred around 2030) and a planning horizon centred around 2050.

Supplementary modelling scenarios were used to help capture relative changes and understand the shift from 'without development' settings and 'pre-Basin Plan' settings for each Line of Enquiry. These scenarios are:

- **Without Water Resource Development (WOD) Scenario** - The without water resource development scenario is a model run based on the Pre-Basin Plan scenario (detailed below), but

removes from the system all the dams, irrigation and environmental works/infrastructure, all consumptive users (such as irrigation, town water supply and industrial water uses) and the rules governing flows such as channel capacity constraints. However, these models are not necessarily a representation of pre-European conditions, as inflow estimates have not been corrected for land use changes and on-farm development in the catchments (interceptions were estimated at 2721 GL/y [15]), which are largely included implicitly in the measured flow data and rainfall runoff responses used to calibrate the models. Moreover, the impact of changes to geomorphology such as vegetation changes, levee construction and other in-channel structures, soil compaction and channel incision are some examples of impacts that are not modelled. This scenario is imperfect, but is best available representation of natural conditions.

- **Pre-Basin Plan (PBP) Scenario** - The Pre-Basin Plan scenario represents a starting point against which the effect of implementing the Basin Plan (in particular, the introduction of SDLs) can be assessed. This scenario reflects the water sharing arrangements that were in place in June 2009, and is the best available estimate of use of water resources and flows across the Basin in 2009. These arrangements include entitlements, water allocation policies, water sharing rules, operating rules, channel capacity constraints and infrastructure such as dams, locks and weirs. The level of development, which includes irrigation area, crop coverage and pumping capacity, is as per the Murray–Darling Cap for all Basin state governments, unless current water sharing arrangements have a usage level lower than the Cap level, e.g. the NSW Water Sharing Plans. Any water recovered under The Living Murray Initiative[16] and Water for Rivers (for the Snowy and Murray Rivers) is included as part of the PBP scenario. However, water recovered under other programs such as the Commonwealth government programs of Sustainable Rural Water Use and Infrastructure [17] and Restoring the Balance in the Murray Darling Basin NSW Government River Environmental Restoration Program[18] and Northern Victorian Irrigation Renewal Program[19] is not included in the PBP Scenario, thus water recovered as a result of these initiatives is available to offset the proposed reductions in SDLs.

An important component of the SDL Assessment is testing of environmental outcomes under plausible future climates. These were provided by MDBA's Sustainable Yields (SY) program. The Commonwealth Scientific and Industrial Research Organisation (CSIRO), through its work on the Sustainable Yields (SY) program, provided hydroclimate modelling based on best available science and the advice provided by the Independent Hydroclimate Science Expert Panel (IHSEP) in 2023/24. The Strategic Hydroclimate Working Group (SHWG) and Modelling Advisory Group (MAG), including Basin state governments representatives, were also consulted and updated by the IHSEP throughout this process. The hydroclimate modelling provided by CSIRO was run through the river system models by the MDBA to generate future hydroclimate scenarios that contain modelled flow data throughout the Basin.

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[15] MDBA (Murray-Darling Basin Authority) (2011) *The proposed "environmentally sustainable level of take" for surface water of the Murray-Darling Basin: Methods and outcomes*, MDBA publication no: 226/11, Murray-Darling Basin Authority, Canberra.

[16] MDBA (Murray–Darling Basin Authority) (2025f) The Living Murray MDBA website, accessed 13 January 2026.

[17] DCCEW (Department of Climate Change, Energy, the Environment and Water) (2025) Sustainable Rural Water Use and Infrastructure Program DCCEW website, accessed 13 January 2026.

[18] DECCW (Department of Environment, Climate Change and Water) NSW (2011) *NSW Rivers Environmental Restoration Program: Final Report,* DECCW, accessed 30 January 2026.

[19] DTP (Department of Transport and Planning) (2025) Northern Victoria irrigation renewal project (foodbowl modernisation) DTP website, accessed 13 January 2026.

For Line of Enquiry 3, six hydroclimate scenarios below correspond to the 10th, 50th and 90th percentiles of the Coupled Model Intercomparison Project Phase 6 (CMIP6) global climate model simulations for two future timeframes centred around 2030 and 2050. These modelled hydroclimate scenarios were designed to represent future hydroclimates and help to understand the scale, range and trends in risks to water availability from climate change. However, climate processes and drivers are complex, resulting in a high degree of data and model uncertainty. These scenarios do not attempt to represent changes in cropping, demands or the environment that could reasonably be expected to occur in response to a changing climate. Awareness of this uncertainty and the models' assumptions informed and constrained the interpretation of results and the identification of vulnerabilities.

A summary of modelling assumptions that contributed to each of the resource unit assessment can be found in Appendix C.

Hydroclimate Outcomes from Sustainable Yields Module 1

Some of the key findings from the Sustainable Yields Module 1 on Hydroclimate Projections for the Murray–Darling Basin include that under climate change:

- the MDB is virtually certain to be hotter,
- potential evapotranspiration (PET) is virtually certain to be higher,
- very heavy rainfall will very likely become more intense,
- cool season rainfall in the MDB is very likely to decline, and
- annual rainfall will likely become more variable.

The changes in the MDB climate will affect runoff (including system inflows and water resource availability) which is very likely to decline and drive an increase in the frequency and severity of hydrological droughts[28].

Scenarios S1 to S3 (~2030 Future Climates)

These three scenarios are for ~2030 relative to ~1990. These three scenarios, reflect a 1.0°C global average warming relative to 1990 (1.5°C global average warming relative to 1850-1900 pre-industrial). These reflect: (i) the (UNFCCC, 2015)[20] to limit global average warming below 1.5°C; (ii) low global warming by 2050; or (iii) medium global warming by around 2030. The scaling factors for these (below) are therefore 1.0/1.5 or 0.667 of those for the core scenarios.

[20] UNFCCC (United Nations Framework Convention on Climate Change) (2015*)* 'The Paris Agreement' [conference publication] *Paris Climate Change Conference - November 2015*, COP 21, accessed 30 January 2026.

Table 1. Sustainable Yields scenarios for one degree of global warming from 1990[21]. Note – all variable changes are expressed as a percentage change with the exception of temperature (expressed as change in degrees Celcius).

Variable (change in)	Plausible scenarios at ~2030 (~ 1 degree of global warming from 1990)					
	Scenario S1		Scenario S2		Scenario S3	
	Northern Basin	Southern Basin	Northern Basin	Southern Basin	Northern Basin	Southern Basin
Warm season rainfall (%)	+5.7	+6.3	+0.7	-0.3	-3.3	-4.8
Cool season rainfall (%)	+3.6	+1.0	-4.4	-3.5	-8.0	-7.7
Potential Evapotranspiration (%)	+2.6	+2.6	+3.0	+3.0	+3.6	+3.6
Temperature (°C)	+0.9	+0.9	+1.1	+1.1	+1.2	+1.2
Mean warm season runoff (%)	+18	+5	+1	-9	-13	-17
Mean cool season runoff (%)	+6	0	-11	-10	-21	-20

Scenarios S4 to S6 (~2050 Future Climates)

These scenarios are for ~2050 relative to ~1990. The scaling factors below come from analysis of ~40 CMIP6 GCMs for SSP245, SSP370 and SSP585. They reflect change for a 1.5°C global average warming relative to 1990 (2.0°C global average warming relative to 1850-1900 pre-industrial), and ~2050 relative to ~1990 in the IPCC median projected change in global average temperature.

Table 2. Sustainable Yields scenarios for one point five degrees of global warming from 1990[21].

Variable (change in)	Plausible scenarios at ~2050 (~ 1.5 degree of global warming from 1990)					
	Scenario S4		Scenario S5		Scenario S6	
	Northern Basin	Southern Basin	Northern Basin	Southern Basin	Northern Basin	Southern Basin
Warm season rainfall (%)	+8.6	+9.4	+1.1	-0.5	-5.0	-7.2
Cool season rainfall (%)	+5.4	+1.5	-6.6	-5.2	-12.0	-11.5
Potential Evapotranspiration (%)	+3.9	+3.9	+4.5	+4.5	+5.4	+5.4
Temperature (°C)	+1.3	+1.3	+1.6	+1.6	+1.8	+1.8
Mean warm season runoff (%)	+27	+8	+2	-13	-19	-26
Mean cool season runoff (%)	+9	0	-17	-15	-31	-30

2.4 Step 4. Drivers Identification

Sustainable Diversion Limits (SDLs) are a key driver for supporting Basin Plan environmental outcomes. However, many other drivers may also influence these outcomes. The Environmental Outcomes Assessment Approach enables consideration of these additional drivers of environmental outcomes. This includes non-SDL flow related drivers (e.g. operational and other environmental water delivery constraints) and other non-flow related drivers (e.g. pest-species). It is also worth noting that some of the "non-flow drivers" such as pest-species, are also indirectly flow-related. Determining the presence of non-SDL drivers and how they may be detrimentally impacting on the ability to achieve Basin Plan environmental outcomes will inform the type of response that is most appropriate. This may result in a recommendation to revise SDLs or explore other response mechanisms (or both) or to reconsider the

[21] MDBA (Murray–Darling Basin Authority) (2026b) *Murray–Darling Sustainable Yields Module 2 River System Modelling – Technical Report,* MDBA, accessed 21 January 2026.

Basin Plan objectives and desired outcomes. By identifying significantly limiting drivers we aim to support the development of an adaptive evidence-based response framework[5] to support informed decision-making on risk mitigation strategies that can be enacted through Basin Plan mechanisms.

2.5 Step 5. Evidence Synthesis

This assessment draws on multiple lines of evidence (MLE), with observed environmental condition assessments (Chapter 3) and modelled flow performance assessments (Chapter 4), providing the two primary sources of information.

Combining of the multiple lines of evidence is a two-step process, with step 1 relying on the monitoring and modelling outcomes.

2.5.1 Step 5.1 Generating Information Packages

Information packs were generated by compiling the following information for each theme for each Line of Enquiry (where relevant):

- Monitoring Condition Grade and Confidence level (for further detail see Chapter 3)
- Modelling flow improvement grade (improvement in environmental objectives relative to pre-Basin Plan levels) (for further detail see Chapter 4 Modelled Flow Performance Assessment)
- Likelihood that flows support theme level environmental outcomes and associated confidence levels (for further detail see Chapter 2.5.2)
- Key Risks, Drivers and Other Considerations for theme level environmental outcomes (for further detail see Chapter 3)

2.5.2 Step 5.2. Generating Default Statements

Once the condition grades have been determined and the change to long-term modelled flow outcomes have been calculated, the monitoring and modelling outcomes were viewed together to form initial "default" statements. These were then reviewed and altered if needed. This section will provide how each default statement is generated:

2.5.2.1 Monitoring Condition Statement

The current condition statement uses the monitoring grade and confidence levels from an internal elicitation panel process (see Chapter 3) to generate the default statement which has the following format:

"*The [Theme] objectives are currently in [Monitoring Grade] Condition. The confidence in the condition is [Monitoring Confidence Rating]. However, [any exceptions that are at risk]*." Within this:

- The monitoring grade can be: very poor, poor, moderate, good, very good or flagged with Not Assessed. The "Not assessed" option was used when there are no ecological objectives for the theme within the SDL resource unit and there is very little or no relevant data.
- The monitoring confidence rating can be: low, medium, high or flagged with 'Data Paucity Issues' indicative of very low confidence.

Further information on the monitoring outcomes can be found in Chapter 3 *Observed Environmental Condition .*

2.5.2.2 Likelihood Statements

The likelihood statements use information from the flow modelling and condition monitoring to represent the likelihood that the flow regime will support the ecological objectives of the theme over the long term. These follow the format:

"*The flow regime is considered [Likelihood] to support the ecological [Theme] over the long term. The confidence in the likelihood is [Likelihood Confidence Rating]*"

The likelihood Confidence Rating can be: low, medium, high. The assessment adapts the Intergovernmental Panel on Climate Change (IPCC) likelihood terminology[22] — very unlikely, unlikely, about as likely as not, more likely than not, likely and very likely —to express the assessed probability that the flow regime will support the ecological objectives of the theme over the long term. These likelihoods are assigned by assessing uncertainty in outcomes using multiple lines and levels of evidence including observations or model results.

The below rubric (see Figure 6) shows how the default likelihood grades are generated. The number 'Identifier' is given by the intersect of the Observed Condition (monitoring) grade and the Flow Improvement (modelling) grade. It should be noted that where the modelling and monitoring are less congruent there is less confidence in the initial statements and refinement will rely more heavily on the Steps 6 & 7, as outlined in the following sub-sections.

The likelihood and confidence default statements (see Figure 7) consider both the current condition and the expected long-term improvement in flows together to inform the initial gradings. Where both condition and flow improvements have positive outcomes, the likelihood is better, where both condition and flow have negative outcomes, the likelihood is worse (and in these cases the default confidence is higher due to alignment between the two sources of information. However, where the condition and flow improvement are either contradictory, or sitting in the middle, the likelihood of flows supporting outcomes is less clear and is supported by a correspondingly lower confidence rating. These more complicated combinations tend to fall into one of three categories:

- Condition is good, but flows are declining. This tends to result in a default statement that flows are about as likely as not, or unlikely to support the outcomes over the long term, but that confidence in this statement is low
- Condition is poor, but flows are improving. This tends to result in a default statement that flows are likely to support outcomes over the long term, but that confidence in the statement is low (possibly condition is impacted by non-flow drivers or modelling is insufficient to represent reality of flow behaviour)

[22] Pachauri, RK and Reisinger, A (2007) *Climate change 2007: Synthesis report. Contribution of working groups I, II and III to the fourth assessment report of the Intergovernmental Panel on Climate Change*, IPCC.

- Condition is moderate, flows show slight decline. This results in a default statement that flows are about as likely as not to support outcomes over the long term. Confidence is low as neither evidence source is showing a strong trend in a positive or negative direction.

Note – All grades (including confidence levels) are reconsidered through the science synthesis moderation described in Chapter 2.6. This step is particularly relevant for the likelihood ratings that bring together multiple sources of information and inform more complex interpretations and correlations between flows and outcomes.

		Condition				
		Very Poor	Poor	Moderate	Good	Very Good
Flow Improvement	Significant Decline	9	9	6	5	5
	Major Decline	9	9	6	5	5
	Moderate Decline	9	8	5	4	4
	Minor Decline	8	8	4	3	3
	Maintained	8	8	3	2	2
	Minor Improvement	8	4	3	2	2
	Moderate Improvement	7	7	2	1	1
	Major Improvement	7	7	2	1	1
	Signficant Improvement	7	7	2	1	1

Figure 6. Monitoring/Modelling Rubric

		Confidence
1	Theme is currently in (enter condition) condition, Flows highly likely to support Theme over long term	High
2	Theme is currently in (enter condition) condition, Flows likely to support Theme over long term	High
3	Theme is currently in (enter condition) condition, Flows more likely than not to support Theme over long term	Moderate
4	Theme is currently in (enter condition) condition, Flows about as likely as not to support Theme over long term	Low
5	Theme is currently in (enter condition) condition, Flows unlikely to support Theme over long term	Low
6	Theme is currently in (enter condition) condition, Flows very unlikely to support Theme over long term	Low
7	Theme is currently in (enter condition) condition, Flows likely to support Theme over long term. Condition likely impacted by non-flow driver	Low
8	Theme is currently in (enter condition) condition, Flows unlikely to support Theme over long term. Condition also may be impacted by non-flow driver	Moderate
9	Theme is currently in (enter condition) condition, Flows very unlikely to support Theme over long term.	High

Figure 7. The likelihood and confidence default statements corresponding to Figure 6. Monitoring/Modelling Rubric

2.5.2.3 Line of Enquiry Condition Statement

The Line of Enquiry statements look across the Themes to assess the Effectiveness of the flow regime in supporting outcomes for that SDL resource unit.

For Line of Enquiry 1 there is a condition statement across all themes:

"[*Proportion] Desired Basin Plan Outcomes (DBPO) are in a moderate or better condition. However, there are risks to [enter risks/exceptions]*."

The Proportion is given by percentage of Themes in 'Moderate' or above to give Category (Proportion)

Table 3. Condition Proportion Categories

Category (Proportion)	**Proportion range %**
Very few or none	0 - 20
Some	20-40
About half	40-60
Many	60-80
All or most	80-100

2.5.2.4 Line of Enquiry Flow Regime "Effectiveness" Statement

Flow Regime Statement is given by:

"*The flow regime is [Effectiveness] in supporting DPBO over the long term*."

Where the Effectiveness is given by the percentage of Themes with a rating of 'more likely than not' or above that flows support outcomes.

Table 4. Effectiveness Proportion Categories

Category (Effectiveness)	**Proportion range %**
Not effective	<50%
Partially effective	50-70%
Largely effective	71-85%
Highly effective	>85%

All statements are reconsidered through the science synthesis moderation described in Chapter 2.6.

2.5.2.5 Line of Enquiry 'Other' Statements

Statements to capture overall confidence levels, key risks, drivers and other considerations are also included where relevant.

2.6 Step 6. Moderation

As a key step of the Environmental Outcomes Assessment Approach, the 'default' statements generated from the rubrics are reconsidered in light of all lines of evidence and reasonable judgement by following a hybrid approach of focus groups and Delphi method[23].

This is an iterative process, considering the following:

- The original monitoring and modelling grades as provided through the internal elicitation panel and the EWR modelling outputs respectively.
- The 'default' likelihood ratings provided from Figure 6. Monitoring/Modelling Rubric.
- The appropriateness of those grades in light of other lines of evidence, including system knowledge, additional model analysis/interpretation, internal expert review commentary and Basin state governments inputs.

Moderation is an essential step because there may be nuance in the system not being captured by the modelling and resulting default statements. This step allows the assessment to broaden its consideration of multiple lines of evidence, consistent with the general MDBA approach to science and knowledge. Reasons for moderation are outlined within Appendix B: Science Synthesis Moderation.

The Default Statements from Step 5 for the Themes, alongside the information packs for the monitoring and modelling grades, were shared with Basin state governments for review in the State Expert Elicitation phase. This process aims to collect feedback on the Default Statements, and any other information that may be useful to consider (such as risks, drivers and other considerations). This feedback has been considered alongside the full suite of multiple line of evidence (MLE) for the MDBA to consider in the Science Synthesis stage. This stage allowed review and moderation of the Statements in the context of this additional information.

The following approach was taken to elicit further feedback and reconsider findings in light of new information:

- **Delphi-style panel consensus**: Iteratively reviewing evidence and refining statements to reach agreement by following the Delphi method, emphasising structured expert input and convergence toward defensible conclusions[24,25].
- **Focus group consultation**: Internal groups of subject matter experts (SME) provide structured feedback through focus group–style discussions [25], to review the initial modelling and monitoring assessment outcomes and provide additional insights as to key risks, drivers and considerations that may not have already been captured. These draft findings were then shared with the Basin state governments for review and feedback.

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[23] Geampana, A and Perrotta, M (2025) 'Using interview excerpts to facilitate focus group discussion', *Qualitative Research*, 25(1):130-146.
[24] Egan, AF, Jones, SB, Luloff, AE, and Finley, JC (1995) 'The value of using multiple methods: An illustration using survey, focus group, and Delphi techniques'. *Society & Natural Resources*, *8*(5): 457-465.
[25] Tan K, Baxter G, Newell S, Smye S, Dear P, Brownlee K, Darling J (2010) 'Knowledge elicitation for validation of a neonatal ventilation expert system utilising modified Delphi and focus group techniques. *International Journal of Human-Computer Studies*, 68(6):344-54.

- **Interactive synthesis loop**: Feedback from these focus groups and Basin state government reviews were integrated into revised statements where needed to ensure a defensible and evidence-based final output.

The initial results and narratives were then adjusted as deemed appropriate based on the additional evidence and insights provided. The statements were then finalised for each of the Themes and for the effectiveness of flows in supporting outcomes at the SDL resource unit level.

Appendix B: Science Synthesis Moderation includes the original results of the elicitation panel and modelling alongside the final results and the tracking of reasoning for changes.

2.7 Step 7. Final Assessment and Generation of Science Synthesis Findings

In Step 7, the final evidence base and the weight of evidence supporting judgements is considered and a conclusion is developed for each of the three questions in Step 1. These conclusions, along with the monitoring, modelling and likelihood grades and any supporting narratives developed, constitute the science synthesis findings.

The lines of evidence and their associated information bases are considered in light of key information characteristics such as their plausibility, evidence of response, consistency of association and agreement among indicated outcomes This step considers a complex combination of outcomes from various information sources to give a nuanced narrative for consideration in making the final judgements.

This step captures the phase after the lines of evidence have been gathered. This includes:

- The Modelling assessment completed using EWRs from LTWPs (or other relevant instruments) and modelled scenarios including climate change from Sustainable Yields.
- The Condition Monitoring assessment through the Internal Elicitation Process.
- Any additional information collected through information gathering process.
- Any additional information or insights gathered through internal groups (SMEs) and external experts (from Basin state governments)

This information was assessed together to create a narrative-based rationale of the scientific evidence base. The key objectives of this step were to provide a summary (for each Line of Enquiry) of:

- The evidence base (i.e. modelling and monitoring outcomes)
- The key risks (e.g. themes or reaches within the SDL resource unit that may be at risk of compromise, either now or in the future)
- The key drivers (e.g. particular forces that may impact on the health and condition of the desired basin plan outcomes. Examples may include lack of water, constraints or pest species)
- Other considerations (e.g. are there other physical or policy impacts that should be considered, such as SDLAM works and measures)
- The narrative around what the outcomes are indicating for that SDLRU both now, under varying policy and varying climate conditions, as it relates to water recovery or other drivers.

These rationales were then considered to form the interpretations for each Line of Enquiry at the SDLRU level and to adjust any default statements to form the final science synthesis statements and narratives.

The final science synthesis statements around condition, likelihood flows support outcomes, risks and drivers, then inform the effectiveness ratings for the pattern and volume of flow.

2.7.1 SDL Assessment Results

These statements and narratives are then considered in light of both science and policy information. This process considers the risks to environmental outcomes not being met within the SDL resource unit, any identified drivers of impact and whether further work may be needed through the response framework to address identified risks. The step is not part of the Surface Water Technical Method. As such, for further information on this step see the SDL Assessment and Response Framework.

2.8 Uncertainty

Uncertainty is an inherent feature of assessing ecological and environmental systems, which are complex, interconnected, and constantly changing. Both monitoring and models are influenced by incomplete or uneven data, natural variability, while modelling also needs to simplify real-world processes across large spatial and temporal scales. This section aims to recognise and clearly communicate this uncertainty to provide essential context for interpretation and support more informed, adaptive environmental decision-making. Uncertainty is generally assigned to three broad categories as follows[26,27].

- Aleatoric Uncertainty: it refers to the notion of randomness, that is, the variability in the outcome of an experiment which is due to inherently random effects.
- Epistemic Uncertainty: it refers to uncertainty caused by a lack of knowledge, i.e., to the epistemic state of the agent.
- Ontological Uncertainty: it exists when similarities and differences between different people's ontologies are not certain.

Each step of the Approach (Chapters 2.1-2.8) entails a combination of the different kinds of uncertainty. For each source of uncertainty there is likely to be a different scale of impact on the final confidence levels (e.g. where uncertainty levels are large, this would likely alter the confidence levels to be lower for that attribute). In some cases, uncertainty may have a direct impact on confidence, in others it may have flow on effects where the uncertainty propagates through the process, and this may be in such a way that the impact of that uncertainty increases. Hence it will be important to identify and categorise not only the sources of uncertainty and their types, but also some level of categorisation and tracking through the process. Ideally a quantification of uncertainty would be used, but it is unlikely that quantification of all types of uncertainty would be possible, therefore a comparative categorisation of impact was considered be more appropriate given the timeframes, resourcing, and types of uncertainty

[26] Clermont, KM (2024) 'Kinds of Uncertainty', in *A General Theory of Evidence and Proof: Forming Beliefs in Truth*, 17-29, Cham: Springer International Publishing.

[27] Helmholtz UQ (2023) ' Types of Uncertainty' Types of Uncertainty — Uncertainty Quantification (helmholtz-uq.de) Helmholtz UQ website, accessed 14 January 2026.

involved. Table 5 below categorises the type of uncertainty and their corresponding components in this assessment.

Table 5. A summary of the types of uncertainty and their corresponding components considered in this assessment

Types of Uncertainty	**Corresponding Components**
Aleatoric Uncertainty	• Condition Monitoring • Climate Modelling
Epistemic Uncertainty	• Condition Monitoring • Climate Modelling • Hydrology Modelling • Ecological Modelling • Aggregation and Synthesis
Ontological Uncertainty	• Condition Monitoring • Aggregation and Synthesis

This section provides an overview of core uncertainty being introduced through this analysis chain:

- Climate modelling (Chapter 2.8.1)
- Hydrology modelling (Chapter 2.8.2)
- Ecological modelling, including EWRs (Chapter 2.8.3)
- Condition monitoring (Chapter 2.8.4)
- Aggregation and synthesis (Chapter 2.8.5)

It will also touch on assessment uncertainty and how uncertainty is addressed (Chapter 2.8.6).

2.8.1 Uncertainty in Climate Modelling

There are multiple uncertainties that propagate from the Climate Modelling. These are detailed in the Hydroclimate Projections for the Murray–Darling Basin report by CSIRO[28].

To summarise some key sources of uncertainty, the below are highlighted within the report:

- "Unlike temperature and PET, there is considerably more uncertainty in the rainfall projections. There is general consensus in the projected reduction in cool season (May-Oct) rainfall, whilst the direction of change in warm season (Nov-April) rainfall is uncertain."
- "There is a large range in the runoff projections, mainly because of the uncertainty in future rainfall projections. The 10th and 90th percentile projections for mean annual runoff range from -22% to +16% in the northern Basin, and from -29% to +1% in the southern Basin."
- "The differences in the modelled runoff response to changes in future rainfall from different rainfall-runoff models are generally much smaller than the uncertainty in the future rainfall projections."
- "There can be significant differences between modelled runoff response to changes in future PET depending on how the rainfall-runoff models simulate evapotranspiration."

- "Existing rainfall-runoff modelling, as used here, does not adequately account for hydrological non-stationarity, and when extrapolated to model a future drier climate will tend to underestimate the reduction in runoff" [28]

2.8.2 Uncertainty in Hydrology Modelling

River system models across the basin have been the subject of continuous development and improvement for over 40 years. However, all river system models have inherent uncertainties due to complex interactions between limited and imprecise input data sets, parameter equifinality, and simplified model conceptualisations, particularly of human behaviour and decisions in the management of water resources.

These uncertainties can be compounded when analysing the system under future climates, as future hydrological behaviour may not reflect past observations, and actual human behaviour is likely to be more adaptive to future hydroclimate conditions than model assumptions are able to represent.

Due to these uncertainties modelling results need to be interpreted by identifying trends about the general direction and magnitude of change across the plausible range of future climates rather than the absolute numbers the model produces.

2.8.3 Uncertainty in Ecohydrological Modelling

Environmental Water Requirements assist in water planning and evaluating hydrology and therefore broader environmental performance. However, there are several areas of uncertainty that challenge the accuracy and reliability of defining and analysing flow-ecology relationships.

This is an active area of research, and flow to ecology relationships continue to be refined throughout the Basin as new information becomes available.

A key area of uncertainty arises from attempting to model responses in highly complex ecological systems. Ecology interacts with hydrology, geology, atmospheric science, and social sciences, making comprehensive models difficult to construct. As water is just one driver of ecological outcomes, even if the relationship between flows and ecological response is modelled appropriately there may be other drivers influencing ecological outcomes. For example, all EWRs may be achieved for a wetland, but there may be feral pigs present. So even though the modelled outcomes are adequate based on the flow to ecology relationship, the actual outcomes may be poor due to this other influence of feral pigs.

Another area of uncertainty exists within the EWR to ecological objective links. EWRs can map to multiple objectives, and objectives can be mapped to multiple EWRs. In practice this results in thousands of different links at the Basin scale. In reality, there is likely a complex response between the EWR and objective, but it is unrealistic to completely account for each of these thousands of complex responses, so in the model framework developed by the MDBA, each of the responses is assumed to be the same. The significant number and overlapping nature of EWRs and objectives, as well as the scale of the assessment (SDL resource unit) act to mitigate this uncertainty in variable responses at a reach or unit scale.

[28] Chiew FHS, Devanand A, Khan Z, Zheng H, Potter NJ, Robertson DE, Grose MR, Post DA and Fu G (2025) *Hydroclimate Projections for the Murray–Darling Basin,* CSIRO report from Module 1 of the MDB Sustainable Yields Project: 131.

The Basin Plan outlines a method for identifying assets, functions and developing EWRs. However, across such large complex systems, it is difficult to avoid inconsistencies in aspects of development and outcomes for EWRs. Given such diversity of ecosystem types and information availability, some EWRs will inherently require differences in approach and specification. These differences are likely to create areas of uncertainty.

2.8.4 Uncertainty in Condition Monitoring

Uncertainty in condition monitoring is mostly driven by the different information and metrics used across monitoring programs, which differ in their timing, spatial coverage, methods and report frameworks. These differences mean that the same location can appear to be in markedly different condition depending on when and how it is assessed. Climate variability adds a further complication: ecosystems naturally cycle through wet and dry phases, and measurements taken during a dry period may suggest deterioration even when underlying ecological condition has improved. Likewise, measurements taken during a wet phase may temporarily inflate condition scores. This climate-driven variability sometimes makes it difficult to distinguish genuine ecological change from short-term effects of wet and dry flow phases.

A further layer of uncertainty is from the way ecological indicators are defined, measured and benchmarked. Even when assessments focus on the same environmental outcome, reporters (e.g. jurisdictions) often use different metrics, thresholds or grading systems. Reference points may be based on different assumptions and baseline (e.g. climate and land use), and the same indicator value may be classified differently depending on the scoring system applied. This variability complicates the synthesis of results across different SDL units, particularly where reports compare condition against different baselines or targets. Together, these methodological, spatial and conceptual differences shape how condition is interpreted and contribute to the uncertainty that must be acknowledged when drawing conclusions for condition monitoring.

2.8.5 Uncertainty Arising from Analysis Methods

The assessment is designed to detect broad-scale flow regime changes attributable to Basin Plan implementation or Climate Change on the scale of SDL resource units. As such, aggregation and information synthesis are necessary steps in the process. These introduce new uncertainties:

- Broad-scale inference limits: The assessment is designed for SDL unit-scale pattern detection, not prediction of indicator-specific and site-specific ecological condition. Ecological systems exhibit emergent behaviours, non-linear responses, and context-dependent interactions that cannot be fully captured at SDL-unit scale.
- Single EWRs are aggregated to ecological objectives at the planning unit scale, then into themes at the SDL unit scale. At each level, information is aggregated, and fine-scale ecological nuance may be lost. This can mask partial benefits, localised risks, or subthreshold ecological responses
- Binary assessment of EWRs: In the absence of ecological evidence on partial benefits and limiting conditions, we have adopted conservative approaches that avoids unjustified assumptions. This has meant adopting a primarily binary based assessment when it comes to “successful” EWR Frequency performance. This means that it is likely that some benefit, and disbenefit, is not being tracked. This is due to a lack of information to inform attribution of changes below the target frequencies.

- Integrating modelled EWR performance with monitoring results requires assumptions about how well each data stream align in representing environmental outcomes. Differences in spatial coverage, temporal resolution, and climate context add further uncertainty.
- The final assessment reflects structured synthesis by the science synthesis team as well as input from internal and external subject matter experts. While transparent and methodologically grounded, this process introduces ontological uncertainty because individuals may conceptualise ecological processes, risks, or priorities differently.

2.8.6 How Uncertainty is Being Accounted for

Qualitative analysis is increasingly used to address deep uncertainty. In fields such as nonlinear dynamics, it helps describe general system behaviour without solving complex equations. Scenario thinking is one of the qualitative approaches in dealing with deep uncertainty[14,29]. A scenario-based approach enables a new method to focus on multiple plausible futures rather than a 'best-guess' future[30,14].

Using a scenario thinking approach[30], the assessment developed a set of qualitative and quantitative trajectories for exogenous inputs (see Chapter 2.3). These scenarios guided the assessment of whether the Basin Plan's SDLs reflect an ESLT under current and full implementation of settings, and under the current and future climate scenarios. The assessment also examined whether SDLs are reasonable across near-natural, lightly-modified and highly regulated systems. As with all modelling, uncertainty is present. By linking global uncertainties to basin- and catchment-scale conditions and exploring changes over time, the adopted scenario thinking approach enables a forward-looking, multi-level and multi-angle perspective on addressing uncertainty.

In climate and water resource assessments, relative comparisons across scenarios offer a more robust basis for interpretation relative to a benchmark (in this case, the Pre-Basin Plan scenario) than reliance on absolute model outputs. All models contain structural and parametric biases, meaning that absolute values may systematically over- or underestimate key variables. Relative comparison sharpens understanding of the drivers of change by reducing the influence of specific assumptions and modelling setups, addressing the uncertainty in modelling and aggregations. This comparative logic aligns closely with scenario thinking, which emphasises learning from differences across plausible futures rather than treating any single projection as definitive[14].

Relative assessments also provide greater insight into the drivers of change. They allow analysts and decision-makers to isolate the influence of specific inputs or assumptions. For example, comparing outcomes under a dry climate scenario versus a very dry climate scenario highlights the additional effect of reduced inflows. This form of comparison supports a clearer understanding of system sensitivity and helps decision-makers focus on the implications of different futures rather than on model-dependent absolute values.

[29] Fortes, P, Alvarenga, A, Seixas, J, and Rodrigues, S (2015). 'Long-term energy scenarios: Bridging the gap between socio-economic storylines and energy modelling', 91:161-178.
[30] Wu, W, Eamen, L, Dandy, G, Maier, HR, Razavi, S, Kwakkel, J, Huang, J and Kuczera, G (2025) 'Beyond the traditional paradigm of water resources management: scenario thinking to address deep uncertainty', *Journal of Hydrology*, 661:133-547.

Uncertainty can also arise from incomplete or contested knowledge; the following approaches are used to manage and reduce these uncertainties through structured evidence integration, collaborative validation, and methodological testing.

Evidence integration:

Multiple lines of evidence are aggregated and configured by following the Environmental Outcome Assessment Approach. It is built on the premise that individual pieces of evidence alone may be weak, but when combined and considered along with multiple lines of evidence can build a strong argument for the final conclusion. Each evidence stream captures different aspects of the ecological system, reducing reliance on any single source. When independent lines of evidence converge on the same conclusion, the overall inference becomes more robust and less sensitive to epistemic limitations or data-specific weaknesses.

Moderation and Collaborative validation:

Deterministic assessment methods are sensitive to assumptions and parameter choices, while having a limited ability to represent uncertainty, variability and risk. For complex environmental assessments such as the SDL Assessment, a more flexible and comprehensive approach was required to allow for consideration of more system aspects, interactions, and uncertainties. While some aspects of the assessment are more deterministic than others (e.g. EWR flow modelling grades vs panel findings), the overall assessment utilised a combination of MLE, structured elicitation process, panel-based iterative assessment and broader stakeholder engagement.

Following on from the key lines of evidence being systematically assessed to produce the 'default statements', a moderation process was applied. The moderation process has allowed for qualitative consideration of uncertainties across the assessment and to lower confidence where there is increased uncertainty. This approach also reduces the impact of specific uncertainties such as those introduced by oversimplification which would likely occur using a more deterministic approach. The first step in the moderation was a re-consideration of the initial information base whilst also bringing in other supporting information for consideration. This initial moderation allowed changes to the default statements based on a more informed, evidence-rich and nuanced consideration of the system. Further moderation could then be applied upon further review and input from subject matter experts (both internal and external). Moderation undertaken are captured in Appendix A: Engagement B: Science Synthesis Moderation.

Internal and external subject matter experts were engaged through an interactive synthesis loop (i.e. steps 5, 6 &7 in Figure 2), where structured focus-group discussions enabled experts to examine the initial results with new or stronger evidence, identity nuance and clarify ambiguous or conflicting evidence. This collaborative process helps resolve uncertainty in aggregation and synthesis by reviewing interpretations, challenging preliminary results, and strengthening the defensibility of the final statements. Years of collaboration with Basin state governments have ensured that EWR definitions, hydrological assumptions, and monitoring syntheses reflect the most up-to-date knowledge and jurisdictional expertise. This long-term partnership reduces the likelihood that modelling artefacts, data inconsistencies, or interpretive gaps propagate into the final assessment, and it strengthens the defensibility of the ecological conclusions drawn from the work. Engagement has also extended into the interpretive and analytical stages of the assessment. Internal and external subject-matter experts have

contributed to iterative reviews of modelling outputs, monitoring results, and the logic used to combine them. These interactions have supported early testing of methods, refinement of templates and metrics, and clarification of assumptions, allowing the assessment to incorporate emerging insights and reduce both epistemic and interpretive uncertainty. The record is provided in Appendix A: Engagement.

Sensitivity Testing:

Sensitivity testing was undertaken throughout method development to inform and refine the final approach. Consistent with early pilot testing, this work was conducted internally to support iterative development and relied on interim data and tools that have since been updated. Additional sensitivity testing is ongoing or has been identified as a priority for future work.

2.8.7 Assumptions

Given the complexity of environmental systems and limitations in observational and modelled data, assumptions are inherent to all environmental monitoring and modelling methods. In addition to assumptions about system behaviour and data representativeness, methods often require assumptions regarding definitions and classification, as many ecological concepts, indicators, and requirements lack universally agreed or operationally precise definitions. These assumptions enable the consistent synthesis and interpretation of diverse datasets and support transparent, repeatable assessments across regions and timeframes, while explicitly acknowledging uncertainty in both system processes and terminology.

Assumptions underpinning the application of the SDL Assessment methods:

- As defined in LTWPs, PEAs and PEFs are a reasonable approximation of KEAs and KEFs.
- EWRs are used as the best available science and reasonable approximations for the water needs of the PEAs and PEFs of the SDL resource units.
- EWR targets (e.g. Frequency Targets and Maximum Recommended Interevent Periods) are reasonable approximations for the long-term performance of EWRs required to support sustainable systems.
- Condition grades correlating to “Moderate” or above are more likely than not to support sustainable ecosystems over the long-term if supported by appropriate flow performance (i.e. flows are maintained or improved relative to pre-basin plan levels). Higher likelihoods are supported by better condition grades and/or larger long-term flow improvements.
- Condition grades correlating to “Poor” or lower are less likely to support sustainable ecosystems unless sufficient improvements are predicted to flows over the long term. These assumptions are tested through the Science Synthesis process.
- “No Compromise” is a test within the Water Act as it relates to the ESLT. This is not defined and so an approximation of compromise occurring as it related to the ESLT through the surface water technical methods, is triggered by condition scores that are ‘Poor’ or worse (with insufficient long-term flow improvements predicted) or better condition outcomes paired with long-term declines in flows supporting outcomes. In addition to these default starting assessments, multiple lines of evidence may be used to pick up compromise that may be impacted by non-flow factors and not preventable by flow improvements alone.

- All environmental outcomes are treated with equal weighting over the long term because the available scientific evidence is insufficient to support weighting.

3 Observed Environmental Condition Assessment

The current observed environmental condition provides important information to inform *Line of Enquiry 1*. It complements the assessment of EWRs, which determines if there has been sufficient provision of flows to support the environmental outcomes in the long term. Comparison of the observed condition versus the modelled flows provides a more nuanced understanding of ecological outcomes under different scenarios and helps identify where further investigation is needed. If observed environmental condition aligns with the modelled, it can be inferred that flow settings are adequate for the scenario. If there is a difference, the influence of non-flow drivers should be considered. It is also possible that the EWRs or the way they were assessed is not appropriate for representing flow condition for the scenario.

Overall, observed environmental condition informs all scenario assessments and comparisons a starting point for assessment (see Chapter 3). The following sections describe how the observed environmental condition were obtained.

3.1 Elicitation Process: Subjective but Scientific

Conservation and natural resource management often require decision making under uncertainty, where data may be incomplete and consequences are potentially severe. In such cases, elicitation is widely used to quantify uncertainty across various fields of conservation and natural resource management [31].

Although expert judgements are inherently subjective, it should be made as carefully, as objectively, and as scientifically as possible[32]. In this context, elicitation involves capturing expert knowledge as probability distributions for uncertain quantities[33]. To minimise bias, the elicitation process needs to be formally structured to ensure consistency and transparency[32].

A structured elicitation process was used to collectively assess condition grades and confidence levels as they relate to the key themes by gathering perspectives from individuals who have practical knowledge of the system being assessed (refer Figure 8). These participants were not formal subject matter experts, but they possessed relevant experience and an informed understanding of the Basin that enabled them to build on available data and monitoring reports to provide a condition rating and confidence score for each theme in each SDL resource unit at the time of the review.

This approach allowed the assessment to draw on tacit knowledge (information that is known through experience but not formally recorded) while maintaining a structured and transparent method for capturing and integrating these insights.

[31] Hemming, V, Burgman, MA, Hanea, AM, McBride, MF, and Wintle, BC (2018) 'A practical guide to structured expert elicitation using the 31 protocol', Methods in Ecology and Evolution, 9(1): 169-180, doi.org/https://doi.org/10.1111/2041-210X.12857.
[32] O'Hagan, A (2019) 'Expert Knowledge Elicitation: Subjective but Scientific', *The American Statistician*, 73(sup 1): 69 - 81.
[33] Hozo, SP, Djulbegovic, B, and Hozo, I (2005) 'Estimating the mean and variance from the median, range, and the size of a sample', *BMC Med Res Methodol*, 5(13), doi.org/10.1186/1471-2288-5-13.

3.2 Elicitation Process for Observed Environmental Conditions

The Elicitation process focused on *Line of Enquiry 1* – which represents settings at the commencement of the Basin Plan review (June 2024).

The primary information sources were:

i. Matter reports – reports prepared in accordance with Basin Plan Schedule 12 reporting requirements.
ii. Flow-Monitoring, Evaluation and Research (Flow MER) – is the Commonwealth Environmental Water Holder's science program, working in partnership with scientists, water managers and communities across the Murray–Darling Basin.
iii. Sustainable Rivers Audit (SRA) 2025[7] – a comprehensive assessment of ecological health of the rivers in the Murray–Darling Basin, based on observed data from the last 5 years to assess current condition and from the last 30 years to assess trends.

All source reports, supplemented by the South Australia 2023 Report Cards, Marne Saunders Report Card 2024 and findings from the Eastern Australian Aerial Waterbird Survey (incorporating the MDB Waterbird Survey) and MDB Fish Survey were compiled in a shared folder and provided to the panel.

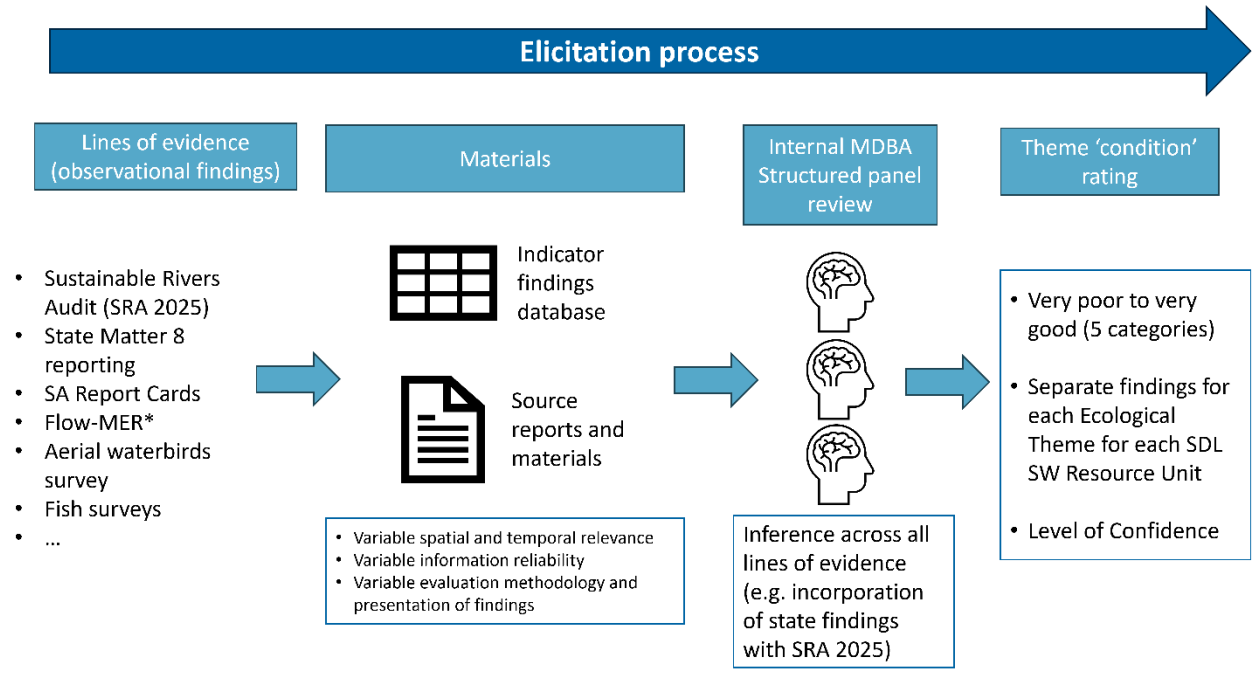

Figure 8. Schematic of the elicitation process for Line of Enquiry 1

3.3 Incorporating the Different Approaches to Reporting

The SRA report and Matter 8 reports from each Basin state and territory were two key lines of evidence. For Matter reporting, each Basin state government adopts a different approach to reporting the observational outcomes (Figure 9). For example, ACT reports both condition and trend where available, Victoria reports on trend only and Queensland reports using a risk framework.

Figure 9. Summary of reporting approaches taken by MDBA and juristictions. Tick mark indicates what themes were generally monitored and approach. The star indicates that SRA only provided information on some valleys for waterbirds.

STATE	THEMES					INDICATORS			
	Flow	Veg	Fish	Birds	Other	Trend	Condition	Outcome	Risk
ACT	✓	✓	✓		✓	✓	✓		
NSW	✓	✓	✓	✓				✓	
QLD			✓		✓				✓
SA	✓	✓	✓	✓	✓	✓		✓	
VIC		✓	✓	✓	✓	✓			
MDBA-SRA	✓	✓	✓	★		✓	✓		

For the SRA, there is not a perfect match between its valley-scale reporting and the SDL resource units. The panel was required to take this into account when determining ratings. For some SDL resource units, like the Loddon, the spatial extents of the SRA valley and the SDL resource unit align.

For other SDL resource units, like Intersecting Streams, the translation is more challenging. The Intersecting Streams SDL resource unit overlaps 5 different SRA valleys[7]. The extent to which each valley overlaps ranges from around 5-50% by area and each of these valleys is shared between one or more additional SDL resource units. To assist the panel in considering these types of mixed influences the package provided to them included information on the spatial relevance of each SRA unit to the SDL resource unit.

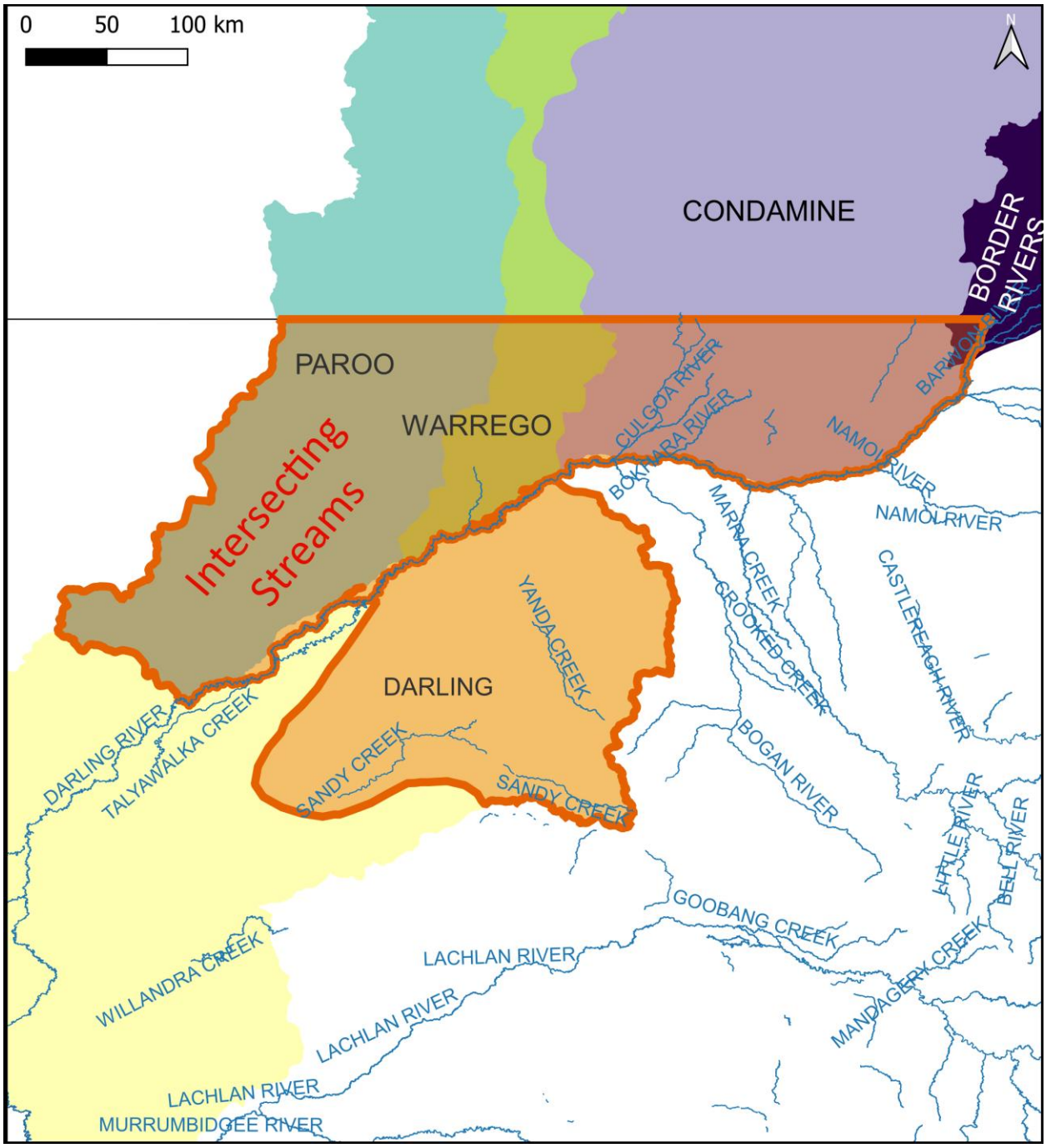

Figure 10. Intersecting streams SDL (in orange) and the SRA valleys that it intersects with including the Darling, Paroo, Warrego, Condamine and Border Rivers.

The information folder also contained tables mapping each finding or indicator reported in the evidence (SRA, Matter 8 reports, SA report cards etc.), to its respective ecological theme (i.e. flows and connectivity, ecosystem functions, native fish, native vegetation, waterbirds and other species). The tables also summarised the condition, trend, information reliability, geographical location and other details about the condition of the theme or timespan of data availability.

3.4 Elicitation Methods

The Panel comprised 7 individuals with multi-disciplinary expertise. The literature recommendation is to recruit 6-12 members for an elicitation panel and, according to empirical evidence, only minor improvements in the group's performance are gained by having more than 6–12 participants[34,35,36].

Data for some themes was sometimes incomplete in the primary evidence sources. In such cases, panel members were asked, if possible, to use their knowledge of the system and theme to still score the theme and adjust their confidence accordingly.

3.4.1 IDEA Protocol

The elicitation process used a structured elicitation process aligned with the IDEA ('Investigate', 'Discuss', 'Estimate', 'Aggregate') protocol (Figure 11) which has been tested in public health, ecology, and conservation for more than 15 years[31].

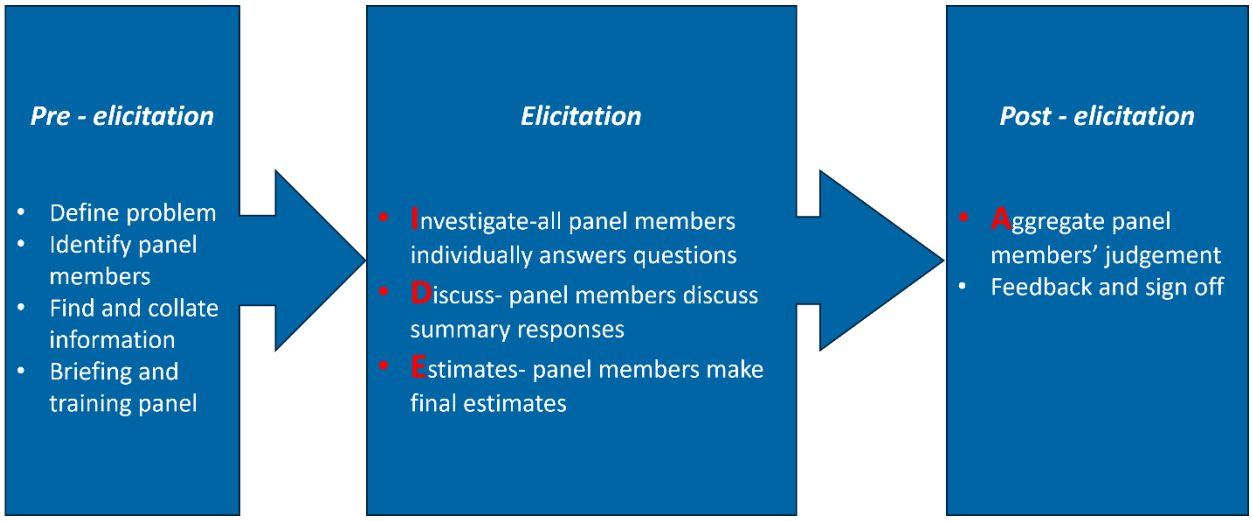

Figure 11. Schematic of Pre-elicitation through to Post-elicitation, adapted from Hanea et al (2016)[37]

3.4.1.1 Condition Estimation Process

To reduce overconfidence in the judgements of panel members, a four-step procedure was used [38]:

1 A briefing session explaining the process
2 Round 1: Initial estimates
3 Anonymised feedback and discussion of Round 1 results
4 Round 2: Revised estimates

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[34] Armstrong, JS (2001) 'Combining forecasts. In: J. S. Armstrong, Principles of forecasting', International series in operations research & management science, 30: 417–439. Boston: MA: Springer.
[35] Hogarth, RM (1978) 'A note on aggregating opinions, Organizational Behavior and Human Performance', 21: 40–46.
[36] Hora, SC (2004) 'Probability judgments for continuous quantities: Linear combinations and calibration', Management Science, 50: 597–604.
[37] Hanea A, McBride M, Burgman M, Wintle B, Fidler F, Flander L, Mascaro, S (2016) 'Investigate Discuss Estimate Aggregate for structured expert judgement', *International Journal of Forecasting*, 33, 267–269.
[38] Speirs-Bridge, A, Fidler, F, McBride, M, Flander, L, Cumming, G, and Burgman, M (2010) 'Reducing overconfidence in the interval judgments of experts', Risk Anal, 30(3): 512-523, doi:10.1111/j.1539-6924.2009.01337.x.

The panel members were introduced to the mechanism of the elicitation process in an initial workshop and could ask any clarifying questions regarding the assessments. All but one panel members were in attendance, the briefing was recorded and the last panel member was asked to view the briefing at a later date. The 'Estimation' element involved answering 6 questions as detailed in Table 6. An Excel spreadsheet containing relevant data from the Basin state governments Matter 8 reports, the Sustainable Rivers Audit (SRA) 2025 report[7], report cards, aerial surveys, fish surveys and other documents was provided to the panel. All source reports, including Matter 8 reports, SRA 2025, Flow-MER (monitoring, evaluation and research) reports, and South Australia 2023 Report Cards, were compiled in a shared folder and provided to the panel. Additional information that could be included in the assessment were the UNSW waterbird report of 20 Water Resource Planning Areas[39], which is not fully included in the SRA reports, and the Native Fish status assessment 2023[40]. These reports were added to the Source Reports folder, for the panel members to consider whilst completing their assessment.

Flow-MER reports draw on monitoring data to assess how fish, birds, vegetation and river connectivity respond to Commonwealth environmental water (CEW). These reports provide evidence to support estimation of the role of water (Question 5 in Table 6) and inform assessment of likely 'future' conditions (Question 6 in Table 6).

For each line of evidence (SRA, Matter 8 reports, SA report cards), each finding or indicator reported was mapped or assigned to its respective ecological theme (i.e. flows and connectivity, ecosystem functions, native fish, native vegetation, waterbirds and other species) and condition, trend, information reliability, geographical location, reporter, timescale of assessment, key finding or risk and any other details that were available about the condition of the theme or timespan of data availability was recorded and provided to the panel members.

For the assessment, panel members were required to answer six questions (Table 6) for each theme and across the 29 SDL resource units and one additional area of interest, the Coorong and the Lower Lakes and Murray Mouth (CLLMM)*. Panel members determined lower bound; upper bound and preferred estimates in five categories of condition (very poor, poor, moderate, good and very good) and their confidence level of the interval (lower bound to upper bound).

**Note, following discussion with SA the Coorong and the Lower Lakes and Murray Mouth was removed from SS10 SA Non-prescribed and instead assessed separately alongside the CLLMM, which were originally part of SA River Murray SS11. This was technically consistent with the EWR modelling was undertaken. SS11 therefore includes two assessments: one for the river channel and floodplain, and another for CLLMM.*

The 'Estimation' element included six questions as detailed below (Table 6).

[39] Bino G, Lanceman, D and Kingsford RT (2023) *Murray Darling Basin Condition Assessment,* Centre for Ecosystem Science, University of New South Wales, report to Murray–Darling Basin Authority.
[40] Lintermans M, Koehn J, Robinson W, Cottingham P, Butcher R and Brooks S (2025) 'Native fish status assessment 2023' Murray–Darling Basin Authority Canberra. CC BY 4.0

Table 6. Six estimation questions used to gather panel member views (Adapted from Hemming et al. (2017). 'Best guess' refers to the panel member's preferred estimate across the five condition categories, based on a realistic judgement that considers temporal, spatial, climatic and data variability

Q 1	Considering the temporal, spatial, climatic and data variability - realistically, what do you think the **lowest plausible** 'condition' value for [Theme i] within this SDL is?____
Q 2	Considering the temporal, spatial, climatic and data variability - realistically, what do you think the **highest plausible** 'condition' value for [Theme i] within this SDL is?____
Q 3	Considering the temporal, spatial, climatic and data variability - realistically, what is your **best guess** for the true value of the current condition of [Theme i] within this SDL ?____
Q 4	How **confident** are you that your interval, from lowest to highest, could capture the true value of the current condition of [Theme i] within this SDL? **Answer between 50%-100%**____
Q 5	Do you consider pattern and volume of flow to be the most influential driver for the condition rating you assigned to this [theme] in this SDL resource unit? **Yes/No**
Q 6	If pattern and volume of flow were to be improved, would you expect the condition rating of this [theme] in this SDL to also improve or display a different trend? **Yes/No** If **No**, are there other drivers preventing the condition rating or trend to improve? [**identify main driver(s)]** If **Yes**, are there other drivers preventing the condition from improving further? [**identify main driver(s**)]

The five categories of condition—Very Poor, Poor, Moderate/Fair, Good, and Very Good—are consistent with the SRA 2025 report. However, Basin state governments apply different reporting approaches to their observational outcomes in the Matter 8 reports. Under the structured IDEA protocol, experts define their own metrics, criteria and cut-offs for assigning each category, ensuring that the meaning of each condition class is applied systematically and transparently. Because this was a qualitative elicitation, it was not possible to establish a single, overarching definition for each condition category. This inevitably led to variation in how the five condition classes were interpreted and applied. Step 3 of the procedure (anonymised feedback and discussion of Round 1 results) aided in moderating this. In addition, results were statistically summarised (see Chapter 3.5) allowing similarities and differences to be examined both visually and statistically.

Median was used to represent the panel's preferred estimates for each theme/SDL resource unit. This is because median is a less sensitive measure of central tendency than mean, particularly for smaller sample sizes or when data are skewed. In addition, median represents an actual category on the condition scale, whereas mean may fall between two condition categories thus not representing any real category. The average group confidence was shown alongside the median for each ecological theme across all SDL resource units.

3.4.1.2 Rating 'confidence' in estimations

Panel members were asked to rate how confident their estimated interval captured the true condition of the given theme (between 50-100% where 50% indicated confidence no better than guessing the toss

of a coin)[37]. Guidance on defining confidence was from the Intergovernmental Panel on Climate Change (IPCC) guidelines of consistent treatment of uncertainties[41] (Figure 12).

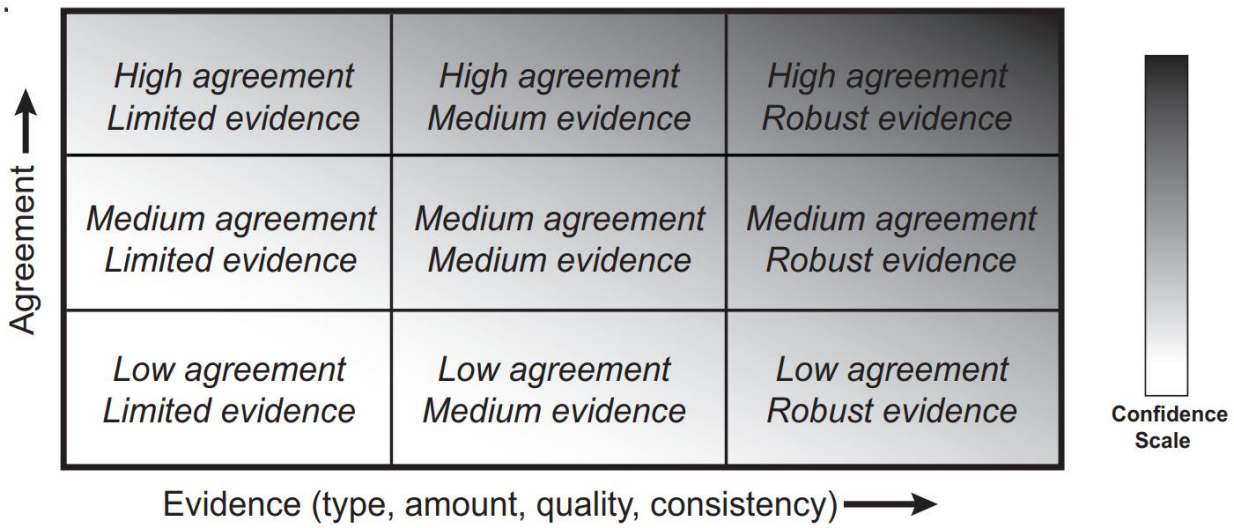

Figure 12. Guidance on defining confidence that a panel member's provided interval captures the true value (Mastrandrea et al., 2010)

The confidence score was averaged at theme level for each SDL resource unit and categorised into 3 categories: Low confidence = 50% - 69%, Medium confidence = >69% - 79% and High confidence = >79% - 100%.

3.5 Results Analysis

The median of the panel member's preferred estimate (Question 3) was used for the condition rating in the SDL Assessment reports for Line of Enquiry 1. Confidence in the condition rating was the categorised mean of the panel member's confidence score (Question 4, reported as *low, medium* or *high* confidence).

3.5.1 Thematic Narrative Analysis of Non-numerical Data

Question 5 and 6 (Table 6) elicit what drivers the panel members believe are likely to be influencing the results. These were open-ended questions with written responses explaining the reasoning behind their estimates. To analyse the returned textual data in a transparent and systematic way, we followed a 'textual narrative synthesis[42, 43], approach to examine the similarities and differences of the results and synthesise them into themes. For each SDL resource unit, a word cloud was generated to visualise panel members' views on key drivers and risks in that SDL resource unit.

[41] Mastrandrea MD, Field CB, Stocker TF, Edenhofer O, Ebi KL, Frame DJ, Held H, Kriegler E, Mach KJ, Matschoss PR, Plattner GK, Yohe GW, and Zwiers FW (2010) Guidance Note for Lead Authors of the IPCC Fifth Assessment Report, accessed 8 January 2026.
[42] Barnett-Page E, and Thomas J (2009) 'Methods for the synthesis of qualitative research: a critical review', BMC Medical Research Methodology, 9(1): 59, doi:10.1186/1471-2288-9-59.
[43] Elliott-Mainwaring, H (2021) 'Exploring using NVivo software to facilitate inductive coding for thematic narrative synthesis', *British Journal of Midwifery,* 29(11): 628-632.

The full analysis methods and results are available from the MDBA on request, with Figure 13 below providing an overview map of the full analysis process.

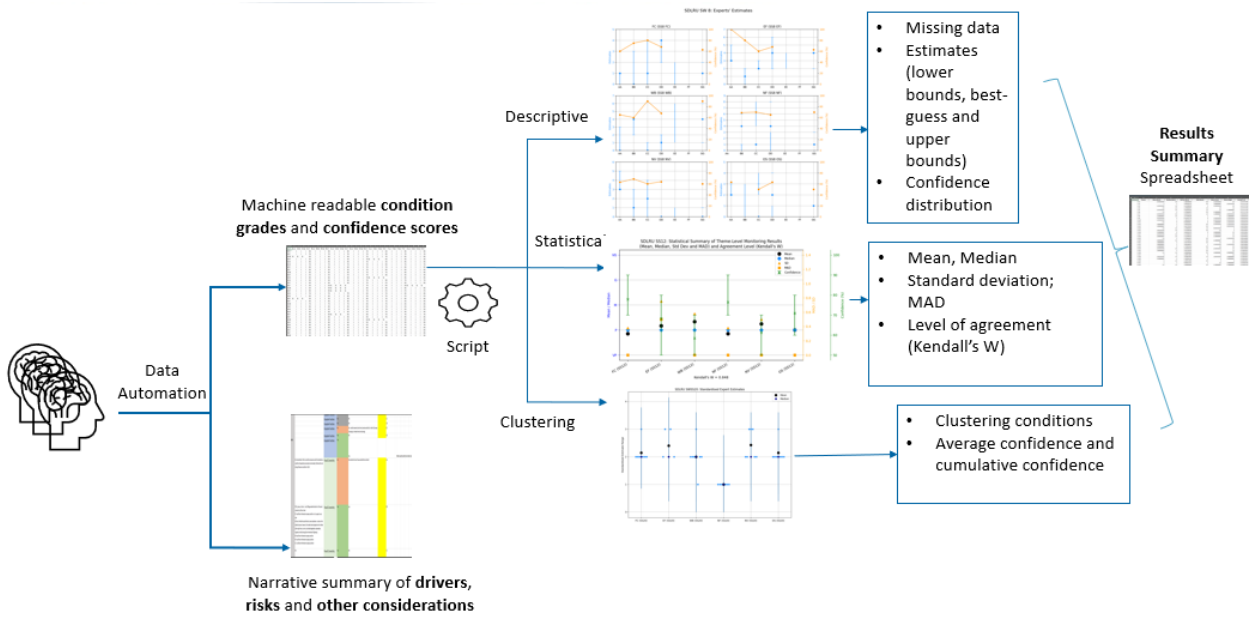

Figure 13. Overview of the analysis process for the internal elicitation process.

3.6 Basin State Governments Involvement in Elicitation Process and Outputs

Basin state governments provided essential technical input to the environmental condition elicitation process. This input included early review of the elicitation method, opportunity to provide additional evidence for consideration into elicitation process, and review and contribution to elicitation outputs. Input from state representatives was sought before the first briefing session with the elicitation panel, allowing Basin state governments to identify relevant information for panel consideration during elicitation. Involving Basin state governments enhanced methodological transparency, incorporated current on-ground knowledge, and supported a shared understanding of how ecosystems are responding to implementation of the Basin Plan at the Basin scale.

Engagement with Basin state governments was undertaken to:

- ensure the elicitation method was appropriate, feasible, and aligned with jurisdictional knowledge
- provide opportunities for Basin state governments to review the outputs of the elicitation process
- support transparency and traceability in how panel members knowledge informed the assessment.

For further details on engagement (refer Appendix A: Engagement) evidence synthesis (refer Step 5. Evidence Synthesis) and moderation (refer to Step 6. Moderation .

3.7 Data Paucity Investigation

In some cases, very little or no data were available to inform the ratings. In these cases, panel members sometimes drew on system knowledge and professional judgement to provide a judgement (with lower confidence accordingly). Some panel members did not assign condition scores where they considered data were not sufficient to inform a rating. This resulted in not all panel members scoring all themes/SDL resource units.

During the Science Synthesis process (see Chapter 2.5) condition scores and confidence levels were shared with Basin state governments for review and discussion. Through elicitation and review by Basin state governments, it became clear that some theme and SDL resource unit combinations could not be reliably rated due to very limited understanding or absent data. In some cases, Basin state governments advised that the theme was not an ecological objective for the SDL resource unit and therefore was not monitored.

During the elicitation process, some panel members withheld ratings in the absence of data, while others provided scores based on system understanding. This inconsistency highlighted the need for a clear and standardised approach to identifying data paucity and responding to it in the SDL Assessment. It was determined that this observation in combination with Basin state governments feedback justified a revision of the monitoring scores and confidence levels. The output from the data paucity investigation has been reported as a separate process and incorporated into the final SDL assessment. The identification of data-limited situations has relied on MLE, including panel judgement. The approach seeks to ensure consistent treatment of data gaps, transparent confidence reporting and balances use of panel members judgement with respect for state advice and maintains clarity for downstream users and reporting tools.

3.7.1 Identifying Data Paucity

Data paucity was identified using two key lines of evidence:

- Internal elicitation- Themes within SDL resource units where most panel members did not provide ratings due to lack of understanding or data was identified. Supporting statements from panel members regarding data limitations was also considered.

- Basin state governments feedback- Themes within SDL resource units where Basin state governments explicitly advised that no appropriate monitoring data exist was identified. In some cases, other programs may include monitoring data which is not in the Basin state governments program (such as SRA, aerial bird survey, native fish status assessment).

3.7.2 Responding to Data Paucity

Once data paucity was identified, it was decided to respond to the data paucity by either not assessing the theme, “Not assessed”, or retain the condition rating and revise the confidence rating down to “Very low confidence due to data paucity”. The “Not assessed” option was used when there are no ecological objectives for the theme within the SDL resource unit and there is very little or no relevant data. “Very low confidence due to data paucity” option was used where ecological objectives exist for the theme but there is very little or no relevant data. This effectively introduced a fourth confidence

category, “Data deficient” due to very low confidence due to data paucity. Links to the final results from the Data paucity investigation can be found in Chapter 5. The Science Synthesis process and the further moderation of monitoring results and modelling EWR results that took place with Basin state governments are further detailed in Chapter 2.6.

3.8 Comparison of Key Evidence and Elicitation Results

A comparison was undertaken of the MDBA Elicitation Panel results with the 2025 Sustainable Rivers Audits (SRA) and Matter 8 monitoring reports. The comparison was undertaken visually by plotting the theme and sub-theme condition scores from each report for SDL resource units where there was good spatial overlap for the analysis in the three reports (11 of 29 SDL units).

For example, for native fish the elicitation results fell in between or alongside the results from the SRA and Matter 8 reports for all SDL resource units (Figure 14).

An example is shown that considers all themes in one SDL resource unit, the SS22 Gwydir (Figure 15). Again, elicitation results fall between or alongside the results SRA and Matter 8 report. This was true for all other SDL resource units where both SRA and Matter report results were available. These observations provide a visual confirmation that elicitation results were effective in combining MLE.

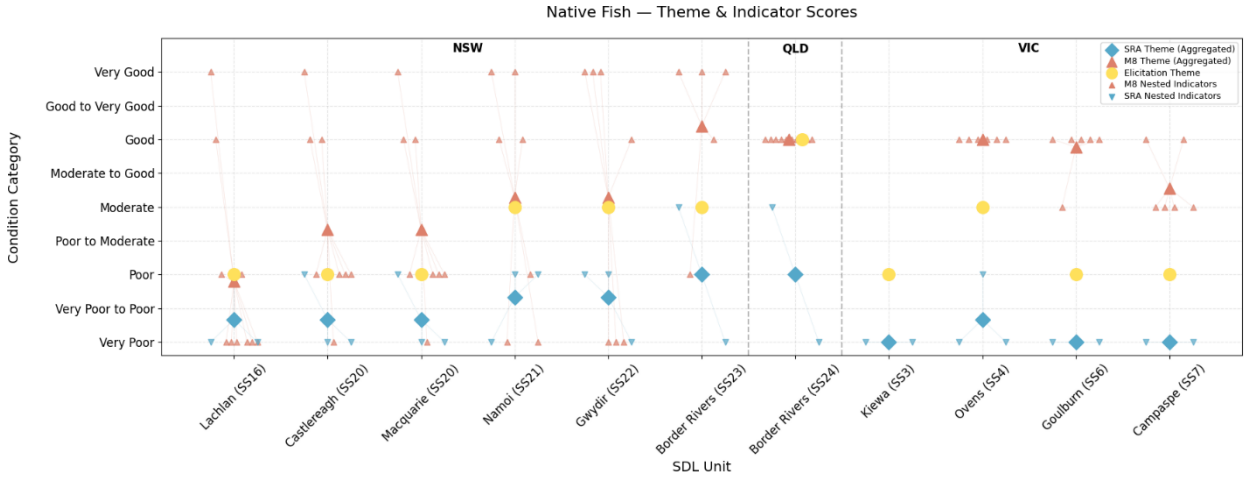

Figure 14. Native fish condition scores by theme and by nested theme indicators across SDL resource units.
The y axis shows condition categories from Very Poor to Very Good. Blue diamonds show SRA scores. Orange triangles show Matter 8 (M8) scores. Yellow circles show elicitation scores. Large symbols represent aggregated theme level scores, while small symbols represent nested indicators scores. SDL units are grouped by jurisdiction, with NSW, Qld, and VIC separated by dashed vertical lines.

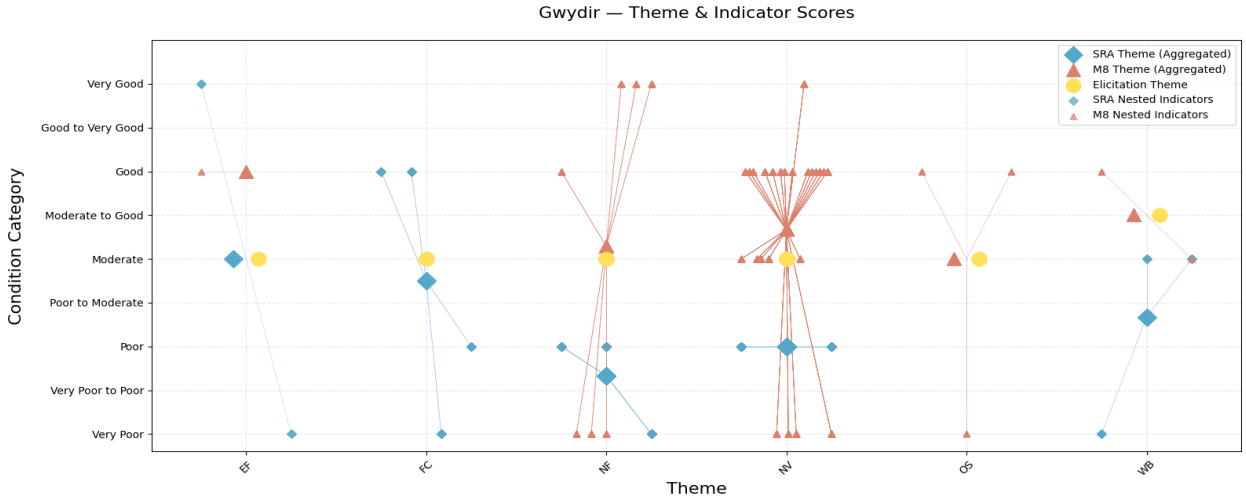

Figure 15. Theme and nested indicator condition scores for the Gwydir SDL unit across the 6 environmental themes (EF= ecosystem function, FC=flows and connectivity, NF=native fish, NV=native vegetation, OS=other Species, WB=waterbirds). The y axis shows condition categories from Very Poor to Very Good. Blue diamonds represent SRA condition scores. Orange triangles represent Matter 8 (M8) condition scores. Yellow circles represent elicitation condition scores. Large symbols show aggregated theme condition scores, while small symbols represents theme level nested indicator scores.

4 Modelled Flow Performance Assessment

4.1 Introduction

The modelled flow performance assessment forms a key line of evidence for consideration through the science synthesis steps of the process. The flow assessment is relevant to all lines of enquiry and uses modelled flow data to assess the performance of EWRs across ten individual model scenarios. This part of the assessment allows testing of what the general changes in flows to support outcomes may be over the long-term between scenarios. EWRs have been used as the best science available to represent the flow needs of the KEAs and KEFs of the system. Key metrics associated with these EWRs are assessed throughout the modelled periods and changes between scenarios inform the science synthesis part of the process.

The following sections all relate to the EWR assessment used to inform an overall modelled flow performance assessment.

4.2 Principles for EWR Assessment

Key Principles for EWR performance assessment include:

- Use the best available science
- Be as consistent as possible across the Basin
- Be representative of the performance of hydrology metrics as a proxy for environmental outcomes
- Be nuanced - whereby State preferences and differences in EWR development can be considered and the method adjusted to allow for environmental outcomes to be most appropriately represented.
- Be transparent - as shared through various State engagement processes and online (sharing tools and data e.g. GitHub)

4.3 The EWR Tools and EWR Analysis Pipeline

As part of developing results for the ESLT project a suite of supporting tools have been developed. This section outlines those tools and how they have been used to inform the ESLT Review.

Analysing the achievement of ecological objectives is a key step in the SDL Assessment process. In preparing for the review of the ESLT, it was decided that EWRs from LTWPs in NSW[44], Qld [45,46], SA (MDBA was provided an advanced copy of a revised, unpublished version of the LTWP by SA) and

[44] DPIE (Department of Planning, Industry and Environment) (2026) Search long-term water plans | Water | Environment and Heritage DPIE website, accessed 13 January 2026.
[45] DNME (Department of Natural Resources, Mines and Energy) (2019a) Long-term watering plan for the Water Plan (Border Rivers and Moonie), accessed 13 January 2026.
[46] DNME (Department of Natural Resources, Mines and Energy) (2019b) Long-term watering plan for the Water Plan (Condamine and Balonne), accessed 13 January 2026.

Environmental Water Management Plans (EWMPs) and Flow Studies in Victoria[47,48,49,50,51,52,53,54,55,56,57,58,59,60,61,62,63,64,65,66,67,68] (MDBA was also provided unpublished versions of EWMPs/Flow Studies in a number of regions by VIC) would be used to track flow performance and as an indicator of environmental performance to complement monitoring data.

This suite of EWRs developed by Basin state governments represents the second generation of Basin Plan environmental flow indicators, with the first generation being the Site-Specific Flow Indicators (SFIs) used for the Basin Plan development. The EWRs span a range of flow and water-level based indicators that address the needs of the environment, including waterbirds, native fish, native vegetation, other species and ecosystem functions. The EWRs describe the flow/level/volume thresholds, duration, timing, frequency range and maximum recommended inter-event period that are likely to achieve pre-defined environmental objectives. The MDBA has worked with Basin state

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[47] RM Consulting Group (2024) *Environmental Water Management Plan - Wimmera River, Yarriambiack Creek and their terminal lakes.* Report for Wimmera Catchment Management Authority.
[48] RM Consulting Group (2025) *Environmental Water Management Plan - MacKenzie River and Burnt and Bungalally Creeks.* Report for Wimmera Catchment Management Authority.
[49] North Central CMA (Catchment Management Authority) (2015a) *Birch's (Bullarook) Creek Environmental Water Management Plan,* North Central Catchment Management Authority, Huntly, Victoria.
[50] North Central CMA (Catchment Management Authority) (2014) *Campaspe River Environmental Water Management Plan*, North Central Catchment Management Authority, Huntly, Victoria.
[51]North Central CMA (Catchment Management Authority (2015b) *Coliban River Environmental Water Management Plan,* North Central Catchment Management Authority, Huntly, Victoria.
[52] North Central CMA (Catchment Management Authority) (2015c) *Loddon River System Environmental Water Management Plan*, North Central Catchment Management Authority, Huntly, Victoria.
[53] Horne, A, Webb, A, Rumpff, L, Mussehl, M, Fowler, K, John, A (2020*) Kaiela (Lower Goulburn River) Environmental Flows Study*, The University of Melbourne.
[54] Cottingham P, Bond N, Boon P, Nielsen D, Vietz G and Neal B (2013) *Broken River environmental watering plan,* Report prepared for the Goulburn-Murray Water Connections Project and Goulburn Broken Catchment Management Authority by Peter Cottingham & Associates.
[55] Goulburn Broken CMA (Catchment Management Authority (2023a) *Goulburn River Seasonal Watering Proposal 2023/2024*, Goulburn Broken Catchment Management Authority, Shepparton.
[56] MDBA (Murray–Darling Basin Authority) (2012) *Gunbower Forest: Environmental Water Management Plan 2011.*
[57] Goulburn Broken CMA (2023b) *Barmah-Millewa Forest Environmental Water Management Plan,* Goulburn Broken CMA, Shepparton, Victoria.
[58] Mallee CMA (Catchment Management Authority) (2021a) *Lindsay-Mulcra-Wallpolla Islands Environmental Water Management Plan*, prepared by the Mallee Catchment Management Authority, Mildura, Victoria.
[59] Mallee CMA (Catchment Management Authority) (2024a) *Heywood Environmental Water Management Plan*, prepared by the Mallee Catchment Management Authority, Mildura, Victoria.
[60] Mallee CMA (Catchment Management Authority) (2025a) *Bottlebend Environmental Water Management Plan*, prepared by the Mallee Catchment Management Authority, Mildura, Victoria.
[61] Mallee CMA (Catchment Management Authority) (2024b) *Wemen-Liparoo Environmental Water Management Plan*, prepared by the Mallee Catchment Management Authority, Mildura, Victoria.
[62] Mallee CMA (Catchment Management Authority) (2023a) *Merbein Common Environmental Water Management Plan*, prepared by the Mallee Catchment Management Authority, Mildura, Victoria.
[63] Mallee CMA (Catchment Management Authority) (2024c) *Carina Bend Environmental Water Management Plan*, prepared by the Mallee Catchment Management Authority, Mildura, Victoria.
[64] Mallee CMA (Catchment Management Authority) (2024d) *Spences Bend Environmental Water Management Plan*, prepared by the Mallee Catchment Management Authority, Mildura, Victoria.
[65] Mallee CMA (Catchment Management Authority) (2021b) *Kings Billabong Environmental Water Management Plan*, prepared by the Mallee Catchment Management Authority, Mildura, Victoria.
[66] Mallee CMA (Catchment Management Authority) (2023b) *Johnson's Bend and Chaffey Bend Environmental Water Management Plan*, prepared by the Mallee Catchment Management Authority, Mildura, Victoria.
[67] Mallee CMA (Catchment Management Authority) (2023c) *Psyche Bend Lagoon and Woorlong Wetland Environmental Water Management Plan*, prepared by the Mallee Catchment Management Authority, Mildura, Victoria.
[68] Mallee CMA (Catchment Management Authority) (2025b) *Karadoc Swamp Environmental Water Management Plan*, prepared by the Mallee Catchment Management Authority, Mildura, Victoria.

government representatives to ensure scientific integrity of EWRs has been maintained when translating from raw EWRs in the Basin state government instruments to a machine-readable format (stored in the parameter sheet, within the EWR tool package). i.e. in some cases, there were non-measurable parts of EWRs, and as such were filtered out during the EWR parameterisation process.

4.3.1 EWR Tool

A python package was developed by the MDBA called the "EWR tool" to evaluate EWR success quantified as a binary pass/fail score of the EWR parameters described in the parameter sheet for a given hydrology sequence or observed gauge network. By inputting the hydrographs modelled under scenarios of interest (including various climate and water recovery scenarios), the tool outputs results in various formats that may be used to inform the ESLT. The below schematic shows the workflow of the EWR Tool.

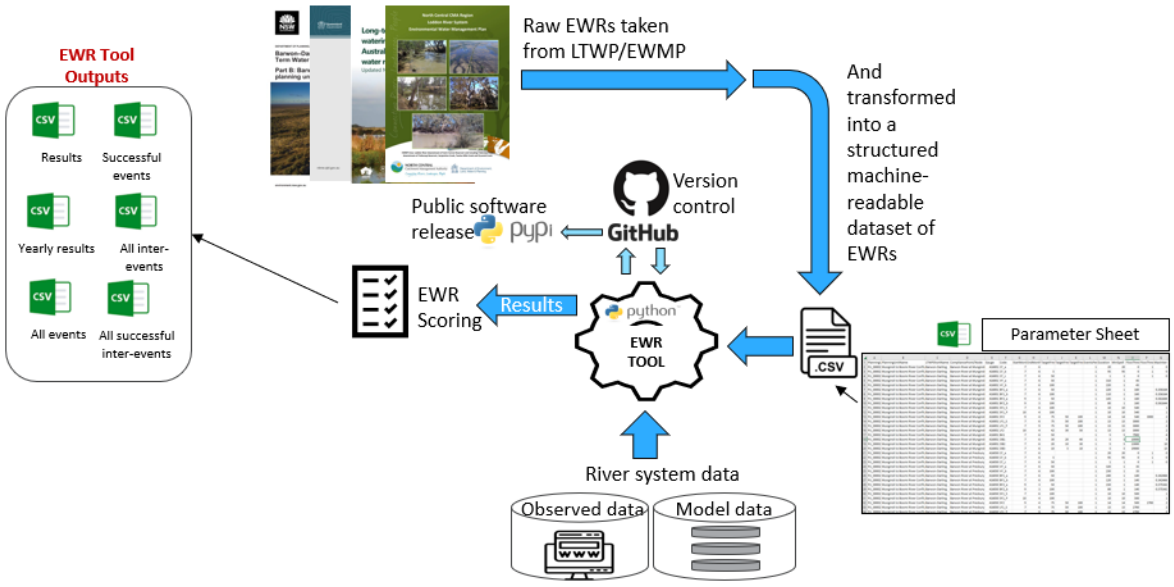

Figure 16. EWR Tool workflow schematic

The EWR tool codebase is open source and available on GitHub[69]. On the GitHub repository, users can find instruction on how to install the Python package via command line using pip: 'pip install py-ewr'. Further detail on the EWR Tool, its functions and outputs can be found in the *Basin-wide EWR User Guide.*[70]

4.3.2 EWR Analysis Pipeline

The outputs of the EWR Tool (being the timing/number of successful EWR events and interevents) then feed into the EWR Analysis Pipeline which performs the following functions:

- Cleaning and quantification of EWR metrics at the EWR level

[69] MDBA (Murray–Darling Basin Authority) (2026c) GitHub - MDBAuth/EWR_tool. github.com, accessed 19 January 2026.
[70] MDBA (Murray–Darling Basin Authority) (2026d) EWR_tool user guide, github.com, https://github.com/MDBAuth/EWR_tool/tree/main/document, accessed 22 January 2026.

- Aggregation of EWRs to the ecological objective level. This step happens through linking the EWR Tool outputs with datasets stored in the EWR tool (these being the causal network and key parameters from the parameter sheet).
- Aggregated summary statistics for ESLT specific metrics across variables of interest such as SDL resource units, ecological objective, and model scenarios. These metrics are expanded on below.

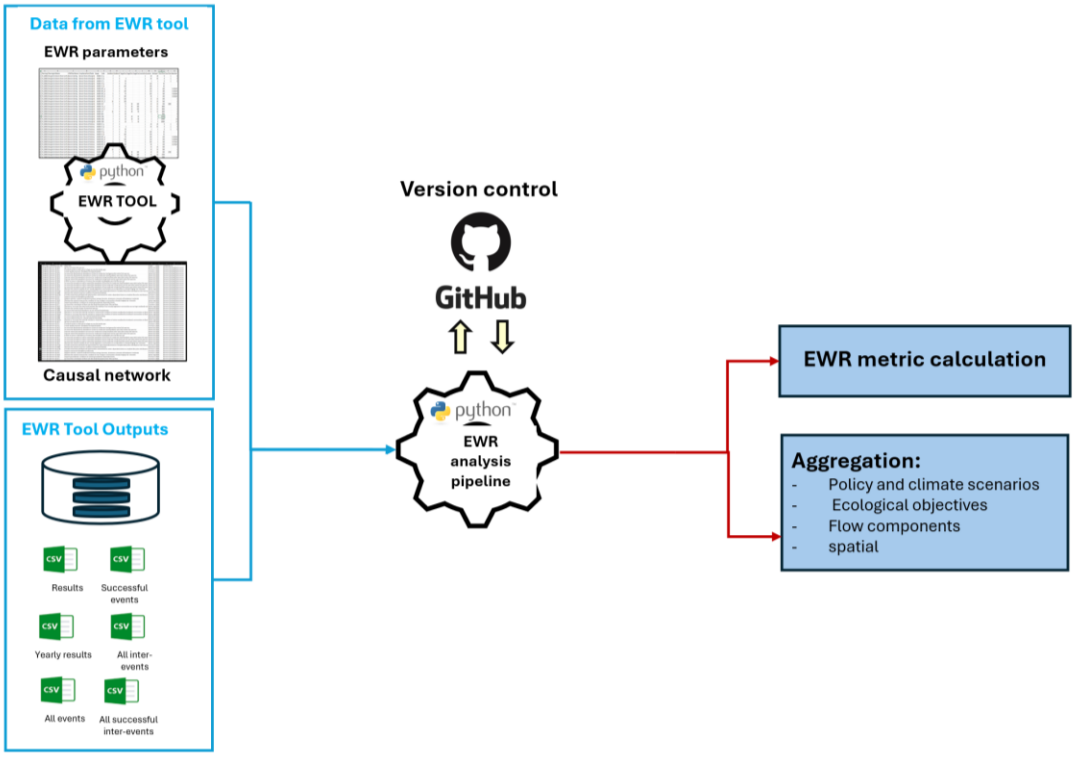

Figure 17. EWR Analysis Pipeline schematic

The EWR tool package and EWR tool analysis pipeline integrate to form the backbone of the workflow. The schematic above shows how the tools connect.

4.4 Metrics

The EWR Tool gives many useful statistics on EWR performance. However, with ~3,500 EWRs, each checked over more than a hundred years of data, multiple scenarios and against multiple criteria, there is a need for simplified metrics. The two key performance areas are:

Frequency Metrics:

- Frequency Ratio (FR): The long-term frequency of years with successful events as compared to the Target Frequency (as given by the LTWPs).
- Frequency ratio Success proportion (FRsp): The Proportion of EWRs (that map to the relevant Ecological Objective) that achieve a Frequency Ratio of at least 90% of the Target Frequency.

Interevent Metrics:

- Maximum Recommended Interevent Period (MRIP) Exceedance Time Proportion (ETP): This metrics looks at the gaps between the successful events, referred to from here as the 'interevent periods'. All interevent periods were identified and assessed against the maximum recommended interevent period (MRIP). These could then be aggregated to determine long-term statistics around MRIP Exceedances.

These two key performance areas were used to infer ecological outcomes and these are discussed separately below. The frequency metrics and interevent metrics give insight into the shorter-term and longer-term ecological risks in the system related to desirable flows not being achieved.

The EWRs in the analysis have been grouped by environmental themes (native fish, native vegetation, waterbirds, ecosystem functions, other species and flows and connectivity) that are supported by the mapping within LTWPs. This is done through the use of a causal network explained below in Chapter 4.5. Some terms relevant to the EWR assessment are shown below in Table 7.

Table 7. Glossary or terms relevant to EWR assessment

Scenario	Subscript
s	Any scenario excluding the wod and pbp scenarios
wod	Without Water Resource Development (Historical)
pbp	Pre Basin Plan (Historical)

4.4.1 Frequency Assessment

This section looks at the first part of the EWR achievement – the frequency of successful EWR event achievements over the entire period of the hydrograph.

Table 8. Glossary of terms relevant to Frequency Analysis

Terms	Description	Value
ev	EWR event years (years where the EWR event was achieved at least once)	1 if occurred, 0 if no occurrence
$nYears$	Number of years in a given hydrograph	129
F_t	Target Frequency of event occurrence over the entire modelled flow period for a given EWR	Specific to each EWR in the long-term water plan.
B	Buffer (maximum allowable proportion difference from pre basin plan scenario)	$B_{FR} = 0.05$
Thd	Threshold for wod scenario inclusion in calculation	$Thd_{FR} = FRsp_{pbp}(1 + B_{FR})$

Each scenario is initially passed through the EWR tool. The target frequency is obtained from the relevant state instrument (i.e. a LTWP). The proportion of achievement is then calculated by dividing the frequency of achievement by the target frequency for each EWR. The score then indicates the proximity to the target, where the closer to 1 it is, the better it is performing as an indicator.

Comparing to relevant benchmark scenarios can be useful to gauge relative performance of outcomes between scenarios. This may be useful for supporting a categorisation process in lieu of further information.

The frequency of success of each EWR for each scenario over the whole timeseries (F) is calculated by dividing the years with successful achievements by the total years in the timeseries and multiplying by 100:

$$F = \frac{\sum_{i=1}^{nYears} ev_i}{nYears} 100$$

The next step is to calculate the Frequency Ratio (FR), which gives an indication of how often the EWR occurs relative to how often it is desired (i.e. defined by the relevant benchmark e.g. the LTWP Target Frequency).

4.4.2 Frequency Ratio and Frequency Ratio Success Proportion

Frequency Ratio (FR) (when using the Target Frequency as a benchmark) is defined as follows:

$$FR = \frac{F}{F_T}$$

Where FR = Frequency Ratio, F_{BP} = Frequency achieved under Basin Plan, and F_T = the Target Frequency.

To interpret the scale of change at an aggregated level (i.e. to ecological objectives), the proportion of EWRs with a successful Frequency Ratio (to within 10%) was assessed, i.e. those EWRs with FRs of more than 0.9 were counted towards the successful proportion.

Frequency Ratio success proportion is defined as follows:

$$FRsp = \frac{\sum_{i=1}^{n} I(FR_i \geq 0.9)}{n}$$

where $I(\cdot)$ is the indicator function, equal to 1 if true, 0 otherwise.

4.4.2.1 The 10% Buffer for Aggregation to the Frequency Ratio Success Proportion

The 10% buffer has been applied to account for uncertainty in the models and uncertainty in the original EWR setting. It is recognised that there may be benefits/improvements to changes in FR values below 0.9 (i.e. an EWR moving from 0.6 to 0.75), however, without ecological knowledge for response curves, this frequency improvement may not result in any tangible improvement in reality.

The approach maintains an ecologically grounded method, by being deliberately conservative in the absence of ecological evidence. The following principles have been adopted:

- Assumed achievement of ecological outcomes should be justified by achievement of established targets or close approximation (within 10%)

- Where targets represent expert judgement on ecologically meaningful outcomes, substantial departure from targets suggests outcomes may not deliver the intended benefits
- This approach aims to maintain assessment credibility by balancing accounting for known limitations in metrics while avoiding unjustified extrapolation.

The following knowledge would enhance future assessments:

- Characterizing benefit-scaling relationships for key EWR types
- Identifying ecological thresholds below which improvements deliver minimal benefit
- Developing response curves linking flow delivery to ecological outcomes

Such knowledge would enable future assessments to move beyond binary thresholds while maintaining ecological grounding.

4.4.3 Interevent Assessment

This section looks at the second part of the EWR achievement – interevent periods.

The interevent period examines the length of periods in between successful EWR achievements, with longer periods indicating greater time between successful EWR achievements. Most EWRs have a maximum recommended interevent period (MRIP) which interevent periods can be assessed against.

The maximum recommended interevent periods are obtained from the relevant state instrument (i.e. LTWP). All interevent periods exceeding the MRIP are used to determine the MRIP Exceedance Time Proportion.

Table 9. Glossary of terms relevant to ETP Analysis

Terms	Description	Value
$nDays$	Number of days in the hydrograph	47117
$MRIP$	Maximum recommended interevent period (days)	Specific to each EWR in the long-term water plan.
l	Individual Interevent length (days)	Per EWR tool output
L	Interevent Length (days) subtracting MRIP	$L = \max(0, l - MRIP)$
B	Buffer (maximum allowable proportion difference from pre basin plan scenario)	$B_{ETP} = 0.01$
Thd	Threshold for wod scenario inclusion in calculation	$Thd_{ETP} = ETP_{pbp}(1 - B_{ETP})$

MRIP Exceedance Time Proportion: the total time spent exceeding the MRIP as a percentage of the timeseries. E.g. if MRIP ETP = 20%, 20% of the time is spent exceeding the MRIP. To calculate the MRIP ETP, first calculate MRIP ETP for each EWR, whereby the parts of each interevent that exceed the MRIP are summed to a total exceedance number and then divided by the timeseries length. This statistic provides insight into the overall amount of time spent exceeding the MRIP.

$$MRIP\ ETP\ =\ \frac{\sum_{i=1}^{n} L_i}{nDays}$$

4.5 Objective Mapping

Each of these metrics is calculated first at the EWR scale across the timeseries and then is aggregated by mapping all relevant EWRs to the LTWP objectives they contribute to and then their respective ecological theme through the Causal Network (shown below Figure 18). It is a simplification of the process showing EWRs linking directly to the Ecological Themes, rather than the Ecological Objectives which sit below those. Each EWR may map to many relevant Ecological Objectives and Themes, while tending to only map to one specific flow regime component.

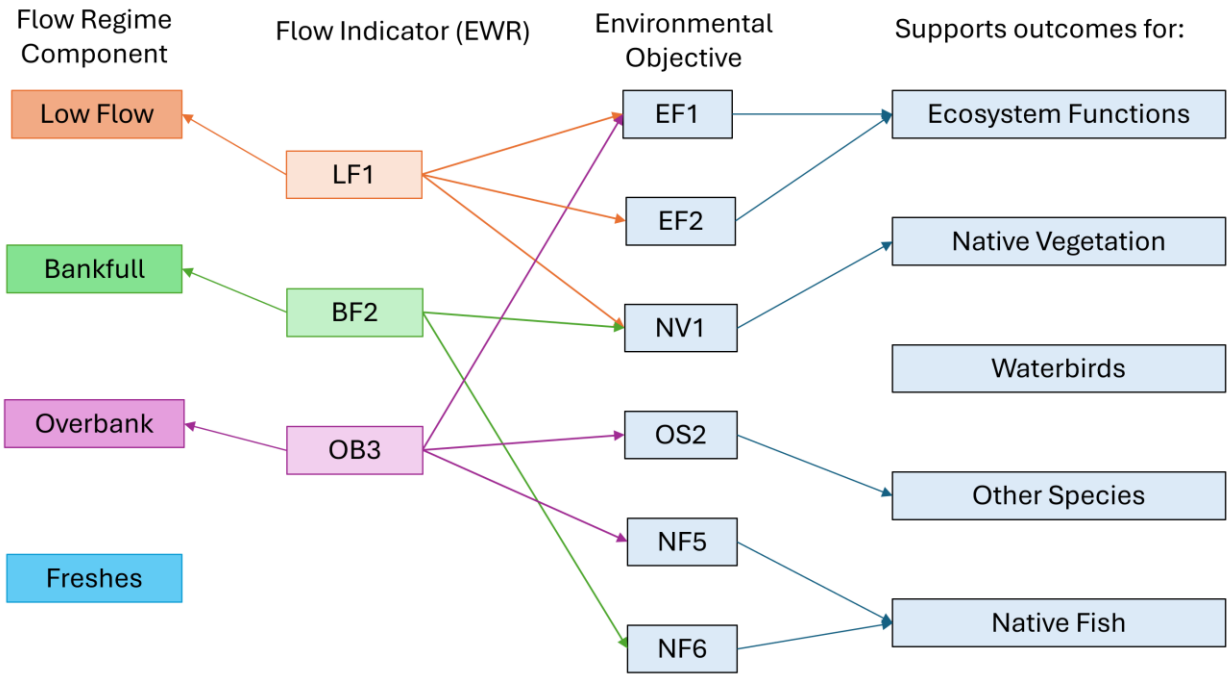

Figure 18. Hypothetical Causal network showing the EWR as a representation of a flow regime component, that is linked to specific environmental objectives, that are in turn grouped to broader ecololgical outcomes (themes) in a heirachical fashion

4.6 Aggregation & Categorisation

4.6.1 Overarching Process

Once the metrics have been calculated at the EWR scale, the causal network allows a process of aggregation to occur. This is a way of combining and mapping the scores to their detailed objectives or themes. Aggregation allows the movement from individual EWR events all the way through to the environmental theme gradings. This is a useful process as it allows thousands of results to be translated to a single outcome. However, this simplification comes at a cost – the loss of narrative around the range or distribution of results. This section describes the approach to aggregation and categorisation.

Results are aggregated through the following steps:

- Determine metric performance for each EWR for the scenario of interest.

- In the case of Frequency Ratio (FR)– a check is done for whether or not the EWR FR meets the Target (to within the allowed 10% buffer).
- For both metrics (where available) compare the scenario performance to the Pre-Basin Plan (PBP) (historical) performance and, where relevant, to the Without Development (historical) performance.
- Use the relative performance to categorise performance at the ecological objective scale.
- Combine the ratings for the two metrics for each ecological objective (where both are available).
- Combine ratings across ecological objectives for each Theme.
- Report on Theme ratings at the SDLRU scale.
- Ratings are provided as a comparative change from PBP (historical) (and towards WoD where appropriate).

Figure 19 and Figure 20 show the key steps for frequency and interevent analysis from input of results from EWR tool to final determination of categorisation.

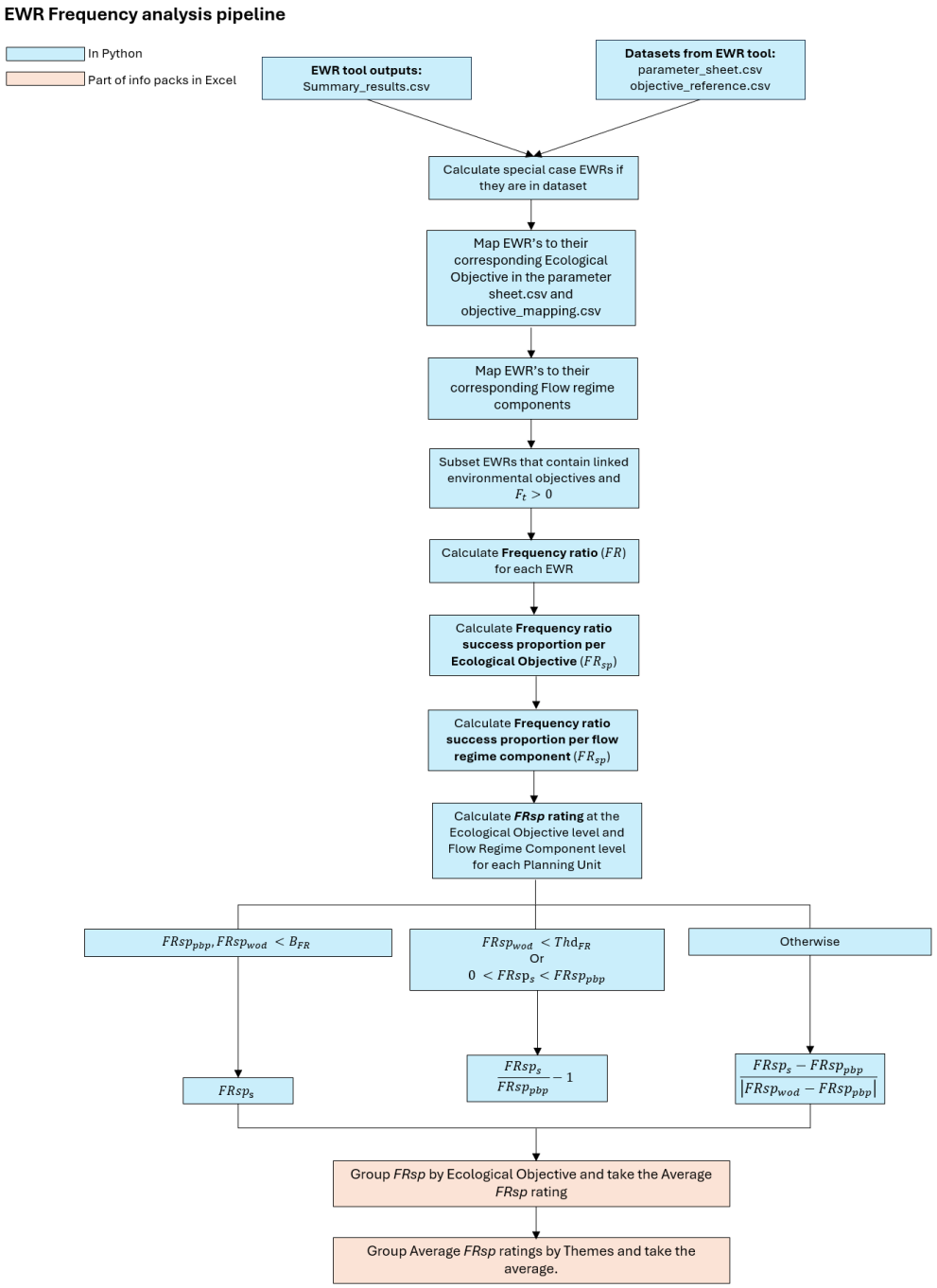

Figure 19. Key steps for arriving at a rating for Frequency metrics aggregated to the environmental objective and theme levels including flows and connectivity.

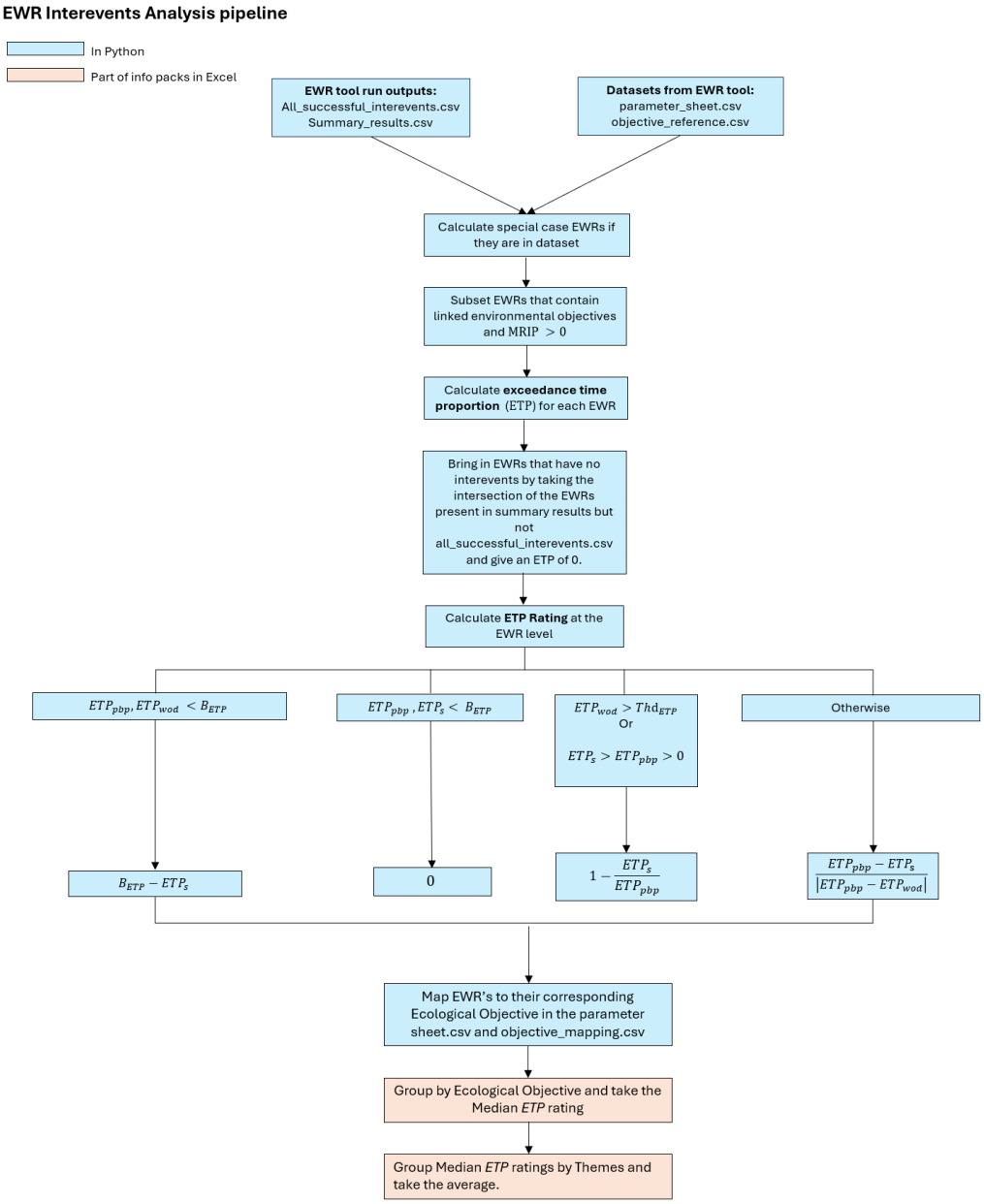

Figure 20. Key steps for arriving at a rating for interevent metrics aggregated to the environmental objective and theme levels including flows and connectivity. * MRIP ETP shortened to ETP for readability

4.6.2 Ratings for Ecological Objectives

For both EWR performance metrics, the rating is determined by comparing the result for the scenario being tested with the result achieved under the Pre-Basin Plan (2009 conditions) scenario. Where the performance of EWR metrics under the Without Development (WoD) scenario is higher than Pre-Basin Plan, the achievement under WoD may be used to understand the range of possible outcomes for that EWR type and location. By considering WoD performance as a proxy for a healthy ecosystem we can gauge the relative size of an improvement in a more meaningful way – noting that the highest improvement category is achieving a 60% (or better) improvement from PBP towards WoD. This recognises that although the aim is not to return to WoD condition it provides an effective method to gauge a more realistic scale of change that can be associated with positive improvements.

Where the scenario performance is below PBP levels, or WoD is sitting below PBP levels, the change in score from the relevant scenario to PBP is only assessed relative to PBP conditions. In these cases, maintaining PBP is likely sufficient to support outcomes and this should be considered as part of the Science Synthesis step. The ratings for the performance metrics are then combined, through averaging and aggregated to determine the overall theme rating for native fish, native water birds, native vegetation, ecosystem function (including flows and connectivity) and other species.

Figure 21 and Figure 22 below show that where WoD is above PBP, by comparing to both scenarios, we get a much better picture of the performance, as both scenarios are important to understand the relative size of the improvement in the context of the system and the desired behaviours.

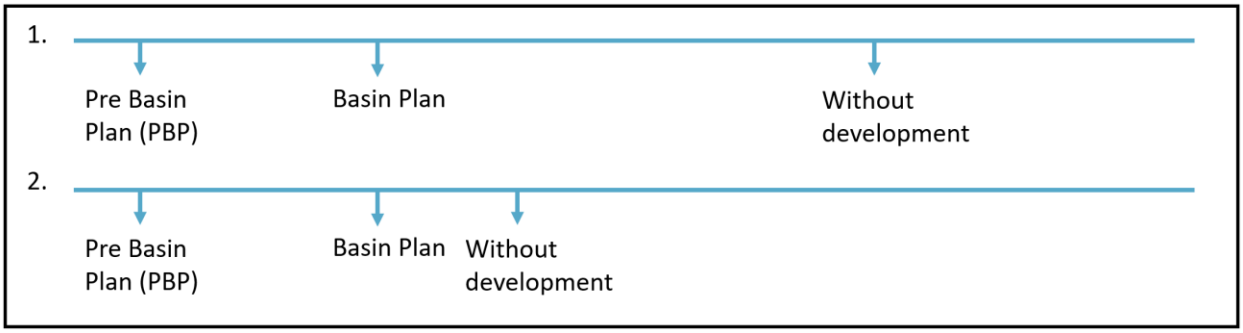

Figure 21. Concept of the double reference assessment

The below example in Figure 22 shows how the same improvement from PBP could tell a different story when viewed in light of the WoD performance. Figure 22 provides an example of the relativistic comparison where a 55% successful achievement of an objective (e.g. Floodplain specialist Fish survival) is compared against the achievement under the PBP (e.g. at 50%) and WoD (e.g. at 70% or 58%). Therefore, Figure 22 shows that the relative improvement in Scenario 2. at 62.5 % is better than Scenario 1. at 25%. Comparing to both scenarios allows an assessment of a more meaningful improvement, especially when combined with the information from the condition monitoring and other lines of evidence.

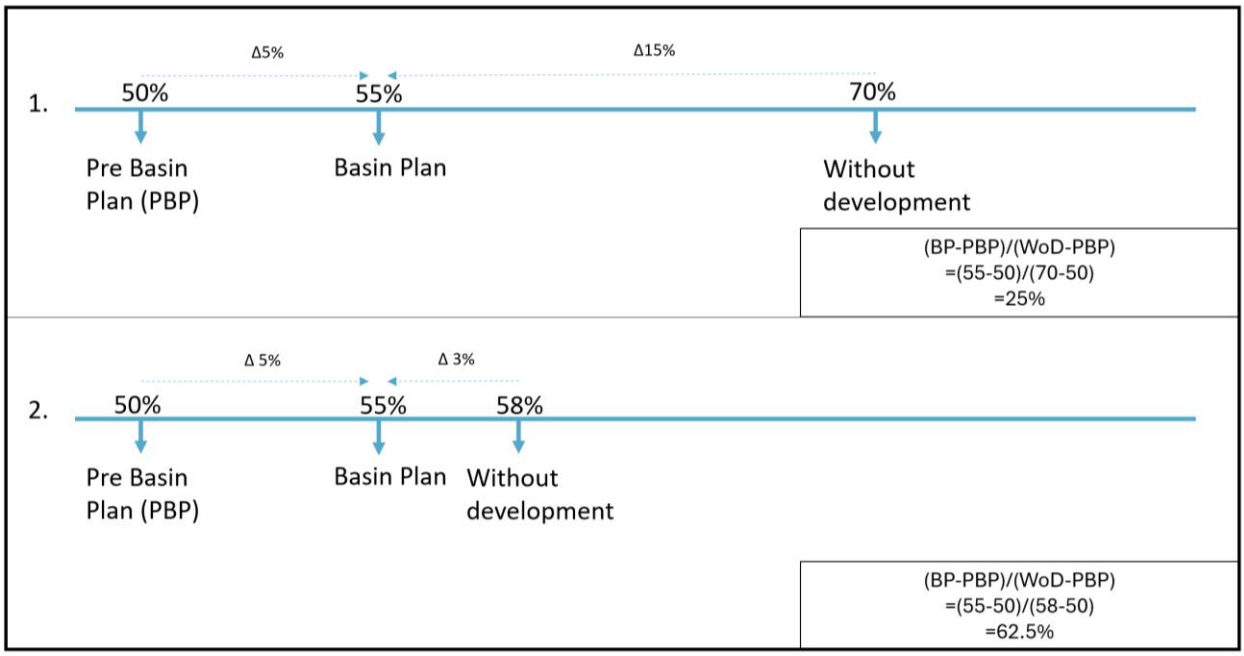

Figure 22. Example of double reference assessment

4.6.2.1 Frequency Ratio Improvement at Ecological Objective Scale

For Frequency Ratio, each EWR will be assessed as to whether or not it meets the minimum requirement of FR = 0.9. These are then counted to give the proportion of EWRs that satisfy the Target. This proportion is then compared between the Basin Plan scenario of interest, the Pre-Basin Plan (PBP) scenario and the Without Development (WoD) scenario. The steps are:

- First the proportions of EWRs meeting their targets (to within 10%) are calculated for the three scenarios (FRsp)
- Then the rating at the ecological objective level is calculated as per the conditions shown in Figure 19.

The resulting rating for FRsp at the ecological objective level gives the relative improvement in the proportion of EWRs (for those EWRs mapping to the ecological objective) meeting their Frequencies Targets (to within 10%) under the Basin Plan (BP) scenario, when viewed as an increase from Pre-Basin Plan (PBP), towards Without Development (WoD).

Table 10. Example of Frequency Ratios for Ecological Objective: native fish 2 (NF2)

EWRs related to Native Fish 2 objective (NF2)	Target frequency (F_t)	Frequency PBP Historical (F_{pbp})	Frequency BP Historical (F_{BPhist})	Frequency WoD Historical (F_{wod})	Frequency Ratio (FR) PBP Historical (FR_{pbp})	Frequency Ratio (FR) BP Historical (FR_{BPhist})	Frequency Ratio (FR) WoD Historical (FR_{wod})
Very low flow 1	**50**	40	50	50	0.8	1	1
Baseflow 1	**50**	50	55	55	1	1.1	1.1
Small fresh 2	**50**	38	39	47	0.8	0.8	0.94
Bankfull 3	**40**	18	28	28	0.5	0.7	0.7
Overbank 4	**20**	16	20	20	0.8	1	1
Overbank 5	**20**	20	20	20	1	1	1
Proportion $(FRsp_{BPhist})$					2/6 = 33%	4/6 = 67%	5/6 = 83%
How far does BP take us from PBP towards WoD?					$\frac{FRsp_s - FRsp_{pbp}}{\lvert FRsp_{wod} - FRsp_{pbp} \rvert}$		"=(67-33)/(83-33) =(34/50)" 68%

In this example, the Basin Plan scenario results in a 68% improvement from PBP towards WoD in EWRs meeting their target frequencies and therefore an increase to flows driving positive outcomes for

ecological objective NF2. This can then be categorised into a relatively large or small improvement or decline away from PBP. These categories are shown below. Note – these category thresholds were a judgement applied for the purpose of the SDL Assessment and may be adapted for future purposes.

Table 11. Categorisation of rating scores for Frequency Ratio (FR)

Change		Category
From	To	
-60		"Significant decline from PBP"
-40	-60	"Major decline from PBP"
-20	-40	"Moderate decline from PBP"
-5	-20	"Minor decline from PBP"
-5	5	"PBP Maintained"
5	20	"Minor improvement from PBP towards WoD"
20	40	"Moderate improvement from PBP towards WoD"
40	60	"Major improvement from PBP towards WoD"
60		"SIgnificant improvement from PBP towards WoD"

4.6.2.2 MRIP Exceedance Time Proportion Improvement at ecological objective scale

The approach for the MRIP ETP is similar, but slightly different. As there is no target for MRIP ETP, the MRIP ETP values are simply calculated for each EWR and the difference in MRIP ETP is then taken between the Basin Plan scenario and the Pre-Basin Plan (PBP) scenario, then the rating for MRIP ETP are calculated in accordance the conditions shown in Figure 19. These values are then aggregated up to an overall improvement in ETP by using the arithmetic mean of the individual EWR results. As MRIP ETP represents the percentage of the time series spent exceeding the MRIP, a lower value is generally considered to be better.

The calculation for ETP Ratings at the EWR level are determined through the conditions shown in Table 12Table .

Table 12. Example of MRIP ETP for Ecological Objective: native fish 2 (NF2)

EWRs related to Native Fish 2 objective (NF2)	ETP PBP Historical (ETP_{pbp})	ETP BP Historical (ETP_{BPhist})	ETP WoD Historical (ETP_{wod})	Change in ETP $(ETP_{pbp} - ETP_{BPhist})$	Range $(ETP_{pbp} - ETP_{wod})$	Improvement from PBP towards WOD = $\frac{ETP_{pbp} - ETP_{BPhist}}{\lvert ETP_{pbp} - ETP_{wod} \rvert}$
Very low flow 1	20	15	10	5	10	50%
Baseflow 1	32	25	22	7	10	70%
Small fresh 2	8	5	5	3	3	100%
Bankfull 3	18	16	5	2	13	15%
Overbank 4	35	32	20	3	15	20%
Overbank 5	25	10	8	15	17	88%
How far does BP take us from PBP towards WoD?						57%

The improvement of ETP, from PBP towards WoD is 57%.

This can then be categorised into a relatively large or small improvement or decline away from Pre-Basin Plan (PBP) using the same rubric as for Frequency Ratio (Table 13).

Table 13. Categorisation for MRIP ETP

Change		Category
From	To	
-60		"Significant decline from PBP"
-40	-60	"Major decline from PBP"
-20	-40	"Moderate decline from PBP"
-5	-20	"Minor decline from PBP"
-5	5	"PBP Maintained"
5	20	"Minor improvement from PBP towards WoD"
20	40	"Moderate improvement from PBP towards WoD"
40	60	"Major improvement from PBP towards WoD"
60		"SIgnificant improvement from PBP towards WoD"

4.6.3 Ratings for Themes

To move up from Ecological Objectives to Themes we take the average of the Ecological Objective ratings. This gives a Theme rating for FR and ETP separately as shown below in Table 14. Where both FR and ETP ratings are both available, the average of the two are taken as representative for the overall Theme rating (see Table 14), where only one is available, it becomes the Theme rating.

Table 14. Example of combining theme ratings across the different metrics to produce combined rating.

Themes		Basin plan 2024
Combined (FR and ETP)	Improvement Rating	Historical Climate
Ecosystem functions	0.12	Minor Improvement
Native fish	-0.11	Minor Decline
Native vegetation	0.11	Minor Improvement
Waterbirds	0.14	Minor Improvement
Other species	0.36	Moderate Improvement
Flows and connectivity	0.00	PBP Maintained
Frequency Ratio (FR)		
Ecosystem functions	-0.04	PBP Maintained
Native fish	-0.10	Minor Decline
Native vegetation	0.14	Minor Improvement
Waterbirds	0.14	Minor Improvement
Other species	0.12	Minor Improvement
Flows and connectivity	0.00	PBP Maintained
MRIP ETP Rating		
Ecosystem functions	-0.20	Minor Decline
Native fish	-0.11	Minor Decline
Native vegetation	0.08	Minor Improvement
Waterbirds	0.13	Minor Improvement
Other species	0.08	Minor Improvement
Flows and connectivity	0.00	PBP Maintained

4.6.3.1 SDL Resource Unit scale reporting on Themes

The Themes can then each be reported on for the SDLRU in a template like the one shown below. For Line of Enquiry 1 (current conditions) we are also able to report on observed outcomes from monitoring data.

Table 15. Line of Enquiry 1 (LoE1) SDLRU ratings example for Themes and their objectives

SDLRU	LoE1 - 2024 at time of the review									
Example	Monitoring		Modelling							
Theme	Condition	Confidence	BP 2024 (historical climate)							
Flows & Connectivity			FC Theme	FCAC	FCBF	FCBK	FCLF	FCOB	FCSF	FCVLF
	Moderate	Low	PBP Maintained	PBP Maintained	PBP Maintained	PBP Maintained	Minor Improvement	PBP Maintained	PBP Maintained	PBP Maintained
Ecosystem Functions			EF Theme	EF1	EF2	EF3a	EF3b	EF4	EF5	EF6	EF7
	Moderate	Low	PBP Maintained	PBP Maintained	PBP Maintained	PBP Maintained	PBP Maintained	PBP Maintained	PBP Maintained	PBP Maintained	PBP Maintained
Waterbirds			WB Theme	WB1	WB2	WB5					
	Poor	Low	PBP Maintained	PBP Maintained	PBP Maintained	PBP Maintained					
Native Fish			NF Theme	NF1	NF2	NF3	NF4	NF5	NF6	NF8	NF9
	Moderate	Low	PBP Maintained	PBP Maintained	PBP Maintained	PBP Maintained	PBP Maintained	PBP Maintained	PBP Maintained	PBP Maintained	Minor Improvement
Native Vegetation			NV Theme	NV1	NV2	NV3	NV4a	NV4b	NV4c	NV4d	NV4e
	Moderate	Low	PBP Maintained	PBP Maintained	PBP Maintained	PBP Maintained	PBP Maintained	PBP Maintained	PBP Maintained	PBP Maintained	PBP Maintained
Other species			OS Theme								
	Not Assessed	NA	NA								

4.6.4 Reporting on Impacts of Climate Change

Lines of Enquiry 1 and 2 focus on the existing monitoring information to give an indication of recent trend and condition, combined with modelling to determine a likelihood of flows supporting outcomes over the longer term under a partially and fully implemented Basin Plan.

Line of Enquiry 3 (LoE 3) then looks to provide an indication of the scale, direction and variability of the plausible climate outcomes, with the climate modelling associated with conditions centred around 2030 and 2050. The six scenarios represent three distribution points for the two future periods. For both 2030 and 2050, there are scenarios representing the 10th, 50th and 90th percentiles of the GCM outputs. To understand the range of plausible scenarios, all three are used to help inform the LoE 3 statements, see Table 16.

Table 16. Approach to LoE 1 to 3

	LoE1		LoE2	LoE3 - S 1, 2, 3		LoE3 - S 4, 5, 6	
Theme	*"BP 2024"*	*"BP 2024"*	*"Fully Implemented BP" (historical)*	**Climate**	*"Fully Implemented BP ~ 2030"*	**Climate**	*"Fully Implemented BP ~ 2050"*
	Monitoring	*Modelling*	*Modelling*		*Modelling*		*Modelling*
Waterbirds	Poor	PBP Maintained	Minor Improvement	Warmer & Wetter	Major Improvement	Hotter& Wetter	Significant Improvement
				Warmer & Drier	BDL Maintained	Hotter & Drier	BDL Maintained
				Warmer & Much Drier	Minor Decline	Hotter & Much Drier	Minor Decline
Native Fish	Moderate	PBP Maintained	Minor Improvement	Warmer & Wetter	Moderate Improvement	Hotter& Wetter	Significant Improvement
				Warmer & Drier	Minor Decline	Hotter & Drier	Minor Decline
				Warmer & Much Drier	Minor Decline	Hotter & Much Drier	Moderate Decline
Native Veg	Poor	Minor Improvement	Moderate Improvement	Warmer & Wetter	Minor Improvement	Hotter& Wetter	Major Improvement
				Warmer & Drier	Minor Decline	Hotter & Drier	Minor Decline
				Warmer & Much Drier	Moderate Decline	Hotter & Much Drier	Major Decline
Ecosystem Functions	Good	Minor Improvement	Moderate Improvement	Warmer & Wetter	Moderate Improvement	Hotter& Wetter	Moderate Improvement
				Warmer & Drier	BDL Maintained	Hotter & Drier	BDL Maintained
				Warmer & Much Drier	Minor Decline	Hotter & Much Drier	Minor Decline
Other Species	Moderate	Minor Improvement	Moderate Improvement	Warmer & Wetter	Moderate Improvement	Hotter& Wetter	Significant Improvement
				Warmer & Drier	BDL Maintained	Hotter & Drier	BDL Maintained
				Warmer & Much Drier	Minor Decline	Hotter & Much Drier	Minor Decline
Flows & Connectivity	Good	PBP Maintained	Minor Improvement	Warmer & Wetter	Moderate Improvement	Hotter& Wetter	Moderate Improvement
				Warmer & Drier	Minor Decline	Hotter & Drier	Minor Decline
				Warmer & Much Drier	Minor Decline	Hotter & Much Drier	Major Decline

As is the case in other parts of the method, although averages or medians have been used to aggregate, any extreme risks that are masked by the SDLRU score were flagged and considered in the science synthesis process.

Other informative metrics have been calculated on an as-needs basis to supplement the primary metrics, to help clarify result interpretations during the science synthesis phase.

4.7 State Feedback on Ecohydrology Modelling Processes

Basin state governments played an important role in the development and application of the EWR analysis method. The EWRs used in this assessment were originally developed by state governments through their LTWPs and other state-based planning documents. In some cases, EWRs were adapted to

ensure they could be consistently parameterised and assessed within the analytical framework. These adaptations were discussed with relevant Basin state governments to confirm that the intent and ecological logic of EWRs was preserved.

To support this process, the MDBA convened a series of workshops with Basin state governments to review how EWRs were being interpreted, parameterised and incorporated into the EWR Tool and the EWR Analysis Pipeline. These workshops built on the existing collaborative development of the EWR Tool. Transparency in how state EWRs were interpreted, applied and translated into machine-readable formats was prioritised throughout the process, and how the workflow would be applied in the SDL Assessment.

Given the complexity of the workflow, there were instances where views on specific analytical choices and assumptions did not align. Feedback was incorporated where feasible, and where changes could not be made within project constraints, the feedback was documented to be explored further in future application of the tool and analytical method.

In addition to workshops, the MDBA engaged with Basin state governments through targeted correspondence and face-to-face meetings to ensure that objective mapping was being applied appropriately. This included confirming that EWRs were linked to the correct environmental objectives and ecological themes, and that spatial allocation of EWRs within SDL Resource Units reflected state knowledge of where particular flow needs apply.

Finally, Basin state governments were invited to review the outcomes of the EWR analysis. This review step enabled state representatives to assess whether the modelled results aligned with observed on-ground outcomes, local ecological knowledge and recent environmental watering experience. This final check provided an important line of assurance that the analysis was ecologically plausible and grounded in real-world system behaviour.

4.8 Key Improvements to the Method

The key improvements from the method used to assess SDLs for the Basin Plan 2012 to the current method developed to support SDL assessment for the 2026 Basin Plan review include:

- The use of updated science from state LTWPs, EWMPs and Flow Studies, reflecting the best available flow-to-ecology information for the Basin SDL Resource Units.
- Use of a flexible MLE approach to allow consideration of different types and scales of evidence to generate better informed conclusions.
- An increase in spatial resolution, moving from ~100 SFIs to ~3,500 EWRs across the basin.
- Testing the risks to outcomes under various hydroclimate futures through Climate Scenarios (through Sustainable Yields project).
- Testing the risks to outcomes under various policy futures through updated modelling scenarios.
- Testing the risks to outcomes through not only a change to flows, but a change to other hydroclimate variables such as temperature, rainfall and runoff through the Thresholds of Change module of Sustainable Yields.
- Mapping flow-based risks to environmental themes (waterbirds, native vegetation, native fish, etc) and to flow components (e.g. baseflows, freshes, overbank).

- Consideration of the current condition of assets and functions through a broad evidence base.
- Clearer articulation of sources of uncertainty.

Table 17 represent improvements to the method and address some of the key concerns raised through the previous studies including CSIRO review[71] of the initial method in 2011 and community feedback.

Table 17. Previously identified areas for improvement and how they have been addressed.

Previously identified areas for improvement:	**Improvement:**
The use of indicator sites to represent broader reach requirements.	Higher resolution of EWR sites at planning unit scale are now used.
The development of water requirements being based only on limited species information.	The EWRs are now based on a range of available species information.
Limited uncertainties documented.	MDBA now include a detailed uncertainties section (see Chapter 2.8), recognising the multiple sources of uncertainty. Where possible, confidence levels are also reported on for the outcomes reported.
Outputs not being linked back to ecological targets, and very few linked to KEF metrics.	The EWRs now link to detailed ecological objectives and targets, while also mapping to 'themes' including: waterbirds, native vegetation, native fish, other species, ecosystem functions and flows and connectivity. The EWRs of LTWP are formulated to represent the flow needs of the PEAs and PEFs for each LTWP area.
Data archiving and availability.	All data is now shared transparently through publicly available links/locations. Shared data includes (but is not limited to) EWR results, Monitoring results, Moderation results and Science Synthesis results.
Continued development of new river system models	Through the Integrated River System Model Framework Uplift, hydrology models have been updated in consultation and collaboration with state modellers.

This assessment represents an update to the knowledge base and method used in 2011, applying the best available science.

[71] Young WJ, Bond N, Brookes J, Gawne B and Jones GJ (2011) *Science Review of the Estimation of an Environmentally Sustainable Level of Take for the Murray–Darling Basin,* a report to the Murray–Darling Basin Authority from the CSIRO Water for a Healthy Country Flagship.

5 SDL Resource Unit Results

Multiple sources of information and datasets have contributed to the SDL Assessment of surface water and groundwater. Additionally, during this assessment process the MDBA have created new datasets and produced results for various components of the technical methods that have contributed to the assessments. To make as much of this data available as possible the majority of it has been placed into an online library, available by searching using key words at https://library.mdba.gov.au/. Broadly, results have been placed into the MDBA online library.

Below are links to the published results for monitoring, modelling and science synthesis outputs.

- Monitoring condition and confidence results: The following link provides the monitoring condition and confidence results for the 6 environmental themes (flows and connectivity, ecosystem function, waterbirds, native fish, native vegetation and other species) for each of the 29 surface water SDL resource units as well as CLLMM. The file contains three tabs, (1) elicitation monitoring results (2) monitoring results after implementation of the data paucity investigation and (3) monitoring results after the science synthesis process (https://library.mdba.gov.au/data_product/sdl-monitoring-condition-and-confidence-results)[72]
- Summary Monitoring and Modelling Results: The following link provides the monitoring and modelling grades used for the Science Synthesis process. These include the final monitoring condition and confidence grades (including data paucity exercise changes) and the modelled flow improvement grades for the three LoE: (https://library.mdba.gov.au/data_product/sdl-assessment-monitoring-and-modelling-summary-results)[73]
- Science Synthesis findings: The following link provide the surface water templates containing the outcomes of the Science Synthesis including the likelihood flows support outcomes grades, drivers and risks. (https://library.mdba.gov.au/group/sustainable-diversion-limit-assessments-surface-water)[74].
- EWR Tool outputs and EWR Analysis Pipeline outputs: The following link provides the location of intermediate outputs of the EWR Tool and EWR Analysis Pipeline: (https://library.mdba.gov.au/data_product/sdl-environmental-water-requirement-and-ecological-objective-results)[75]. The following links to the EWR tool code: (https://github.com/MDBAuth/EWR_tool/)[69], the EWR tool user guide is located in this package and can be found using the following link (https://github.com/MDBAuth/EWR_tool/tree/main/documents)[70], The following links to

[72] MDBA (Muray-Darling Basin Authority) (2026e) https://library.mdba.gov.au/data_product/sdl-monitoring-condition-and-confidence-results, library.mdba.gov.au, accessed 27 January 2026.
[73] MDBA (Murray- Darling Basin Authority) (2026f) https://library.mdba.gov.au/data_product/sdl-assessment-monitoring-and-modelling-summary-results library.mdba.gov.au, accessed 27 January 2026.
[74] MDBA (Murray–Darling Basin Authority) (2026g) https://library.mdba.gov.au/group/sustainable-diversion-limit-assessments-surface-water library.mdba.gov.au, accessed 27 January 2026.
[75] MDBA (Murray–Darling Basin Authority) (2026h) https://library.mdba.gov.au/data_product/sdl-environmental-water-requirement-and-ecological-objective-results library.mdba.gov.au, accessed 27 January 2026.

the EWR Analysis Pipeline (https://github.com/MDBAuth/EWR_analysis_pipeline)[76], with further documentation for this code available in the README file for this package.

*Please note: more detailed outputs may be made available upon request.

[76] MDBA (Murray–Darling Basin Authority) (2026i) https://github.com/MDBAuth/EWR_analysis_pipeline library.mdba.gov.au, accessed 27 January 2026.

Appendix A: Engagement

Meaningful engagement is critical to refining ecological and hydrological analyses, ensuring that evolving insights directly inform responsive and robust decision-making. MDBA is committed to fostering ongoing collaborative relationships that will help improve our methods and ultimately support effective decision-making and outcomes. Below is a summary of key past engagements with Basin state governments and key forums regarding monitoring outcomes, EWR tools, metrics and methods.

Table A- 1 External meeting history of surface water

Date	Stakeholder	Content
2020-	NSW Government	Ongoing engagement to parameterise and refine EWRs and EWR tool
2023-	VIC Government, SA Government, QLD Government	Ongoing engagement to parameterise and refine EWRs and EWR tool
10/10/23	Murray Darling Water Environmental Research Program (MDWERP)	Theme 1 (Climate Adaptation) End User Advisory Group Meeting 10
2024-	ACT Government	Ongoing engagement to parameterise and refine EWRs and EWR tool
13/03/2024-14/03/2024	Advisory Committee on Social, Economic and Environmental Sciences (ACSEES)	SDL Assessment and MDWERP
31/07/2024	Advisory Committee on Social, Economic and Environmental Sciences (ACSEES)	Hydroclimate modelling
30/8/2024	NSW Government	EWR tool
25/9/2024	QLD Government	EWR tool
21/10/2024	Advisory Committee on Social, Economic and Environmental Sciences (ACSEES)	EWR assessment
23/10/2024	QLD Government	EWR tool
29/10/2024	NSW Government	EWR tool
27/11/2024	NSW Government	EWR tool
28/11/2024	Senior Officials Group (SOG)	EWR tool
03/12/2024	ACT Government	EWR tool
04/12/2024	NSW Government	EWR tool
09/12/2024	QLD Government	EWR tool
12/12/2024	SA Government	CLLMM EWRs

16/01/2025	SA Government	EWR tool
18/02/2025	VIC Government	EWR tool
23/1/2025	NSW Government	EWR tool
10/02/2025	NSW Government	EWR tool
11/02/2025	QLD Government	EWR tool
18/02/2025	DEECA	EWR tool
19/02/2025	Advisory Committee on Social, Economic and Environmental Sciences (ACSEES)	Independent Review and pilot results
20/02/2025	SA Government	SDL Assessment pilot studies stage 2
21/02/2025	NSW Government	EWR tool
24/02/2025	VIC Government	EWR tool
25/02/2025	QLD Government	EWR tool
04/03/2025	ACT Government	EWR tool
07/03/2025	VIC Government	EWR tool
11/03/2025 to 2/05/2025	SA Government	CLLMM, in-channel and floodplain EWRs
17/03/2025	Murray Darling Water Environmental Research Program (MDWERP)	Theme 1 (Climate Adaptation) End User Advisory Group Meeting
26/03/2025	Ecohydrology Community of Practice (CoP)	EWR Assessment Method
27/03/2025	Goulburn Broken Catchment Management Authority (GBCMA)	EWR tool
03/04/2025	SA Government	EWR tool
09/04/2025 to 10/04/2025	Senior Officials Group (SOG)	SDL Assessment Pilot
14/5/2025	QLD Government	EWR Tool
20/5/2025	North Central CMA, DEECA	EWR Tool
21/05/2025	North Central CMA, DEECA	EWR Tool
4/06/2025	Advisory Committee on Social, Economic and Environmental Sciences (ACSEES)	ACSEES review and feedback of Technical Methods Report

10/06/2025	North East CMA, DEECA	EWR Tool
11/06/2025	North East CMA, DEECA	EWR Tool
12/06/2025	SA Government	Elicitation process
14/06/2025	QLD Government	EWR Tool
20/06/2025	Mallee CMA, DEECA	EWR Tool
23/06/2025	ACT Government	EWR Tool
30/06/2025 to 30/09/2025	Elicitation Panel Process for Monitoring Outcomes Assessment	
01/07/25	NSW Government	EWR Tool
04/07/2025	SA Government	SDL assessment
16/07/2025	Wimmera CMA	EWR Tool
17/07/2025	VIC Government	EWR Tool
20/07/2025	ACT Government	EWR Tool
22/07/2025	NSW Government	EWR Tool
23/07/2025	QLD Government	EWR Tool
05/08/2025	QLD Government	QLD Border Rivers Pilot
06/08/2025	NSW Government	NSW Border Rivers Pilot
22/08/2025	NSW Government	EWR Tool
25/08/2025	VIC Government	EWR Tool
28/08/2025	ACT Government	EWR Tool
29/08/25	QLD Government	EWR Tool
01/09/2025 – 30/10/2025	State Engagement Process to review initial findings of EWR Assessment and Monitoring Assessment templates	
05/09/2025	QLD Government	EWR Tool
16/09/2025	NSW Government	Gwydir info pack

19/09/2025	QLD Government	EWR Tool and monitoring
19/09/2025	VIC Government	EWR Tool and monitoring
22/09/2025	NSW Government	EWR Tool
23/09/2025	ACT Government	EWR Tool
23/09/2025	QLD Government	EWR Tool and monitoring
26/09/2025	Independent Review	Introduction to panel members
30/09/2025	Independent Review	Introduction to Independent review
8/10/2025	VIC Government	Env objectives for Murray floodplain in Vic
8/10/2025	GBMCA, NCCMA, NECMA, WCMA, Mallee CMA, DEECA	SDL assessment methods and info packs- Session 1
8/10/2025	GBMCA, NCCMA, NECMA, WCMA, Mallee CMA, DEECA	SDL assessment methods and info packs- Session 2
8/10/2025	Independent Review	EWR Tool and monitoring
10/10/2025	QLD Government	EWR Tool and monitoring
10/10/2025	SA Government	EWR Tool and monitoring
13/10/2025	North Central CMA	EWR Tool and monitoring
13/10/2025	Goulburn Broken CMA	EWR Tool and monitoring
14/10/2025	QLD Government	EWR Tool
22/10/2025	VIC Government/ARI/DEECA	BPR SDL info packs
24/10/2025	QLD Government	Border Rivers
31/10/2025	Independent Review	Deliverable check-in
3/11/2025	Independent Review	EWR Tool and monitoring
4/11/2025	NSW Government	EWR tool and monitoring
4/11/2025	ACT Government	BPR assessment draft
17/11/2025	Mallee CMA	EWR tool and monitoring

18/11/2025	Independent Review	Draft Deliverable 2
20/11/2025	ACT Government	EWR tool
21/11/2025	NSW Government	EWR tool
24/11/2025	ACT Government	EWR tool
25/11/2025	ACT Government	EWR tool

Appendix B: Science Synthesis Moderation

Background

As part of the Science Synthesis step of the method, the 'default' statements generated from the rubrics are reconsidered in light of all lines of evidence and reasonable judgement. This is an iterative process, considering the following:

- The original monitoring and modelling grades as provided through the internal elicitation panel and the EWR modelling outputs respectively.
- The 'default' likelihood ratings provided from the rubric combination of the monitoring/modelling grades.
- The appropriateness of those grades in light of other lines of evidence, including system knowledge, additional model analysis/interpretation, internal expert review commentary and Basin state governments feedback.

Throughout this document, Line of Enquiry is expressed as LoE followed by the relevant LoE number.

General Considerations Affecting Multiple Units:

Modelled Environmental Water Manager Decision Making:

Moderation of results were undertaken where it was apparent that modelled assumptions of environmental water behaviour were not maximising outcomes. Examples where this occurred include:

- Gwydir: The Gwydir is a distributary system; distributary systems have secondary channels which carry a considerable portion of flows away from the main stem. In the Gwydir model, environmental water demands were concentrated in one arm of the system. Outcomes in the part of the system not prioritised declined in the model, but in reality, environmental water managers balance outcomes across the system.
- Border Rivers: Environmental demands were targeting a handful of EWRs at the end of system. The model delivered these as a priority, and this meant they were delivered at the expense of other within system outcomes. In reality water would be used more effectively to maximise outcomes both within the Border Rivers and for connectivity with the Barwon Darling.

Uncertainty Around Improvements in High Flows

In some reaches, hydrology modelling indicated an increase in the frequency of flows between the pre Basin Plan and Basin Plan scenarios in parts of the flow regime that sit above constraint levels. This resulted in projected increases in outcomes associated with ecological objectives linked to the higher part of the flow regime. Further investigation revealed this is likely due to changes in spill behaviour between the pre Basin Plan and Basin Plan scenarios, which appears to be primarily driven by the impact of modelled delivery constraints. To support the Basin Plan review there will be a more detailed

investigation into constraints. In the meantime, until the more detailed investigation can occur, projected increases to outcomes associated with flows above the constraints levels have been generally moderated down due to the understanding of which parts of the flow regime environmental water managers can influence with their held entitlements. This was identified as a factor in the Murray, Murrumbidgee, and Goulburn systems.

EWR representation of the flow regime

In the Loddon, Campaspe, and Broken catchments, EWRs do not cover all parts of the flow regime. Ecological objectives related to the higher parts of the flow regime are not as well understood in some catchments. In these catchments, effort has been more directed towards understanding the in-channel requirements of the ecosystem. These in-channel parts of the flow regime are typically the parts of the channel that can be influenced by environmental water management. As such, there is often very low EWR sensitivity to Basin Plan scenarios, as achievement of in-channel EWR's require smaller volumes of environmental water.

There is therefore higher uncertainty about the flow regime effectiveness for meeting ecological outcomes in these catchments, and it is likely that EWR results are overestimating the benefits of the Basin Plan across all themes in identified catchments. In identified catchments, confidence has generally been lowered, and flow effectiveness ratings lowered to reflect these missing key parts of the flow regime.

Data Paucity Investigation: Monitoring condition score and confidence levels

Through the data paucity investigation (for full details see Chapter 3.7) some themes were placed in a "Not assessed" or "Very low confidence due to data paucity" category. The "Not assessed" option was used when there are no ecological objectives for the theme within the SDL resource unit and there is very little or no relevant data. "Very low confidence due to data paucity" option was used where ecological objectives exist for the theme but there is very little or no relevant data.

Moderation of Queensland monitoring confidence levels across most themes

Following engagement with Queensland, it was agreed to moderate confidence levels downward across most themes (with the exception of native vegetation in Condamine-Balonne). This decision reflects the fact that the assessment's reliance on the SRA as the primary source of evidence, noting that Queensland does not undertake systematic or comprehensive ecological monitoring for most theme-level environmental outcomes.

Reanalysis of flows and connectivity theme for Queensland SDL units

2025 SRA is a key line of evidence used by the elicitation panel. However, at the time the SRA analysis was undertaken, the QLD Environmental Water Requirements (EWR) tool consisted of an early release version. SRA applied the EWR tool to historical gauged flow data and used the resulting outputs to inform flows and connectivity condition and trend reporting in the SRA report. These results were used by the elicitation to score the flows and connectivity theme for QLD SDL units (SS24, SS25, SS26, SS27, SS28 and SS29). Queensland raised concerns about the use of an early release version of the EWR tool in this context.

Following consultation with QLD government, it was agreed that a more recent Queensland EWR tool would be re-run by MDBA to provide an updated assessment. This re analysis was undertaken using 10 years of gauged flow data, across relevant gauging stations, and evaluated against the full set of EWR codes for the five Queensland SDL units (SS25, SS26, SS27, SS28 and SS29). SS24 (Queensland Border Rivers) was excluded, consistent with Queensland's advice to use the corresponding NSW Border Rivers (SS23) results.

The new analysis indicated the same or better achievement of flow and connectivity objectives. Through the science synthesis process, it was determined that the Flows and Connectivity monitoring score for the five Queensland SDL units are revised from 'Moderate' to 'Moderate or better', while reducing the existing confidence level. Queensland indicated they were satisfied with the revised outputs and the resulting elicitation outcomes, and these results were carried forward into subsequent stages of the science synthesis process.

Coorong Lower Lakes and Murray Mouth

The initial SDL Assessments have found further work is required in several areas, in particular for the Coorong, Lower Lakes and Murray Mouth (CLLMM).

The CLLMM is a unique component of the Murray Darling Basin because it functions as the Basin's terminal system, where upstream hydrology, river operations and water quality pressures are compounded and expressed. It is the only location in the Basin where the River Murray directly connects with the Southern Ocean, making connectivity processes, salinity gradients and the export of salt, nutrients and sediments fundamental to system condition.

The region comprises a rare and complex mosaic of freshwater, estuarine and marine environments that support internationally significant biodiversity and ecological functions. As an end of system asset, ecological outcomes in the CLLMM are heavily influenced by cumulative upstream conditions and constraints.

Key features that make the CLLMM unique include:

- its role as the sole outlet for the Basin, enabling the removal of salt, nutrients, sediments and contaminants from the system
- the direct hydraulic connection between the River Murray, Lakes Alexandrina and Albert, the Coorong lagoons and the Southern Ocean, mediated by barrages and the Murray Mouth
- strong dependence on managed flows and infrastructure operations, with barrage releases and lake level management central to maintaining connectivity and ecological function.

Condition

The condition of the Coorong, Lower Lakes and Murray Mouth has improved significantly since the Millennium Drought; however, the Coorong remains degraded and vulnerable, particularly in the South Lagoon. Monitoring indicates uneven recovery across ecological themes: the Lower Lakes show stronger responses, while the Coorong continues to exhibit low resilience, elevated salinity, nutrient stress, degraded sediments, and susceptibility to disturbances.

Maintaining hydrological connectivity through the Murray Mouth is critical to sustaining water quality and ecological conditions in the Coorong and enables ongoing export of salt from the river system. Despite the benefits of Basin Plan flows in reducing the rate of sand accumulation at the Mouth, dredging is necessary to maintain this connection.

Effectiveness of Indicators and Targets

Barrage flows have frequently been insufficient to provide sustained flushing of the Coorong, especially the South Lagoon, with water quality benefits largely confined to periods of high unregulated flows.

Salinity has improved since the end of the Millennium Drought, but the system remains vulnerable. The Lower Lakes and North Lagoon exhibit sustained improvements, while the South Lagoon continues to lag with persistent hyper salinity and high nutrient conditions acting as major constraints to ecological recovery.

Coastal processes, including longshore currents, tidal fluctuations and storm events, continually deposit sand in the Mouth, and large storm events can rapidly infill the channel. Dredging remains the most effective management option to maintain an open Murray Mouth. While barrage releases maintain some degree of connectivity, dredging is expected to be required periodically into the future depending on the frequency and magnitude of high unregulated flow events.

Some indicators and targets may not fully reflect contemporary system behaviour due to changes in understanding over time. Current indicators and targets were developed based on the best available science and knowledge at the time, notably the modelling and analysis that informed the finalisation of the Basin Plan in 2012. We now understand the river system modelling that informed development of the Basin Plan overestimated flows reaching the end of system.

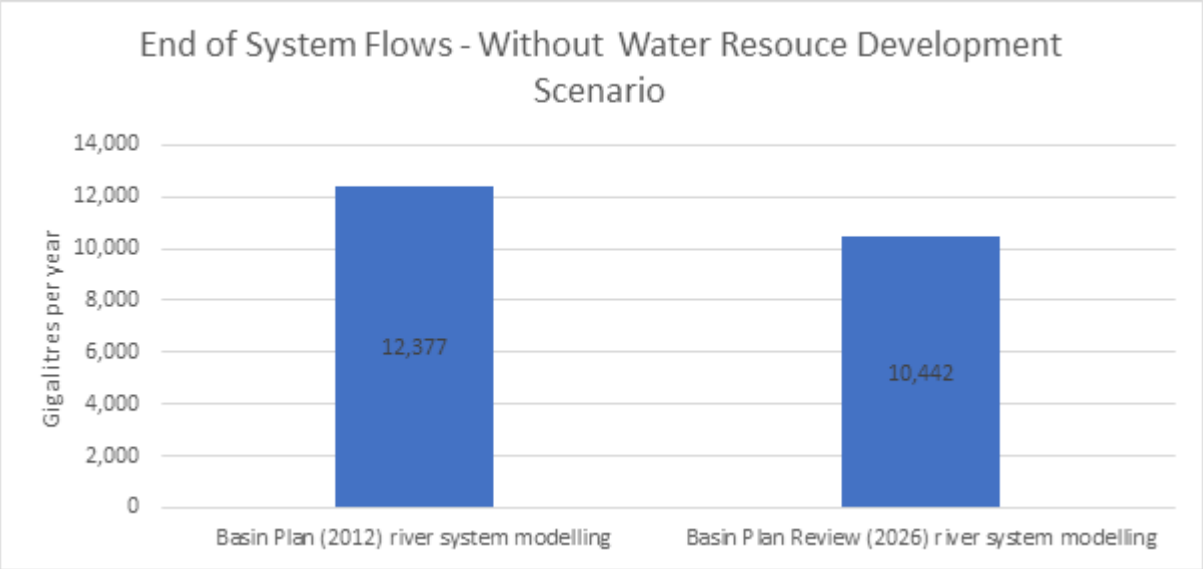

Figure B- 1 Comparison of legacy and contemporary river system modelling end of system long term average flows

As shown in Figure B- 1 contemporary river system modelling provides significantly lower estimates of end of system flows. The comparison of without water source development scenarios demonstrates this difference is driven by calibration, and representation of hydrological processes rather than the representation of water management arrangements.

Indicators and targets and objectives informed by river system modelling that informed development of the Basin Plan therefore require reconsideration to ensure they continue to support intended ecological outcomes and reflect a contemporary understanding of complex processes driving end of system outcomes. More work is needed with Basin state governments to further understand and resolve these complex and interdependent issues.

Drivers of Environmental Risk and Outcomes

Flow is the main factor that shapes the condition of the Coorong, Lower Lakes and Murray Mouth, but it is not the only one. The condition of the system depends on how much water flows, when it arrives, how long it lasts, and which paths it takes. Water quality and other management actions also play major roles.

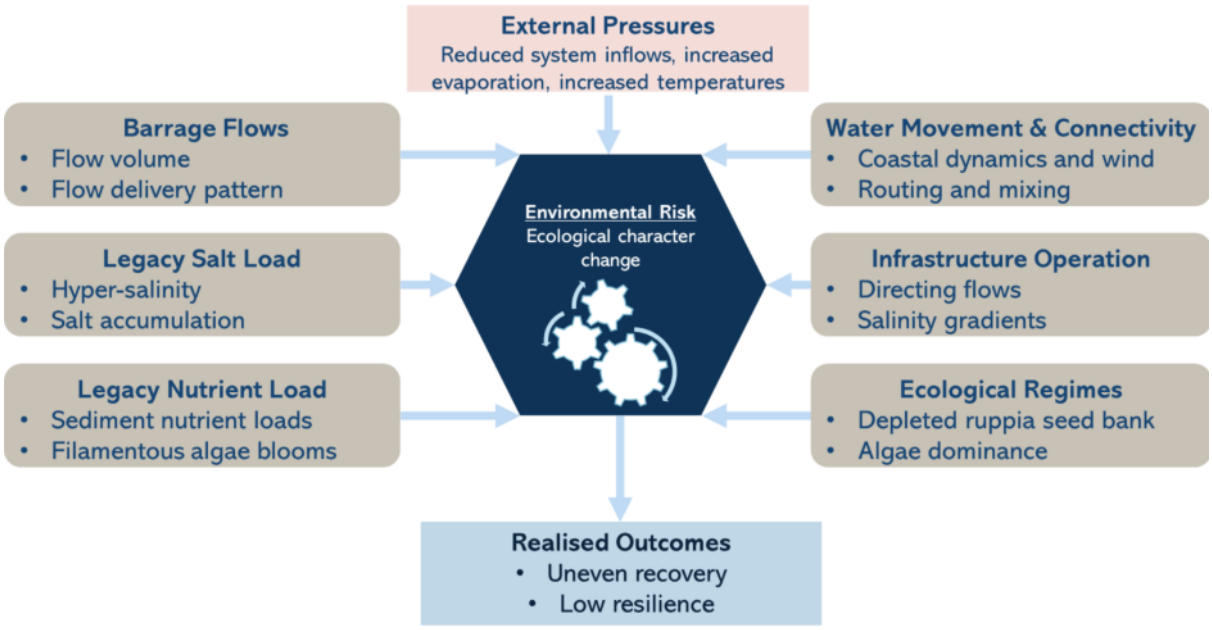

Figure B- 2 *Drivers of environmental risk and outcomes in the Coorong*

As illustrated in Figure B- 2 end of system outcomes are the product of complex interaction between several factors. As such, the Basin Plan Review needs to consider how flow volumes, flow patterns and complementary management actions interact. Further work is required to clarify how non-flow factors, such as legacy nutrient stores, coastal processes and climate change, are limiting outcomes.

SDL Resource Unit Moderations

SA Murray

SA Murray (In-channel and Floodplain)

For both LoE 1 and 2, the modelled likelihood grades for flows and connectivity have been moderated down in the SA Murray due to the modelling likely overestimating the impact that the Basin Plan can have on this part of the system under the current level of constraints. Upstream constraints prevent environmental water managers being able to influence anything above the small fresh part of the flow regime at the SA Border. Additionally, native fish was moderated down for LoE 1 and 2 due to the impacts of instream barriers and constraints (limited access to nursery habitats such as the floodplain and small tributaries).

LoE 3 has been moderated down for flows and connectivity for consistency to changes in LoE 1 and 2. The range for LoE3 has also been moderated down. The EWRs for the flows and connectivity theme were relatively insensitive to climate change impacts, but analysis of the raw hydrology data showed considerable impacts on the flow regime under the drier climates.

The LoE 1 Monitoring grade for ecosystem functions was a range of Poor to Moderate indicated by the internal elicitation panel process. However, a conservative approach was taken when ranges were given, to use the minimum grade (in this case – Poor).

Table B- 1 SA Murray (IC & FP) Pre Moderation

	LoE 1				LoE 2		LoE 3						
Theme	Default Statement LoE 1 (condition)	Default Confidence LoE1 (condition)	Default Statement LoE 1 (likelihood score)	Default Confidence LoE1 (likelihood score)	Default Statement LoE 2 (likelihood score)	Default Confidence LoE 2 (likelihood score)	2030s - Warmer & Much Drier	2030s - Warmer & Drier (Median)	2030s - Warmer & Wetter	2050s - Hotter & Much Drier	2050s - Hotter & Drier (Median)	2050s - Hotter & Wetter	Default Confidence LoE 3 (likelihood score)
Flows & Connectivity	Moderate	Medium	more likely than not	Medium	more likely than not	Medium	about as likely as not	more likely than not	more likely than not	more likely than not	more likely than not	more likely than not	Low
Ecosystem Functions	Poor to Moderate	Medium	about as likely as not	Low	about as likely as not	Low	unlikely	unlikely	about as likely as not	unlikely	unlikely	likely	Low
Waterbirds	Moderate	Medium	more likely than not	Medium	likely	High	about as likely as not	more likely than not	likely	unlikely	about as likely as not	likely	Low
Native Fish	Poor	Medium	about as likely as not	Low	likely	Low	unlikely	unlikely	likely	unlikely	unlikely	likely	Low
Native Vegetation	Moderate	Medium	more likely than not	Medium	likely	High	about as likely as not	more likely than not	likely	unlikely	about as likely as not	likely	Low
Other species	Moderate	Low	more likely than not	Medium	likely	High	about as likely as not	more likely than not	likely	unlikely	about as likely as not	likely	Low

Table B- 2 SA Murray (IC & FP) Post Moderation

	LoE 1				LoE 2		LoE 3						
Theme	Default Statement LoE 1	Default Confidence LoE1	Default Statement LoE 1	Default Confidence LoE1	Default Statement LoE 2	Default Confidence LoE 2	2030s – Warmer & Much Drier	2030s – Warmer & Drier	2030s – Warmer & Wetter	2050s – Hotter & Much Drier	2050s – Hotter & Drier	2050s – Hotter & Wetter	Default Confidence LoE 3
Flows & Connectivity	Moderate	Medium	about as likely as not	Medium	about as likely as not	Medium	about as likely as not	about as likely as not	about as likely as not	about as likely as not	about as likely as not	about as likely as not	Low
Ecosystem Functions	Poor	Medium	about as likely as not	Low	about as likely as not	Low	unlikely	unlikely	about as likely as not	unlikely	unlikely	likely	Low
Waterbirds	Moderate	Medium	more likely than not	Medium	likely	High	about as likely as not	more likely than not	likely	unlikely	about as likely as not	likely	Low
Native Fish	Poor	Medium	about as likely as not	Low	about as likely as not	Low	unlikely	unlikely	likely	unlikely	unlikely	likely	Low
Native Vegetation	Moderate	Medium	more likely than not	Medium	likely	High	about as likely as not	more likely than not	likely	unlikely	about as likely as not	likely	Low
Other species	Moderate	Low	more likely than not	Medium	likely	High	about as likely as not	more likely than not	likely	unlikely	about as likely as not	likely	Low

CLLMM

Line of Enquiry 1:

There were substantial improvements seen between the pre-Basin Plan and Basin Plan (considered as at the time of the review (at June 2024)) 2024 scenario's for the CLLMM. In regards to the CLLMM there are two significant factors likely driving these modelled improvements, the first being the influence of the Basin Plan, and the second being substantial changes to the operation of the Barrages. In the pre Basin Plan scenario, flows over the barrages are prioritized over raising of the lower lakes levels. In the Basin Plan 2024, the lower lakes level raising is prioritized over the barrage flows. The EWRs used for the CLLMM reflect current operational goals of the CLLMM operations. Several of the EWRs are virtually impossible to meet under the pre-Basin Plan model scenario due to the way the CLLMM management is codified in the model. For example, in the pre-Basin Plan model, once the Lower Lakes get to a specified level the model is programmed to release water out of the barrages; this Lower Lakes level is below the minimum target of most Lower Lake level EWRs.

The improvements to flows indicated by the modelling reflect observed improvements to some environmental outcomes, however, on-ground observations suggest the flow regime may still be insufficient in supporting many of the themes. Therefore, the flow regime scores have been moderated significantly in the CLLMM.

The monitoring grade for other species was originally a range of 'Poor to Moderate' from the internal elicitation panel. As a single grade was required, the conservative approach was used to adopt the lower bound of the ranges. In this case Poor was adopted for other species.

Line of Enquiry 2:

LoE2 for the CLLMM was also moderated using the same reasoning as was applied for LoE1. The benefits of a fully implemented Basin Plan were considered in the moderation. The main limiting driver for enhancing CLLMM outcomes is the pattern and volume of flow, so it was determined that an increase in flows to the CLLMM as part of a fully implemented Basin Plan would result in improvements to the flows and connectivity theme, which was rated a grade higher than it was under the LoE1 for the CLLMM. It is likely these additional flows would result in improvements to other themes, however, the synthesis panel felt they did not have the evidence to warrant moderating other theme grades up so a conservative approach was taken and other themes were left as they are. Under the fully implemented Basin Plan constraints will remain a significantly limiting driver impacting on CLLMM outcomes, which was also considered in this moderation.

Line of Enquiry 3

The LoE 3 modelling was considered highly uncertain for the CLLMM due to the complex interaction of sea level rise and decreased flows from the Murray system. The modelling captured the potential benefits of sea level rise on the South Lagoon of the Coorong, without a representation of the real-world disbenefits of these rises. As many metrics concentrate on these level-related outcomes, the focus on these changes impacted by sea-level rise are disproportionately represented in the initial modelling scores. Given the high uncertainty in the climate modelling, the original upper bounds have been maintained, but the lower bounds have been extended down from original ratings to 'unlikely'. This is more in line with what is seen in the SA Murray (in channel and floodplain) and with what would be

expected based on the SY climate modelling outputs for rainfall, runoff, PET and temperature. The median scenario has been removed from the Data Graph for CLLMM to represent the uncertainty in where that should sit.

Table B- 3 CLLMM Pre Moderation

	LoE 1				LoE 2		LoE 3						
Theme	Default Statement LoE 1 (condition)	Default Confidence LoE1 (condition)	Default Statement LoE 1 (likelihood score)	Default Confidence LoE1 (likelihood score)	Default Statement LoE 2 (likelihood score)	Default Confidence LoE 2 (likelihood score)	2030s – Warmer & Much Drier	2030s – Warmer & Drier (Median)	2030s – Warmer & Wetter	2050s – Hotter & Much Drier	2050s – Hotter & Drier (Median)	2050s – Hotter & Wetter	Default Confidence LoE 3 (likelihood score)
Flows & Connectivity	Moderate	High	likely	High	likely	High	more likely than not	more likely than not	likely	likely	likely	likely	Low
Ecosystem Functions	Poor	High	likely	Low	likely	Low	about as likely as not	about as likely as not	likely	about as likely as not	likely	likely	Low
Waterbirds	Poor	High	likely	Low	likely	Low	unlikely	about as likely as not	likely	about as likely as not	likely	likely	Low
Native Fish	Moderate	Medium	likely	High	likely	High	more likely than not	more likely than not	likely	more likely than not	likely	likely	Low
Native Vegetation	Moderate	Medium	likely	High	likely	High	more likely than not	more likely than not	likely	more likely than not	likely	likely	Low
Other species	Poor to Moderate	Medium	likely	Low	likely	Low	about as likely as not	about as likely as not	likely	about as likely as not	likely	likely	Low

Table B- 4 CLLMM Post Moderation

	LoE 1				LoE 2		LoE 3						
Theme	Default Statement LoE 1 (condition)	Default Confidence LoE1 (condition)	Default Statement LoE 1 (likelihood score)	Default Confidence LoE1 (likelihood score)	Default Statement LoE 2 (likelihood score)	Default Confidence LoE 2 (likelihood score)	2030s – Warmer & Much Drier	2030s – Warmer & Drier (Median)	2030s – Warmer & Wetter	2050s – Hotter & Much Drier	2050s – Hotter & Drier (Median)	2050s – Hotter & Wetter	Default Confidence LoE 3 (likelihood score)
Flows & Connectivity	Moderate	High	about as likely as not	High	more likely than not	High	Unlikely		likely	Unlikely		likely	Low
Ecosystem Functions	Poor	High	about as likely as not	Low	about as likely as not	Low	Unlikely		likely	Unlikely		likely	Low
Waterbirds	Poor	High	about as likely as not	Low	about as likely as not	Low	Unlikely		likely	Unlikely		likely	Low
Native Fish	Moderate	Medium	likely	High	likely	High	Unlikely		likely	Unlikely		likely	Low
Native Vegetation	Moderate	Medium	likely	High	likely	High	Unlikely		likely	Unlikely		likely	Low
Other species	Poor	Medium	about as likely as not	Low	about as likely as not	Low	Unlikely		likely	Unlikely		likely	Low

SA Murray Line of Enquiry Moderation

LoE 3 3 (2030) was moderated down from '*Partially Effective'* to '*Not Effective'* to recognize the additional pressures that are expected to impact the SA Murray outcomes and the lower performance compared to LoE 2. Other LoE ratings were not moderated, however it is worth noting that they were informed across both the SA Murray (IC & FP) and CLLMM outcomes.

NSW Murray

Line of Enquiry 1 and Line of Enquiry 2

These lines of enquiry have been moderated consistent with *Uncertainty Around Improvements in High .*

The likelihood that flows will support outcomes has been moderated down for NSW Murray themes. Most themes are moderated down due to having some aspect of performance related to the higher part of the flow regime outside levels that environmental water managers can influence. In the case that the likelihood rating already seemed sufficiently low, the grade was not changed. In the case of native fish and ecosystem functions, outcomes were moderated down further due to what was seen from monitoring outcomes and the ongoing connectivity issues from existing instream barriers and constraints.

In LoE1, Monitoring grades for ecosystem functions and other species were originally a range of 'Poor – Moderate' from the internal elicitation panel, however the need for a single grade required moderation of the range. The conservative approach was taken by using the lower end of the ranges (with Poor being used for ecosystem functions and other species). The confidence in waterbirds grade was lowered from Medium to Low as a result of feedback suggesting that waterbirds have been in decline in some areas even during inundation events that should have supported breeding. The confidence in native fish grade was increased from Medium to High following the NSW Government's input of robust supporting evidence.

Line of Enquiry 3

Some adjustment to LoE3 for flows and connectivity was required to keep consistency with the LoE1 and 2 changes. i.e. the driest scenario correlates to a likelihood rating that is slightly lower than the LoE1/2 outcomes.

Table B- 5 NSW Murray Pre Moderation

	LoE 1				LoE 2		LoE 3						
Theme	Default Statement LoE 1 (condition)	Default Confidence LoE1 (condition)	Default Statement LoE 1 (likelihood score)	Default Confidence LoE1 (likelihood score)	Default Statement LoE 2 (likelihood score)	Default Confidence LoE 2 (likelihood score)	2030s - Warmer & Much Drier	2030s - Warmer & Drier (Median)	2030s - Warmer & Wetter	2050s - Hotter & Much Drier	2050s - Hotter & Drier (Median)	2050s - Hotter & Wetter	Default Statement LoE 3 -2030s (likelihood score)
Flows & Connectivity	Moderate	Medium	more likely than not	Medium	more likely than not	Medium	more likely than not	more likely than not	more likely than not	more likely than not	more likely than not	more likely than not	Low
Ecosystem Functions	Poor - Moderate	Low	likely	Low	likely	Low	unlikely	about as likely as not	likely	very unlikely	unlikely	likely	Low
Waterbirds	Moderate	Medium	more likely than not	Medium	more likely than not	Medium	unlikely	about as likely as not	likely	very unlikely	about as likely as not	likely	Low
Native Fish	Poor	Medium	likely	Low	likely	Low	unlikely	about as likely as not	likely	very unlikely	unlikely	likely	Low
Native Vegetation	Moderate	Medium	more likely than not	Medium	likely	High	about as likely as not	more likely than not	likely	very unlikely	about as likely as not	likely	Low
Other species	Poor - Moderate	Low	about as likely as not	Low	likely	Low	unlikely	unlikely	likely	very unlikely	unlikely	likely	Low

Table B- 6 NSW Murray Post Moderation

	LoE 1				LoE 2		LoE 3						
Theme	Default Statement LoE 1 (condition)	Default Confidence LoE1	Default Statement LoE 1 (likelihood	Default Confidence LoE1 (likelihood	Default Statement LoE 2 (likelihood	Default Confidence LoE 2 (likelihood	2030s – Warmer & Much Drier	2030s – Warmer & Drier (Median)	2030s – Warmer & Wetter	2050s – Hotter & Much Drier	2050s – Hotter & Drier (Median)	2050s – Hotter & Wetter	Default Statement LoE 3 -2030s
Flows & Connectivity	Moderate	Medium	about as likely as not	Medium	about as likely as not	Medium	unlikely	about as likely as not	more likely than not	unlikely	about as likely as not	more likely than not	Low
Ecosystem Functions	Poor	Low	about as likely as not	Low	about as likely as not	Low	unlikely	about as likely as not	likely	very unlikely	unlikely	likely	Low
Waterbirds	Moderate	Low	more likely than not	Medium	more likely than not	Medium	unlikely	about as likely as not	likely	very unlikely	about as likely as not	likely	Low
Native Fish	Poor	High	about as likely as not	Low	about as likely as not	Low	unlikely	about as likely as not	likely	very unlikely	unlikely	likely	Low
Native Vegetation	Moderate	Medium	more likely than not	Medium	more likely than not	High	about as likely as not	more likely than not	likely	very unlikely	about as likely as not	likely	Low
Other species	Poor	Low	more likely than not	Low	more likely than not	Low	unlikely	unlikely	likely	very unlikely	unlikely	likely	Low

VIC Murray

Line of Enquiry 1 and Line of Enquiry 2:

These lines of enquiry have been moderated consistent with *Uncertainty Around Improvements in High* .

In the case of native fish and ecosystem functions, outcomes were moderated down further due to what was seen from the monitoring outcomes and the ongoing connectivity issues from existing instream barriers and constraints. Native vegetation has been moderated down due to the impact of constraints

and spatial variability in the monitoring (condition assessed as Good, but monitoring tends to be concentrated around sites that can be watered through works).

The Confidence for the LoE 1 ecosystem functions monitoring grade was also downgraded from 'low' to 'data deficient' through the data paucity investigation.

Line of Enquiry 3: Some adjustment to LoE3 for flows and connectivity was required to maintain consistency with the LoE1 and 2 changes. For native vegetation LoE 3 – grades moderated down to reflect the changes in LoE 1 and 2, in addition to the declining flows when compared to PBP levels.

Table B- 7 Victorian Murray Pre-Moderation

	LoE 1				LoE 2		LoE 3						
Theme	Condition Grade	Confidence (in condition grade)	Flow Likelihood Grade	Confidence (in likelihood grade)	Flow Likelihood Grade	Confidence (in likelihood grade)	2030s - Warmer & Much Drier	2030s - Warmer & Drier (Median)	2030s - Warmer & Wetter	2050s - Hotter & Much Drier	2050s - Hotter & Drier (Median)	2050s - Hotter & Wetter	Confidence LoE 3
Flows & Connectivity	Moderate	Medium	more likely than not	Medium	likely	High	more likely than not	more likely than not	likely	more likely than not	more likely than not	likely	Low
Ecosystem Functions	Poor	Low	about as likely as not	Low	likely	Low	unlikely	unlikely	about as likely as not	unlikely	unlikely	about as likely as not	Low
Waterbirds	Moderate	Low	more likely than not	Medium	likely	High	more likely than not	more likely than not	more likely than not	about as likely as not	more likely than not	likely	Low
Native Fish	Moderate	Medium	more likely than not	Medium	more likely than not	Medium	more likely than not	more likely than not	more likely than not	unlikely	more likely than not	more likely than not	Low
Native Vegetation	Good	Medium	likely	High	likely	High	more likely than not	likely	likely	about as likely as not	more likely than not	likely	Low
Other species	Moderate	Low	more likely than not	Medium	more likely than not	Medium	more likely than not	more likely than not	more likely than not	about as likely as not	more likely than not	more likely than not	Low

Table B- 8 Victorian Murray Post Moderation

	LoE 1				LoE 2		LoE 3						
Theme	Condition Grade	Confidence (in condition grade)	Flow Likelihood Grade	Confidence (in likelihood grade)	Flow Likelihood Grade	Confidence (in likelihood grade)	2030s - Warmer & Much Drier	2030s - Warmer & Drier (Median)	2030s - Warmer & Wetter	2050s - Hotter & Much Drier	2050s - Hotter & Drier (Median)	2050s - Hotter & Wetter	Confidence LoE 3
Flows & Connectivity	Moderate	Medium	about as likely as not	Medium	about as likely as not	High	about as likely as not	about as likely as not	likely	about as likely as not	more likely than not	likely	Low
Ecosystem Functions	Poor	Data Deficient	about as likely as not	Low	about as likely as not	Low	unlikely	unlikely	about as likely as not	unlikely	unlikely	about as likely as not	Low
Waterbirds	Moderate	Low	more likely than not	Medium	more likely than not	High	more likely than not	more likely than not	more likely than not	about as likely as not	more likely than not	likely	Low
Native Fish	Moderate	Medium	about as likely as not	Medium	about as likely as not	Medium	about as likely as not	about as likely as not	more likely than not	unlikely	about as likely as not	more likely than not	Low
Native Vegetation	Good	Medium	more likely than not	High	more likely than not	High	about as likely as not	about as likely as not	likely	about as likely as not	about as likely as not	likely	Low
Other species	Moderate	Low	more likely than not	Medium	more likely than not	Medium	more likely than not	more likely than not	more likely than not	about as likely as not	more likely than not	more likely than not	Low

Goulburn

The assessment coincided with wet antecedent conditions resulting in unregulated flows connecting the channel and floodplain. However, under regulated conditions constraints mean that environmental water managers cannot influence flows above half bankfull in the lower Goulburn. This constraint was considered as a significant limiting driver across most themes, including the flows and connectivity theme (see *Uncertainty Around Improvements in High*). Therefore, even though the flows and connectivity is considered in good condition currently, constraints reduce the effectiveness of the flow regime over the long term.

As a result of these constraining factors, most themes have been downgraded to reflect the lower likelihood of flows supporting outcomes, with likelihoods of either ‘about as likely as not’ or ‘more likely than not’ for LoE 1 and 2. LoE 3 adjusted where needed to be consistent with changes made to LoE 1 and 2.

In addition to this, there is a considerable increase in spill frequency and volume out of Lake Eildon. This is likely a model artefact rather than representative of reality and was therefore judged to artificially inflate the benefits the Basin Plan can have on the parts of the ecosystem that depend on the parts of the system that

The confidence in the LoE1 Monitoring condition for native fish was adjusted down from ‘High’ to ‘Medium’. This was adjusted as a result of information provided by VIC.

Table B- 9 Goulburn Pre-Moderation

	LoE 1				LoE 2		LoE 3						
Theme	Default Statement LoE 1 (condition)	Default Confidence LoE1 (condition)	Default Statement LoE 1 (likelihood score)	Default Confidence LoE1 (likelihood score)	Default Statement LoE 2 (likelihood score)	Default Confidence LoE 2 (likelihood score)	2030s - Warmer & Much Drier	2030s - Warmer & Drier (Median)	2030s - Warmer & Wetter	2050s - Hotter & Much Drier	2050s - Hotter & Drier (Median)	2050s - Hotter & Wetter	Default Statement LoE 3 - 2030s (likelihood score)
Flows & Connectivity	Good	Medium	likely	High	likely	High	more likely than not	likely	likely	about as likely as not	likely	likely	Low
Ecosystem Functions	Moderate	Medium	likely	High	likely	High	more likely than not	likely	likely	more likely than not	likely	likely	Low
Waterbirds	Moderate	Medium	more likely than not	Medium	more likely than not	Medium	more likely than not	more likely than not	more likely than not	more likely than not	more likely than not	more likely than not	Low
Native Fish	Poor	High	likely	Low	likely	Low	likely	likely	likely	about as likely as not	likely	likely	Low
Native Vegetation	Moderate	Medium	likely	High	likely	High	likely	likely	likely	more likely than not	likely	likely	Low
Other species	Moderate	Medium	likely	High	likely	High	more likely than not	likely	likely	more likely than not	likely	likely	Low

Table B- 10 Goulburn Post-Moderation

	LoE 1				LoE 2		LoE 3						
Theme	Default Statement LoE 1 (condition)	Default Confidence LoE1 (condition)	Default Statement LoE 1 (likelihood score)	Default Confidence LoE1 (likelihood score)	Default Statement LoE 2 (likelihood score)	Default Confidence LoE 2 (likelihood score)	2030s - Warmer & Much Drier	2030s - Warmer & Drier (Median)	2030s - Warmer & Wetter	2050s - Hotter & Much Drier	2050s - Hotter & Drier (Median)	2050s - Hotter & Wetter	Default Statement LoE 3 - 2030s (likelihood score)
Flows & Connectivity	Good	Medium	about as likely as not	High	about as likely as not	High	about as likely as not	about as likely as not	about as likely as not	about as likely as not	about as likely as not	about as likely as not	Low
Ecosystem Functions	Moderate	Medium	about as likely as not	High	about as likely as not	High	about as likely as not	about as likely as not	about as likely as not	about as likely as not	about as likely as not	about as likely as not	Low
Waterbirds	Moderate	Medium	more likely than not	Medium	more likely than not	Medium	more likely than not	more likely than not	more likely than not	more likely than not	more likely than not	more likely than not	Low
Native Fish	Poor	Medium	more likely than not	Low	more likely than not	Low	more likely than not	more likely than not	likely	about as likely as not	more likely than not	likely	Low
Native Vegetation	Moderate	Medium	about as likely as not	High	about as likely as not	High	about as likely as not	about as likely as not	about as likely as not	about as likely as not	about as likely as not	about as likely as not	Low
Other species	Moderate	Medium	more likely than not	High	more likely than not	High	more likely than not	more likely than not	likely	more likely than not	more likely than not	likely	Low

Broken

As is the case for several VIC catchments, there is low confidence in the flow modelling outcomes for LoE 1 and 2. The EWRs do not cover all flow regime requirements and so other lines of evidence are drawn on to understand the likelihood flows support outcomes (see EWR representation of the flow regime).

LoE 3 has been moderated down for consistency with LoE 1 and 2 changes, along with expected water quality issues (strongest affects on in-stream themes).

*Confidence levels across LoEs for likelihood ratings were adjusted down to low to reflect the uncertainty in these outcomes.

Table B- 11 Broken Pre-Moderation

	LoE 1				LoE 2		LoE 3						
Theme	Default Statement LoE 1 (condition)	Default Confidence LoE1 (condition)	Default Statement LoE 1 (likelihood score)	Default Confidence LoE1 (likelihood score)	Default Statement LoE 2 (likelihood score)	Default Confidence LoE 2 (likelihood score)	2030s - Warmer & Much Drier	2030s - Warmer & Drier (Median)	2030s - Warmer & Wetter	2050s - Hotter & Much Drier	2050s - Hotter & Drier (Median)	2050s - Hotter & Wetter	Default Statement LoE 3 -2030s (likelihood score)
Flows & Connectivity	Moderate	Medium	more likely than not	Medium	more likely than not	Medium	more likely than not	more likely than not	more likely than not	more likely than not	more likely than not	more likely than not	Low
Ecosystem Functions	Moderate	Medium	more likely than not	Medium	more likely than not	Medium	more likely than not	more likely than not	more likely than not	more likely than not	more likely than not	more likely than not	Low
Waterbirds	Moderate	Medium	more likely than not	Medium	more likely than not	Medium	more likely than not	more likely than not	more likely than not	more likely than not	more likely than not	more likely than not	Low
Native Fish	Moderate	High	more likely than not	Medium	more likely than not	Medium	more likely than not	more likely than not	more likely than not	likely	more likely than not	more likely than not	Low
Native Vegetation	Moderate	Medium	more likely than not	Medium	more likely than not	Medium	more likely than not	more likely than not	more likely than not	more likely than not	more likely than not	more likely than not	Low
Other species	Good	Medium	likely	High	likely	High	likely	likely	likely	likely	likely	likely	Low

Table B- 12 Broken Post-Moderation

	LoE 1				LoE 2		LoE 3						
Theme	Default Statement LoE 1 (condition)	Default Confidence LoE1 (condition)	Default Statement LoE 1 (likelihood score)	Default Confidence LoE1 (likelihood score)	Default Statement LoE 2 (likelihood score)	Default Confidence LoE 2 (likelihood score)	2030s - Warmer & Much Drier	2030s - Warmer & Drier (Median)	2030s - Warmer & Wetter	2050s - Hotter & Much Drier	2050s - Hotter & Drier (Median)	2050s - Hotter & Wetter	Default Statement LoE 3 -2030s (likelihood score)
Flows & Connectivity	Moderate	Medium	about as likely as not	low	about as likely as not	low	about as likely as not	about as likely as not	more likely than not	about as likely as not	about as likely as not	more likely than not	Low
Ecosystem Functions	Moderate	Medium	about as likely as not	low	about as likely as not	low	about as likely as not	about as likely as not	more likely than not	about as likely as not	about as likely as not	more likely than not	Low
Waterbirds	Moderate	Medium	more likely than not	low	more likely than not	low	more likely than not	more likely than not	more likely than not	more likely than not	more likely than not	more likely than not	Low
Native Fish	Moderate	High	about as likely as not	low	about as likely as not	low	about as likely as not	about as likely as not	more likely than not	about as likely as not	about as likely as not	more likely than not	Low
Native Vegetation	Moderate	Medium	more likely than not	low	more likely than not	low	more likely than not	more likely than not	more likely than not	more likely than not	more likely than not	more likely than not	Low
Other species	Good	Medium	more likely than not	low	more likely than not	low	more likely than not	more likely than not	likely	more likely than not	more likely than not	likely	Low

Campaspe

As is the case for several VIC catchments, there is low confidence in the flow modelling outcomes for LoE 1 and 2. The EWRs do not cover all flow regime requirements and so other lines of evidence are drawn on to understand the likelihood flows support outcomes (see *EWR representation of the flow regime*). As a result, through the moderation process, some Statements for LoE 1 and 2 have been moderated down. For the native fish theme, the poor monitoring condition of fish also informed the moderation process. LoE3 adjustments were made in line with changes to LoE 1 and 2 changes for consistency.

The high variability of outcomes spatially across the Campaspe were also considered as part of the moderation process. The large differences are evident when looking at the modelled outcomes for the Campaspe River compared to the Coliban River. The final likelihood grades considered both parts of the system and this is evident in their final positioning (within the original range).

*Confidence levels across LoEs for likelihood ratings were adjusted down to low to reflect the uncertainty in these outcomes.

For the LoE1 Monitoring confidence grades, flows and connectivity, native fish, and other species were adjusted. Native fish confidence was reduced from High to Medium due to conflicting evidence for the native fish grade provided by Victoria. Other species was reduced from Low to 'Data Deficient' due to the outcomes of the Data Paucity investigation. Flows and connectivity was adjusted from High to Medium due to the high spatial variability in flows and connectivity between the Campaspe and Coliban. Waterbirds was originally rated through the internal elicitation panel but later deemed inappropriate for assessment through the Data Paucity investigation and converted to 'not assessed'.

Note – the Campaspe SDL resource unit was considered collectively as one unit by the internal elicitation panel. Therefore, there is only a single set of monitoring scores and confidence ratings for the whole of the Campaspe. The duplicate tables were generated to consider the impacts of modelled flow outcomes for the Coliban separately to the Campaspe (as modelled results differed greatly). Therefore, monitoring results are represented below in both tables. Moderation of these condition grades happened through the science synthesis where both sets of results are considered together in light of other information.

Table B- 13 Campaspe (Campaspe) Pre-Moderation

	LoE 1				LoE 2		LoE 3						
Theme	Default Statement LoE 1 (condition)	Default Confidence LoE1 (condition)	Default Statement LoE 1 (likelihood	Default Confidence LoE1 (likelihood	Default Statement LoE 2 (likelihood score)	Default Confidence LoE2 (likelihood	2030s – Warmer & Much Drier	2030s – Warmer & Drier (Median)	2030s – Warmer & Wetter	2050s – Hotter & Much Drier	2050s – Hotter & Drier (Median)	2050s – Hotter & Wetter	Default Confidence LoE3 (likelihood
Flows & Connectivity	Good	High	very likely	High	very likely	High	very likely	very likely	very likely	very likely	very likely	very likely	Low
Ecosystem Functions	Good	Medium	very likely	High	very likely	High	likely	likely	very likely	likely	likely	very likely	Low
Waterbirds	Moderate	Low	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	Low
Native Fish	Poor	High	likely	Low	likely	Low	likely	likely	likely	about as likely as not	likely	likely	Low
Native Vegetation	Moderate	Medium	likely	High	likely	High	likely	likely	likely	likely	likely	likely	Low
Other species	Moderate	Low	likely	High	likely	High	likely	likely	likely	likely	likely	likely	Low

Table B- 14 Campaspe (Coliban) Pre-Moderation

	LoE 1				LoE 2		LoE 3						
Theme	Default Statement LoE 1 (condition)	Default Confidence LoE1 (condition)	Default Statement LoE 1 (likelihood	Default Confidence LoE1 (likelihood	Default Statement LoE 2 (likelihood score)	Default Confidence LoE2 (likelihood	2030s – Warmer & Much Drier	2030s – Warmer & Drier (Median)	2030s – Warmer & Wetter	2050s – Hotter & Much Drier	2050s – Hotter & Drier (Median)	2050s – Hotter & Wetter	Default Confidence LoE3 (likelihood score)
Flows & Connectivity	Good	High	about as likely as not	Low	about as likely as not	Low	about as likely as not	about as likely as not	about as likely as not	about as likely as not	about as likely as not	about as likely as not	Low
Ecosystem Functions	Good	Medium	unlikely	Low	unlikely	Low	unlikely	unlikely	unlikely	unlikely	unlikely	unlikely	Low
Waterbirds	Moderate	Low	#N/A	Low	#N/A	Low	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	Low
Native Fish	Poor	High	very unlikely	Low	very unlikely	Low	very unlikely	very unlikely	very unlikely	very unlikely	very unlikely	very unlikely	Low
Native Vegetation	Moderate	Medium	very unlikely	Low	very unlikely	Low	very unlikely	very unlikely	very unlikely	very unlikely	very unlikely	very unlikely	Low
Other species	Moderate	Low	very unlikely	Low	very unlikely	Low	very unlikely	very unlikely	very unlikely	very unlikely	very unlikely	very unlikely	Low

Table B- 15 Campaspe (Combined) Post-Moderation

	LoE 1				LoE 2		LoE 3						
Theme	Default Statement LoE 1 (condition)	Default Confidence LoE1 (condition)	Default Statement LoE 1 (likelihood	Default Confidence LoE1 (likelihood	Default Statement LoE 2 (likelihood score)	Default Confidence LoE2 (likelihood	2030s – Warmer & Much Drier	2030s – Warmer & Drier (Median)	2030s – Warmer & Wetter	2050s – Hotter & Much Drier	2050s – Hotter & Drier (Median)	2050s – Hotter & Wetter	Default Confidence LoE3 (likelihood score)
Flows & Connectivity	Good	Medium	more likely than not	Low	more likely than not	Low	about as likely as not	more likely than not	very likely	about as likely as not	more likely than not	very likely	Low
Ecosystem Functions	Good	Medium	about as likely as not	Low	about as likely as not	Low	unlikely	about as likely as not	very likely	unlikely	about as likely as not	very likely	Low
Waterbirds	NA	NA	#N/A	Low	#N/A	Low	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	Low
Native Fish	Poor	Medium	unlikely	Low	unlikely	Low	very unlikely	unlikely	likely	very unlikely	unlikely	likely	Low
Native Vegetation	Moderate	Medium	more likely than not	Low	more likely than not	Low	about as likely as not	more likely than not	likely	about as likely as not	more likely than not	likely	Low
Other species	Moderate	Data Deficient	more likely than not	Low	more likely than not	Low	about as likely as not	more likely than not	likely	about as likely as not	more likely than not	likely	Low

Wimmera-Mallee

The Wimmera-Mallee modelling outcomes are complex to interpret – as the Wimmera River generally shows good improvement in flows when compared to pre-Basin plan levels, however, the tributaries (represented in the modelling by outcomes at Mackenzie River, and Burnt and Bungalally Creeks) show large declines. With polarized outcomes, it is difficult to attribute likelihood grades across the themes. Considering the issues with reduced longitudinal and lateral connectivity through the catchment, and the heightened risks within the tributaries, likelihood ratings for flows and connectivity, native fish and other species themes have been moderated down to either ‘about as likely as not’ or ‘more likely than not’. Likelihood ratings for remaining themes have been maintained at the original ratings. LoE 3 have been adjusted to remain consistent with the changes made to LoE 1 and 2.

Conceptual understanding of the system – EWR performance reflects the inability of environmental managers to influence key parts of the flow regime due to delivery constraints.

Table B- 16 Wimmera Pre-Moderation

	LoE 1				LoE 2		LoE 3						
Theme	Default Statement LoE 1 (condition)	Default Confidence LoE1 (condition)	Default Statement LoE 1 (likelihood score)	Default Confidence LoE1 (likelihood score)	Default Statement LoE 2 (likelihood score)	Default Confidence LoE 2 (likelihood score)	2030s - Warmer & Much Drier	2030s - Warmer & Drier (Median)	2030s - Warmer & Wetter	2050s - Hotter & Much Drier	2050s - Hotter & Drier (Median)	2050s - Hotter & Wetter	Default Confidence LoE 3 (likelihood score)
Flows & Connectivity	Moderate	Medium	more likely than not	Medium	more likely than not	Medium	about as likely as not	more likely than not	more likely than not	about as likely as not	about as likely as not	more likely than not	Low
Ecosystem Functions	Moderate	Low	more likely than not	Medium	more likely than not	Medium	about as likely as not	more likely than not	more likely than not	unlikely	about as likely as not	more likely than not	Low
Waterbirds	Poor	Low	unlikely	Medium	unlikely	Medium	unlikely	unlikely	unlikely	very unlikely	unlikely	unlikely	Low
Native Fish	Moderate	Medium	likely	High	likely	High	more likely than not	more likely than not	likely	more likely than not	more likely than not	likely	Low
Native Vegetation	Moderate	Medium	unlikely	Low	unlikely	Low	unlikely	unlikely	unlikely	very unlikely	unlikely	unlikely	Low
Other species	Moderate	Low	likely	High	likely	High	likely	likely	likely	more likely than not	likely	likely	Low

Table B- 17 Wimmera Post-Moderation

	LoE 1				LoE 2		LoE 3						
Theme	Default Statement LoE 1 (condition)	Default Confidence LoE1 (condition)	Default Statement LoE 1 (likelihood	Default Confidence LoE1 (likelihood	Default Statement LoE 2 (likelihood score)	Default Confidence LoE 2 (likelihood	2030s - Warmer & Much Drier	2030s - Warmer & Drier (Median)	2030s - Warmer & Wetter	2050s - Hotter & Much Drier	2050s - Hotter & Drier (Median)	2050s - Hotter & Wetter	Default Confidence LoE 3 (likelihood score)
Flows & Connectivity	Moderate	Medium	about as likely as not	Medium	about as likely as not	Medium	unlikely	about as likely as not	more likely than not	unlikely	about as likely as not	more likely than not	Low
Ecosystem Functions	Moderate	Low	more likely than not	Medium	more likely than not	Medium	about as likely as not	more likely than not	more likely than not	unlikely	about as likely as not	more likely than not	Low
Waterbirds	Poor	Low	unlikely	Medium	unlikely	Medium	unlikely	unlikely	unlikely	very unlikely	unlikely	unlikely	Low
Native Fish	Moderate	Medium	more likely than not	High	more likely than not	High	about as likely as not	more likely than not	likely	about as likely as not	more likely than not	likely	Low
Native Vegetation	Moderate	Medium	unlikely	Low	unlikely	Low	unlikely	unlikely	unlikely	very unlikely	unlikely	unlikely	Low
Other species	Moderate	Low	more likely than not	High	more likely than not	High	about as likely as not	more likely than not	likely	unlikely	more likely than not	likely	Low

Loddon

As is the case for several VIC catchments, there is low confidence in the flow modelling outcomes for LoE 1 and 2. The EWRs do not cover all flow regime requirements and so other lines of evidence are drawn on to understand the likelihood flows support outcomes (see *EWR representation of the flow regime*). As a result of this, some higher scores have been moderated down to better reflect these limitations.

*Confidence levels across LoEs for likelihood ratings were adjusted down to low to reflect the uncertainty in these outcomes.

Table B- 18 Loddon Pre-Moderation

	LoE 1				LoE 2		LoE 3						
Theme	Default Statement LoE 1 (condition)	Default Confidence LoE1 (condition)	Default Statement LoE 1 (likelihood score)	Default Confidence LoE1 (likelihood score)	Default Statement LoE 2 (likelihood score)	Default Confidence LoE 2 (likelihood score)	2030s - Warmer & Much Drier	2030s - Warmer & Drier (Median)	2030s - Warmer & Wetter	2050s - Hotter & Much Drier	2050s - Hotter & Drier (Median)	2050s - Hotter & Wetter	Default Confidence LoE3 (likelihood score)
Flows & Connectivity	Good	Medium	likely	High	likely	High	likely	likely	very likely	likely	likely	likely	Low
Ecosystem Functions	Moderate	Medium	likely	High	likely	High	likely	likely	likely	likely	likely	likely	Low
Waterbirds	Moderate	Low	more likely than not	Medium	more likely than not	Medium	more likely than not	more likely than not	more likely than not	more likely than not	more likely than not	more likely than not	Low
Native Fish	Poor	Medium	likely	Low	likely	Low	likely	likely	likely	likely	likely	likely	Low
Native Vegetation	Moderate	Medium	likely	High	likely	High	likely	likely	likely	likely	likely	likely	Low
Other species	Moderate	Medium	likely	High	likely	High	likely	likely	likely	likely	likely	likely	Low

Table B- 19 Loddon Post-Moderation

	LoE 1				LoE 2		LoE 3						
Theme	Default Statement LoE 1 (condition)	Default Confidence LoE1 (condition)	Default Statement LoE 1 (likelihood score)	Default Confidence LoE1 (likelihood score)	Default Statement LoE 2 (likelihood score)	Default Confidence LoE 2 (likelihood score)	2030s - Warmer & Much Drier	2030s - Warmer & Drier (Median)	2030s - Warmer & Wetter	2050s - Hotter & Much Drier	2050s - Hotter & Drier (Median)	2050s - Hotter & Wetter	Default Confidence LoE3 (likelihood score)
Flows & Connectivity	Good	Medium	about as likely as not	Low	about as likely as not	Low	Unlikely	about as likely as not	very likely	Unlikely	about as likely as not	likely	Low
Ecosystem Functions	Moderate	Medium	about as likely as not	Low	about as likely as not	Low	Unlikely	about as likely as not	likely	Unlikely	about as likely as not	likely	Low
Waterbirds	Moderate	Low	more likely than not	Low	more likely than not	Low	about as likely as not	more likely than not	more likely than not	about as likely as not	more likely than not	more likely than not	Low
Native Fish	Poor	Medium	more likely than not	Low	more likely than not	Low	about as likely as not	more likely than not	more likely than not	about as likely as not	more likely than not	more likely than not	Low
Native Vegetation	Moderate	Medium	about as likely as not	Low	about as likely as not	Low	Unlikely	about as likely as not	likely	Unlikely	about as likely as not	likely	Low
Other species	Moderate	Medium	more likely than not	Low	more likely than not	Low	about as likely as not	more likely than not	more likely than not	about as likely as not	more likely than not	more likely than not	Low

Murrumbidgee

Modelling shows that improvements in overbank flows occur in the Yanco Creek System (including Yanco Creek, Billabong Creek, Colombo Creek & Forest Creek). However, the ability to achieve Environmental Outcomes from overbank flows along mid and lower reaches of the Murrumbidgee are significantly limited by operational/delivery constraints (see *Uncertainty Around Improvements in High*). As a result, the grade for the flows and connectivity likelihood rating has been moderated down to 'about as likely as not'.

The LoE 1 Monitoring grade for flows & connectivity was a range of Moderate to Good. However, a conservative approach was taken when ranges were given, to use the minimum grade (in this case – Moderate). The confidence levels for flows & connectivity, native fish and native vegetation scores were all moderated down. The native fish confidence was moderated down from High to Medium as a result of NSW input suggesting that the nature/condition of native fish communities varies within different river reaches/systems and not all would align with the current grade of 'Poor'. Similarly, the flows & connectivity and native vegetation confidence were both moderated down from Medium to Low as a result of spatial variability to performance throughout the catchment.

Table B- 20 Murrumbidgee Pre-Moderation

	LoE 1				LoE 2		LoE 3						
Theme	Default Statement LoE 1 (condition)	Default Confidence LoE1 (condition)	Default Statement LoE 1 (likelihood	Default Confidence LoE1 (likelihood	Default Statement LoE 2 (likelihood score)	Default Confidence LoE2 (likelihood	2030s – Warmer & Much Drier	2030s – Warmer & Drier (Median)	2030s – Warmer & Wetter	2050s – Hotter & Much Drier	2050s – Hotter & Drier (Median)	2050s – Hotter & Wetter	Default Confidence LoE3 (likelihood
Flows & Connectivity	Moderate to Good	Medium	more likely than not	Medium	more likely than not	Medium	about as likely as not	about as likely as not	more likely than not	unlikely	about as likely as not	more likely than not	Low
Ecosystem Functions	Moderate	Low	about as likely as not	Low	more likely than not	Medium	unlikely	unlikely	more likely than not	very unlikely	unlikely	more likely than not	Low
Waterbirds	Moderate	High	more likely than not	Medium	likely	High	about as likely as not	more likely than not	more likely than not	unlikely	more likely than not	more likely than not	Low
Native Fish	Poor	High	unlikely	Medium	unlikely	Medium	very unlikely	unlikely	unlikely	very unlikely	very unlikely	unlikely	Low
Native Vegetation	Poor	Medium	about as likely as not	Low	about as likely as not	Low	unlikely	unlikely	about as likely as not	very unlikely	unlikely	likely	Low
Other species	Moderate	Low	more likely than not	Medium	likely	High	about as likely as not	more likely than not	likely	unlikely	more likely than not	likely	Low

Table B- 21 Murrumbidgee Post-Moderation

	LoE 1				LoE 2		LoE 3						
Theme	Default Statement LoE 1 (condition)	Default Confidence LoE1 (condition)	Default Statement LoE 1 (likelihood	Default Confidence LoE1 (likelihood	Default Statement LoE 2 (likelihood score)	Default Confidence LoE2 (likelihood	2030s – Warmer & Much Drier	2030s – Warmer & Drier (Median)	2030s – Warmer & Wetter	2050s – Hotter & Much Drier	2050s – Hotter & Drier (Median)	2050s – Hotter & Wetter	Default Confidence LoE3 (likelihood
Flows & Connectivity	Moderate	Low	about as likely as not	Medium	about as likely as not	Medium	about as likely as not	about as likely as not	more likely than not	unlikely	about as likely as not	more likely than not	Low
Ecosystem Functions	Moderate	Low	about as likely as not	Low	more likely than not	Medium	unlikely	unlikely	more likely than not	very unlikely	unlikely	more likely than not	Low
Waterbirds	Moderate	High	more likely than not	Medium	likely	High	about as likely as not	more likely than not	more likely than not	unlikely	more likely than not	more likely than not	Low
Native Fish	Poor	Medium	unlikely	Medium	unlikely	Medium	very unlikely	unlikely	unlikely	very unlikely	very unlikely	unlikely	Low
Native Vegetation	Poor	Low	about as likely as not	Low	about as likely as not	Low	unlikely	unlikely	about as likely as not	very unlikely	unlikely	likely	Low
Other species	Moderate	Low	more likely than not	Medium	likely	High	about as likely as not	more likely than not	likely	unlikely	more likely than not	likely	Low

Lachlan

As a result of further information provided by NSW, some likelihood grades were moderated down.

The issues identified were that of increased sedimentation and reduced flow variability (as a result of river regulation). These issues were relevant to all LoEs and were considered to impact ecosystem functions, other species and native fish themes. For these themes, the initial grade was higher than 'about as likely as not' the grade was moderated down to 'about as likely as not'.

The LoE 1 monitoring confidence grades for flows & connectivity was moderated down from Medium to Low due to risks and uncertainties (spatial variability) identified by NSW. Native vegetation monitoring confidence was moderated down from Medium to Low as a result the poor community condition reported throughout the Lachlan catchment, the high spatial variability and lack of data for significant portions of the catchment. The other species confidence was moderated down from Low to Data Deficient through the Data Paucity Investigation due to a lack of data.

Table B- 22 Lachlan Pre-Moderation

	LoE 1				LoE 2		LoE 3						
Theme	Default Statement LoE 1 (condition)	Default Confidence LoE1 (condition)	Default Statement LoE 1 (likelihood score)	Default Confidence LoE1 (likelihood score)	Default Statement LoE 2 (likelihood score)	Default Confidence LoE 2 (likelihood score)	2030s - Warmer & Much Drier	2030s - Warmer & Drier (Median)	2030s - Warmer & Wetter	2050s - Hotter & Much Drier	2050s - Hotter & Drier (Median)	2050s - Hotter & Wetter	Default Confidence LoE3 (likelihood score)
Flows & Connectivity	Moderate	Medium	more likely than not	Medium	more likely than not	Medium	about as likely as not	more likely than not	more likely than not	unlikely	about as likely as not	more likely than not	Low
Ecosystem Functions	Moderate	Low	more likely than not	Medium	more likely than not	Medium	unlikely	about as likely as not	more likely than not	very unlikely	about as likely as not	more likely than not	Low
Waterbirds	Moderate	Medium	more likely than not	Medium	more likely than not	Medium	very unlikely	unlikely	more likely than not	very unlikely	unlikely	more likely than not	Low
Native Fish	Poor	High	about as likely as not	Low	about as likely as not	Low	unlikely	unlikely	about as likely as not	unlikely	unlikely	about as likely as not	Low
Native Vegetation	Moderate	Medium	more likely than not	Medium	more likely than not	Medium	about as likely as not	about as likely as not	more likely than not	unlikely	about as likely as not	more likely than not	Low
Other species	Moderate	Low	more likely than not	Medium	more likely than not	Medium	unlikely	about as likely as not	more likely than not	unlikely	about as likely as not	more likely than not	Low

Table B- 23 Lachlan Post-Moderation

	LoE 1				LoE 2		LoE 3						
Theme	Default Statement LoE 1 (condition)	Default Confidence LoE1 (condition)	Default Statement LoE 1 (likelihood score)	Default Confidence LoE1 (likelihood score)	Default Statement LoE 2 (likelihood score)	Default Confidence LoE 2 (likelihood score)	2030s - Warmer & Much Drier	2030s - Warmer & Drier (Median)	2030s - Warmer & Wetter	2050s - Hotter & Much Drier	2050s - Hotter & Drier (Median)	2050s - Hotter & Wetter	Default Confidence LoE3 (likelihood score)
Flows & Connectivity	Moderate	Low	more likely than not	Medium	more likely than not	Medium	about as likely as not	more likely than not	more likely than not	unlikely	about as likely as not	more likely than not	Low
Ecosystem Functions	Moderate	Low	about as likely as not	Medium	about as likely as not	Medium	unlikely	about as likely as not	more likely than not	very unlikely	about as likely as not	more likely than not	Low
Waterbirds	Moderate	Medium	more likely than not	Medium	more likely than not	Medium	very unlikely	unlikely	more likely than not	very unlikely	unlikely	more likely than not	Low
Native Fish	Poor	High	about as likely as not	Low	about as likely as not	Low	unlikely	unlikely	about as likely as not	unlikely	unlikely	about as likely as not	Low
Native Vegetation	Moderate	Low	more likely than not	Medium	more likely than not	Medium	about as likely as not	about as likely as not	more likely than not	unlikely	about as likely as not	more likely than not	Low
Other species	Moderate	Data Paucity	about as likely as not	Medium	about as likely as not	Medium	unlikely	about as likely as not	more likely than not	unlikely	about as likely as not	more likely than not	Low

Intersecting Streams

The confidence in the initial native vegetation monitoring grade was downgraded from Medium to Low due to spatial variability in condition data across the planning units. This is due to vegetation condition monitoring indicating many vegetation communities are currently in intermediate/poor or poor condition. Most monitoring is also limited to two regions in the Intersecting Streams and these are impacted by different levels of water diversions. The adjustment was also informed by outcomes of the condition monitoring assessments in (Bowen et al, 2024)[77]. The low confidence was also applicable to LoE 2.

The LoE1 monitoring grade for waterbirds was a range of 'Poor to Moderate'. As a single grade was needed, a conservative approach was taken to use the lower bound. In this case waterbirds is assessed as 'Poor' condition. A 'Poor' rating was also supported by NSW.

The confidence score for native fish was moderated down from Medium to Low as a result of high variability of habitats and limited sampling.

The confidence score for other species was moderated down from Low to Data Deficient as a result of the Data Paucity Investigation.

Table B- 24 Intersecting Streams Pre-Moderation

	LoE 1				LoE 2		LoE 3						
Theme	Default Statement LoE 1 (condition)	Default Confidence LoE1 (condition)	Default Statement LoE 1 (likelihood score)	Default Confidence LoE1 (likelihood score)	Default Statement LoE 2 (likelihood score)	Default Confidence LoE 2 (likelihood score)	2030s - Warmer & Much Drier	2030s - Warmer & Drier (Median)	2030s - Warmer & Wetter	2050s - Hotter & Much Drier	2050s - Hotter & Drier (Median)	2050s - Hotter & Wetter	ment LoE 3 -2030s (likel
Flows & Connectivity	Moderate	Medium	more likely than not	Medium	more likely than not	Medium	unlikely	about as likely as not	likely	unlikely	about as likely as not	likely	Low
Ecosystem Functions	Moderate	Low	more likely than not	Medium	more likely than not	Medium	unlikely	more likely than not	likely	very unlikely	more likely than not	likely	Low
Waterbirds	Poor to Moderate	Low	about as likely as not	Low	likely	Low	unlikely	about as likely as not	likely	very unlikely	about as likely as not	likely	Low
Native Fish	Poor	Medium	about as likely as not	Low	likely	Low	unlikely	about as likely as not	likely	unlikely	about as likely as not	likely	Low
Native Vegetation	Moderate	Medium	more likely than not	Medium	more likely than not	Medium	about as likely as not	more likely than not	likely	unlikely	more likely than not	likely	Low
Other species	Moderate	Low	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A

[77]Bowen, S, O'Hea Miller, S, Helfensdorfer, A, Van Den Broek, J, Roberts, I, Cox, B, Marsland, K, Parsons, D, Dabovic J (2024) *Water-dependent native vegetation, Environmental Outcomes Monitoring and Research Program Report 2022 – 2024,* Surface Water Science unit of NSW Department of Climate Change, Energy, the Environment and Water.

Table B- 25 Intersecting Streams Post-Moderation

	LoE 1				LoE 2		LoE 3						
Theme	Default Statement LoE 1 (condition)	Default Confidence LoE1 (condition)	Default Statement LoE 1 (likelihood score)	Default Confidence LoE1 (likelihood score)	Default Statement LoE 2 (likelihood score)	Default Confidence LoE 2 (likelihood score)	2030s - Warmer & Much Drier	2030s - Warmer & Drier (Median)	2030s - Warmer & Wetter	2050s - Hotter & Much Drier	2050s - Hotter & Drier (Median)	2050s - Hotter & Wetter	ment LoE 3 -2030s (likel
Flows & Connectivity	Moderate	Medium	more likely than not	Medium	more likely than not	Medium	unlikely	about as likely as not	likely	unlikely	about as likely as not	likely	Low
Ecosystem Functions	Moderate	Low	more likely than not	Medium	more likely than not	Medium	unlikely	more likely than not	likely	very unlikely	more likely than not	likely	Low
Waterbirds	Poor	Low	about as likely as not	Low	likely	Low	unlikely	about as likely as not	likely	very unlikely	about as likely as not	likely	Low
Native Fish	Poor	Low	about as likely as not	Low	likely	Low	unlikely	about as likely as not	likely	unlikely	about as likely as not	likely	Low
Native Vegetation	Moderate	Low	more likely than not	Low	more likely than not	Low	about as likely as not	more likely than not	likely	unlikely	more likely than not	likely	Low
Other species	Not Assessed	Data Paucity	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A

Intersecting Streams Line of Enquiry Moderation

LoE 1 has been moderated up from *Partially* to *Largely Effective* to reflect the benefits from water infrastructure in the lower sections of the Warrego (at Taroole) supporting fish passage and the enhanced ability to establish and maintain connectivity with the Barwon-Darling system. LoE 2 was moderated down from *Highly* to *Largely Effective* to reflect that, although improvements are expected as a result of the full implementation of the Basin Plan, there are still some concerns around outcomes reliant on larger flows being supported over the longer term. LoE 3 (2030) was moderated up from *Not Effective* to *Partially Effective* as it is expected the large improvements seen in LoE 2 would not be outweighed by the changes expected by around 2030 to the extent that the Largely Effective flow regime would become *Not Effective*. Additionally, most Themes show a similar level of improvement as per LoE 1 for this scenario and the ratings were borderline 'Partially Effective' to begin with.

Lower Darling

For LoE 1 the key changes were to ecosystem functions grades. The LoE 1 ecosystem functions monitoring grade confidence was moderated up to Medium from Low due to NSW providing information on the large body of work looking into water quality in the Lower Darling. Through the Science Synthesis process this was considered and agreed that Medium confidence would be more appropriate.

The ecosystem functions Likelihood grades for LoE 1, 2 and 3 (Median only) were also moderated down from 'about as likely as not' to 'unlikely'. Ecosystem functions in the Lower Darling have been demonstrated to decline significantly during the extended low-flow and cease-to-flow conditions which are characteristic of this SDL resource unit. However, the point-in-time condition assessment was undertaken following consecutive years of relatively high flows, which had temporarily alleviated the flow-related drivers of poor ecosystem functions condition. Input into the assessment from the NSW Government highlighted that the uncharacteristic condition outcome had propagated through the

assessment process, producing a likelihood outcome that did not reflect the reality of current management settings.

Other species LoE 1 Monitoring grade confidence was moderated down from Low to Data Deficient as a result of the Data Paucity Investigation.

Table B- 26 Lower Darling Pre-Moderation

	LoE 1				LoE 2		LoE 3						
Theme	Default Statement LoE 1 (condition)	Default Confidence LoE1 (condition)	Default Statement LoE 1 (likelihood score)	Default Confidence LoE1 (likelihood score)	Default Statement LoE 2 (likelihood score)	Default Confidence LoE 2 (likelihood score)	2030s - Warmer & Much Drier	2030s - Warmer & Drier (Median)	2030s - Warmer & Wetter	2050s - Hotter & Much Drier	2050s - Hotter & Drier (Median)	2050s - Hotter & Wetter	Default Confidence LoE 3 (likelihood score)
Flows & Connectivity	Poor	High	unlikely	Medium	unlikely	Medium	unlikely	about as likely as not	likely	unlikely	unlikely	likely	Low
Ecosystem Functions	Poor	Low	about as likely as not	Low	about as likely as not	Low	unlikely	about as likely as not	likely	unlikely	unlikely	likely	Low
Waterbirds	Moderate	Medium	more likely than not	Medium	more likely than not	Medium	about as likely as not	more likely than not	likely	about as likely as not	more likely than not	likely	Low
Native Fish	Poor	Medium	about as likely as not	Low	about as likely as not	Low	unlikely	about as likely as not	likely	unlikely	about as likely as not	likely	Low
Native Vegetation	Moderate	Medium	more likely than not	Medium	more likely than not	Medium	about as likely as not	more likely than not	likely	unlikely	more likely than not	likely	Low
Other species	Moderate	Low	more likely than not	Medium	more likely than not	Medium	about as likely as not	more likely than not	more likely than not	unlikely	more likely than not	likely	Low

Table B- 27 Lower Darling Post-Moderation

	LoE 1				LoE 2		LoE 3						
Theme	Default Statement LoE 1 (condition)	Default Confidence LoE1 (condition)	Default Statement LoE 1 (likelihood score)	Default Confidence LoE1 (likelihood score)	Default Statement LoE 2 (likelihood score)	Default Confidence LoE 2 (likelihood score)	2030s - Warmer & Much Drier	2030s - Warmer & Drier (Median)	2030s - Warmer & Wetter	2050s - Hotter & Much Drier	2050s - Hotter & Drier (Median)	2050s - Hotter & Wetter	Default Confidence LoE 3 (likelihood score)
Flows & Connectivity	Poor	High	unlikely	Medium	unlikely	Medium	unlikely	unlikely	likely	unlikely	unlikely	likely	Low
Ecosystem Functions	Poor	Medium	unlikely	Low	unlikely	Low	unlikely	unlikely	likely	unlikely	unlikely	likely	Low
Waterbirds	Moderate	Medium	more likely than not	Medium	more likely than not	Medium	about as likely as not	more likely than not	likely	about as likely as not	more likely than not	likely	Low
Native Fish	Poor	Medium	about as likely as not	Low	about as likely as not	Low	unlikely	about as likely as not	likely	unlikely	about as likely as not	likely	Low
Native Vegetation	Moderate	Medium	more likely than not	Medium	more likely than not	Medium	about as likely as not	more likely than not	likely	unlikely	more likely than not	likely	Low
Other species	Moderate	Data Deficient	more likely than not	Medium	more likely than not	Medium	about as likely as not	more likely than not	more likely than not	unlikely	more likely than not	likely	Low

Barwon-Darling

In the Barwon- Darling the LoE1 monitoring grade for waterbirds was a range of 'Poor to Moderate'. As a single grade was needed, a conservative approach was taken to use the lower bound. In this case waterbirds is assessed as 'Poor' condition.

LoE1 confidence for the ecosystem functions Monitoring grade was adjusted from Medium to Low due to limited data availability and inconsistencies across line of evidence.

For LoE1 the flow likelihood grade for ecosystem functions is moderated down from 'more likely than not' to 'about as likely as not' to reflect the fact that monitoring outcome represents a point in time assessment, and it is well understood that under current settings the flow regime in the Barwon-Darling is inadequate. LoE3 medians adjusted for consistency with the change to LoE1. LoE2 left as 'more likely than not' to reflect the expected improvements under this scenario.

The flows & connectivity grade for LoE2 has been moderated up to 'likely' to reflect the expected benefits due to the ecological objective improvements seen from LoE1 to LoE2 and due to the benefits expected as a result of implementation of the Northern Basin Toolkit (NSW and Queensland have implemented a method for identifying and notifying held environmental water crossing the Queensland-NSW border. In addition, accounting arrangements that estimate the volume of held environmental water flowing through the Intersecting Streams and arriving at the Barwon-Darling were put in place in mid-2025).

Other species was moderated down to 'Not Assessed' as a result of the Data Paucity Investigation.

Other species LoE 1 Monitoring grade confidence was moderated down from Low to Data Deficient as a result of the Data Paucity Investigation.

Table B- 28 Barwon-Darling Pre-Moderation

	LoE 1				LoE 2		LoE 3						
Theme	Default Statement LoE 1 (condition)	Default Confidence LoE1 (condition)	Default Statement LoE 1 (likelihood score)	Default Confidence LoE1 (likelihood score)	Default Statement LoE 2 (likelihood score)	Default Confidence LoE 2 (likelihood score)	2030s - Warmer & Much Drier	2030s - Warmer & Drier (Median)	2030s - Warmer & Wetter	2050s - Hotter & Much Drier	2050s - Hotter & Drier (Median)	2050s - Hotter & Wetter	Default Confidence LoE 3 (likelihood score)
Flows & Connectivity	Moderate	Medium	more likely than not	Medium	more likely than not	Medium	about as likely as not	more likely than not	likely	about as likely as not	more likely than not	likely	Low
Ecosystem Functions	Moderate	Medium	more likely than not	Medium	more likely than not	Medium	about as likely as not	more likely than not	likely	unlikely	more likely than not	likely	Low
Waterbirds	Poor to Moderate	Low	unlikely	Medium	unlikely	Medium	unlikely	unlikely	likely	unlikely	unlikely	likely	Low
Native Fish	Poor	Medium	about as likely as not	Low	likely	Low	unlikely	about as likely as not	likely	unlikely	unlikely	likely	Low
Native Vegetation	Moderate	Medium	more likely than not	Medium	more likely than not	Medium	unlikely	more likely than not	likely	very unlikely	about as likely as not	likely	Low
Other species	Poor	Low	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	Low

Table B- 29 Barwon-Darling Post-Moderation

	LoE 1				LoE 2		LoE 3						
Theme	Default Statement LoE 1 (condition)	Default Confidence LoE1 (condition)	Default Statement LoE 1 (likelihood score)	Default Confidence LoE1 (likelihood score)	Default Statement LoE 2 (likelihood score)	Default Confidence LoE 2 (likelihood score)	2030s - Warmer & Much Drier	2030s - Warmer & Drier (Median)	2030s - Warmer & Wetter	2050s - Hotter & Much Drier	2050s - Hotter & Drier (Median)	2050s - Hotter & Wetter	Default Confidence LoE 3 (likelihood score)
Flows & Connectivity	Moderate	Medium	more likely than not	Medium	likely	Medium	about as likely as not	more likely than not	likely	about as likely as not	more likely than not	likely	Low
Ecosystem Functions	Moderate	Low	about as likely as not	Medium	more likely than not	Medium	about as likely as not	about as likely as not	likely	unlikely	about as likely as not	likely	Low
Waterbirds	Poor	Low	unlikely	Medium	unlikely	Medium	unlikely	unlikely	likely	unlikely	unlikely	likely	Low
Native Fish	Poor	Medium	about as likely as not	Low	likely	Low	unlikely	about as likely as not	likely	unlikely	unlikely	likely	Low
Native Vegetation	Moderate	Medium	more likely than not	Medium	more likely than not	Medium	unlikely	more likely than not	likely	very unlikely	about as likely as not	likely	Low
Other species	Not Assessed	NA	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	Low

Barwon-Darling Line of Enquiry Moderation

LoE 2 was moderated down from *Largely* to *Partially Effective* due to further information for flows suggesting that overbank flows may not be well supported over the long term.

Macquarie

For LoE 1 the confidence levels of flows & connectivity, ecosystem functions and native vegetation were all moderated down from Medium to Low as a result of consideration of feedback from NSW.

For flows & connectivity the confidence has been lowered due to the assessment being limited in ability to reflect spatial and temporal variations in the condition for some hydrologic and ecologic elements. The limited nature of the condition assessments undertaken within the Castlereagh and Bogan systems has also reduced confidence in the condition assessment for the SDL resource unit. For LoE 1 and 2 the confidence in the likelihood scores was also lowered from High to Medium to reflect the uncertainty in the monitoring grade.

For ecosystem functions the confidence was lowered due to insufficient monitoring and mixed outcomes across further evidence provided by NSW. For LoE 1 and 2 the confidence in the likelihood scores was also lowered from High to Medium to reflect the uncertainty in the monitoring grade.

For native vegetation the confidence is lowered due to the high spatial variability within the catchment (and given the general emphasis of monitoring on the Macquarie Marshes within this SDL resource unit). Poorer condition is generally exhibited elsewhere in the catchment.

Due to the Poor condition of native fish (noting also with High confidence) and noting the current risks in the system to fish, the likelihood grades were moderated down (from 'likely' to 'more likely than not' for LoE 1 and 2, and from 'more likely than not' to 'about as likely as not' for LoE3 median scenarios).

Table B- 30 Macquarie Pre-Moderation

	LoE 1				LoE 2		LoE 3						
Theme	Default Statement LoE 1 (condition)	Default Confidence LoE1 (condition)	Default Statement LoE 1 (likelihood score)	Default Confidence LoE1 (likelihood score)	Default Statement LoE 2 (likelihood score)	Default Confidence LoE 2 (likelihood score)	2030s - Warmer & Much Drier	2030s - Warmer & Drier (Median)	2030s - Warmer & Wetter	2050s - Hotter & Much Drier	2050s - Hotter & Drier (Median)	2050s - Hotter & Wetter	tatement LoE 3 -2030s (li kelihc
Flows & Connectivity	Moderate	Medium	likely	High	likely	High	more likely than not	likely	likely	more likely than not	more likely than not	likely	Low
Ecosystem Functions	Moderate	Medium	likely	High	likely	High	about as likely as not	more likely than not	likely	unlikely	more likely than not	likely	Low
Waterbirds	Moderate	Medium	likely	High	likely	High	unlikely	likely	likely	very unlikely	more likely than not	likely	Low
Native Fish	Poor	High	likely	Low	likely	Low	unlikely	likely	likely	unlikely	likely	likely	Low
Native Vegetation	Moderate	Medium	more likely than not	Medium	more likely than not	Medium	unlikely	more likely than not	likely	very unlikely	more likely than not	likely	Low
Other species	Moderate	Low	likely	High	likely	High	unlikely	likely	likely	very unlikely	more likely than not	likely	Low

Table B- 31 Macquarie Post-Moderation

	LoE 1				LoE 2		LoE 3						
Theme	Default Statement LoE 1 (condition)	Default Confidence LoE1 (condition)	Default Statement LoE 1 (likelihood score)	Default Confidence LoE1 (likelihood score)	Default Statement LoE 2 (likelihood score)	Default Confidence LoE 2 (likelihood score)	2030s - Warmer & Much Drier	2030s - Warmer & Drier (Median)	2030s - Warmer & Wetter	2050s - Hotter & Much Drier	2050s - Hotter & Drier (Median)	2050s - Hotter & Wetter	ement LoE 3 -2030s (likel
Flows & Connectivity	Moderate	Low	likely	Medium	likely	Medium	more likely than not	likely	likely	more likely than not	more likely than not	likely	Low
Ecosystem Functions	Moderate	Low	likely	Medium	likely	Medium	about as likely as not	more likely than not	likely	unlikely	more likely than not	likely	Low
Waterbirds	Moderate	Medium	likely	High	likely	High	unlikely	likely	likely	very unlikely	more likely than not	likely	Low
Native Fish	Poor	High	more likely than not	Low	more likely than not	Low	unlikely	about as likely as not	likely	unlikely	about as likely as not	likely	Low
Native Vegetation	Moderate	Low	more likely than not	Medium	more likely than not	Medium	unlikely	more likely than not	likely	very unlikely	more likely than not	likely	Low
Other species	Moderate	Low	likely	High	likely	High	unlikely	likely	likely	very unlikely	more likely than not	likely	Low

Macquarie Line of Enquiry Moderation

LoE 1 and 2 were both moderated down from Highly to Largely effective, due to further information for flows suggesting that larger in-channel, bankfull and overbank flows may not be well supported over the long term. These considerations, compounded by the additional stressors of a hotter and drier climate led to the moderation of the LoE 3 (2050) rating down from Largely to Partially.

Namoi

In the Namoi the LoE 1 monitoring grade for waterbirds was a range of 'Poor to Moderate'. As a single grade was required, the conservative approach was used to adopt the lower bound of the ranges. In this case Poor was adopted for waterbirds.

The LoE 1 monitoring confidence grades were moderated down for flows & connectivity, native fish and native vegetation.

Native fish confidence in monitoring score was moderated down to account for variable response across different native fish species and spatial variability.

Native fish modelling confidence grades (for LoE1 and 2) were both moderated down from medium to low due to NSW feedback that Basin plan has improved e-water contribution to Lower Namoi and Barwon-Darling in wetter years (especially via PEW protections which support the WSP 90:10 rule) but due to very limited ability to deliver during dry periods there is extremely limited capacity to actively intervene at ecologically critical times. This effects resilience and ability to maintain native fish condition in the long-term, particularly vulnerable to sequences of dry years.

Flows & connectivity and native vegetation were both moderated down due to high spatial variability in the outcomes (and data availability in the case of native vegetation).

Other species was deemed to be 'not assessed' through the Data Paucity Investigation.

Table B- 32 Namoi Pre-Moderation

	LoE 1				LoE 2		LoE 3						
Theme	Default Statement LoE 1 (condition)	Default Confidence LoE1 (condition)	Default Statement LoE 1 (likelihood score)	Default Confidence LoE1 (likelihood score)	Default Statement LoE 2 (likelihood score)	Default Confidence LoE 2 (likelihood score)	2030s - Warmer & Much Drier	2030s - Warmer & Drier (Median)	2030s - Warmer & Wetter	2050s - Hotter & Much Drier	2050s - Hotter & Drier (Median)	2050s - Hotter & Wetter	tement LoE 3 -2030s (likeli
Flows & Connectivity	Moderate	Medium	more likely than not	Medium	more likely than not	Medium	about as likely as not	more likely than not	more likely than not	about as likely as not	more likely than not	more likely than not	Low
Ecosystem Functions	Moderate	Low	more likely than not	Medium	more likely than not	Medium	unlikely	more likely than not	likely	unlikely	more likely than not	likely	Low
Waterbirds	Poor to Moderate	Low	unlikely	Medium	unlikely	Medium	unlikely	unlikely	likely	unlikely	unlikely	likely	Low
Native Fish	Moderate	Medium	more likely than not	Medium	more likely than not	Medium	about as likely as not	more likely than not	likely	about as likely as not	more likely than not	likely	Low
Native Vegetation	Moderate	High/Medium	more likely than not	Medium	more likely than not	Medium	about as likely as not	more likely than not	likely	unlikely	more likely than not	likely	Low
Other species	Moderate	Low	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	Low

Table B- 33 Namoi Post-Moderation

	LoE 1				LoE 2		LoE 3						
Theme	Default Statement LoE 1 (condition)	Default Confidence LoE1 (condition)	Default Statement LoE 1 (likelihood score)	Default Confidence LoE1 (likelihood score)	Default Statement LoE 2 (likelihood score)	Default Confidence LoE 2 (likelihood score)	2030s - Warmer & Much Drier	2030s - Warmer & Drier (Median)	2030s - Warmer & Wetter	2050s - Hotter & Much Drier	2050s - Hotter & Drier (Median)	2050s - Hotter & Wetter	Statement LoE 3 -2030s (likeli
Flows & Connectivity	Moderate	Low	more likely than not	Medium	more likely than not	Medium	about as likely as not	more likely than not	more likely than not	about as likely as not	more likely than not	more likely than not	Low
Ecosystem Functions	Moderate	Low	more likely than not	Medium	more likely than not	Medium	unlikely	more likely than not	likely	unlikely	more likely than not	likely	Low
Waterbirds	Poor	Low	unlikely	Medium	unlikely	Medium	unlikely	unlikely	likely	unlikely	unlikely	likely	Low
Native Fish	Moderate	Low	more likely than not	Low	more likely than not	Low	about as likely as not	more likely than not	likely	about as likely as not	more likely than not	likely	Low
Native Vegetation	Moderate	Low	more likely than not	Medium	more likely than not	Medium	about as likely as not	more likely than not	likely	unlikely	more likely than not	likely	Low
Other species	Not Assessed	NA	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	Low

Namoi Line of Enquiry Moderation

LoE 1, 2 and 3 (2030) were all moderated down (from *Largely* to *Partially Effective*) due to the uncertainty around suitable flows being supported over the long term for both overbank flows and low flows in the lower reaches of the Namoi River. This uncertainty combined with low confidence for the monitoring outcomes of all themes led to moderating the effectiveness down. LoE 3 (2050) was moderated down further to Not Effective due to the additional stressors on these flows expected under the hotter and drier climate.

Gwydir

For Gwydir the flows and connectivity LoE 1 monitoring confidence level was moderated down from High to Low due to the high spatial variability in the condition of this theme throughout the SDL resource unit.

The LoE 1 monitoring grade for waterbirds was a range of 'Moderate to Good'. As a single grade was required, the conservative approach was used to adopt the lower bound of the ranges. In this case Moderate was adopted for waterbirds. The waterbirds LoE 1 monitoring confidence level was moderated down from High to Medium due to State Feedback and the limited monitoring of waterbirds in sites other than the Gwydir Wetlands.

The native fish, native vegetation and other species LoE 1 monitoring confidence levels were all moderated down from Medium to Low. For native fish this lower confidence is due to high variability in condition/response across different species and spatial variability. For native vegetation this lower confidence is primarily due to high spatial variability in the outcomes. For other species this lower confidence is due to gaps in the underlying data for key species including freshwater turtles and platypus, while evidence of risks to frogs further lowers the confidence.

For native fish, the Likelihood Confidence ratings in LoE 1 and 2 were moderated down from Medium to Low to reflect the difficulty in representing targeted flows for fish in the models and to reflect other risks to flows for fish (i.e. constraints on delivery volumes/timing, in stream barriers, sedimentation and cold-water plumes).

For ecosystem functions, for LoE 3 (2050) median scenario (hotter and drier), the rating of 'more likely than not' was moderated down to 'about as likely as not' to consider the additional impacts to flows that are likely to negatively affect ecosystem functions between 2030 and 2050.

Other species LoE 2 likelihood grade was moderated up from 'about as likely as not' to 'more likely than not' to be consistent with LoE 1 ratings. The confidence rating was then also moderated up accordingly to 'Medium'. In reality it was expected further implementation of the Basin Plan to not negatively impact other species and the category shift was an artefact of the modelling setup.

Table B- 34 Gwydir Pre Moderation

	LoE 1				LoE 2									LoE 3
Theme	Default Statement LoE 1 (condition)	Default Confidence LoE1 (condition)	Default Statement LoE 1 (likelihood score)	Default Confidence LoE1 (likelihood score)	Default Statement LoE 2 (likelihood score)	Default Confidence LoE 2 (likelihood score)	2030s - Warmer & Much Drier	2030s - Warmer & Drier (Median)	2030s - Warmer & Wetter	2050s - Hotter & Much Drier	2050s - Hotter & Drier (Median)	2050s - Hotter & Wetter	Default Confidence LoE3 (likelihood score)
Flows & Connectivity	Moderate	High	more likely than not	Medium	more likely than not	Medium	about as likely as not	more likely than not	more likely than not	unlikely	about as likely as not	more likely than not	Low
Ecosystem Functions	Moderate	Low	more likely than not	Medium	more likely than not	Medium	about as likely as not	more likely than not	more likely than not	unlikely	more likely than not	likely	Low
Waterbirds	Moderate to Good	High	about as likely as not	Low	about as likely as not	Low	unlikely	about as likely as not	more likely than not	unlikely	about as likely as not	more likely than not	Low
Native Fish	Moderate	Medium	more likely than not	Medium	more likely than not	Medium	unlikely	about as likely as not	more likely than not	very unlikely	about as likely as not	more likely than not	Low
Native Vegetation	Moderate	Medium	more likely than not	Medium	more likely than not	Medium	unlikely	more likely than not	likely	very unlikely	more likely than not	likely	Low
Other species	Moderate	Medium	more likely than not	Medium	about as likely as not	Low	unlikely	about as likely as not	more likely than not	unlikely	more likely than not	more likely than not	Low

Table B- 35 Gwydir Post Moderation

	LoE 1				LoE 2									LoE 3
Theme	Default Statement LoE 1 (condition)	Default Confidence LoE1 (condition)	Default Statement LoE 1 (likelihood score)	Default Confidence LoE1 (likelihood score)	Default Statement LoE 2 (likelihood score)	Default Confidence LoE 2 (likelihood score)	2030s - Warmer & Much Drier	2030s - Warmer & Drier (Median)	2030s - Warmer & Wetter	2050s - Hotter & Much Drier	2050s - Hotter & Drier (Median)	2050s - Hotter & Wetter	Default Confidence LoE3 (likelihood score)
Flows & Connectivity	Moderate	Low	more likely than not	Medium	more likely than not	Medium	about as likely as not	more likely than not	more likely than not	unlikely	about as likely as not	more likely than not	Low
Ecosystem Functions	Moderate	Low	more likely than not	Medium	more likely than not	Medium	about as likely as not	more likely than not	more likely than not	unlikely	about as likely as not	likely	Low
Waterbirds	Moderate	Medium	about as likely as not	Low	about as likely as not	Low	unlikely	about as likely as not	more likely than not	unlikely	about as likely as not	more likely than not	Low
Native Fish	Moderate	Low	more likely than not	Low	more likely than not	Low	unlikely	about as likely as not	more likely than not	very unlikely	about as likely as not	more likely than not	Low
Native Vegetation	Moderate	Low	more likely than not	Medium	more likely than not	Medium	unlikely	more likely than not	likely	very unlikely	more likely than not	likely	Low
Other species	Moderate	Low	more likely than not	Medium	more likely than not	Medium	unlikely	about as likely as not	more likely than not	unlikely	more likely than not	more likely than not	Low

Gwydir Line of Enquiry Moderation

The LoE 1 and 2 were moderated down from *Largely* to *Partially Effective* due to the difficulty in achieving flow requirements in the SDL resource unit. Although some improvement is reflected as a result of the increased water delivery, there has been some corresponding decline in the Mehi for connectivity outcomes. In reality, it is expected that water managers would be able to deliver the additional water to provide benefits for both connectivity and wetland purposes depending on the priority in any given year. However, outcomes are also limited in reality by delivery constraints along the Gingham Watercourse (including the Gwydir Raft) and Lower Gwydir River which present significant risk to lateral connectivity from river channels to their floodplains, limiting achievement of large freshes, bank full and overbank flows even when environmental water is available**.** The LoE 3 (2050) was moderated up from *Not Effective* to *Partially Effective* to recognise that targeted water delivery may be able to account for the minor differences between LoE 2 and 3 outcomes.

NSW Border Rivers

Only moderation at theme level was for the LoE 1 monitoring scores.

For all themes, LoE 1 Monitoring confidence scores were lowered to ‘Low’ (where not already low) due to feedback through state engagement and insufficient monitoring data.

Other species was deemed not appropriate for assessment through the ‘Data Paucity Investigation and so shifted to ‘Not Assessed’ category.

Ecosystem functions Likelihood rating for the median scenarios of LoE 3 (2050) was moderated down to ‘about as likely as not’ to reflect the similar declines seen as to the native fish theme.

Table B- 36 NSW Border Rivers Pre Moderation

	LoE 1				LoE 2		LoE 3						LoE 3
Theme	Default Statement LoE 1 (condition)	Default Confidence LoE1 (condition)	Default Statement LoE 1 (likelihood score)	Default Confidence LoE1 (likelihood score)	Default Statement LoE 2 (likelihood score)	Default Confidence LoE 2 (likelihood score)	2030s - Warmer & Much Drier	2030s - Warmer & Drier (Median)	2030s - Warmer & Wetter	2050s - Hotter & Much Drier	2050s - Hotter & Drier (Median)	2050s - Hotter & Wetter	Default Confidence LoE3 (likelihood score)
Flows & Connectivity	Moderate	Medium	more likely than not	Medium	more likely than not	Medium	unlikely	more likely than not	more likely than not	very unlikely	more likely than not	likely	Low
Ecosystem Functions	Moderate	Medium	more likely than not	Medium	more likely than not	Medium	unlikely	more likely than not	likely	very unlikely	more likely than not	likely	Low
Waterbirds	Moderate	Medium	more likely than not	Medium	more likely than not	Medium	unlikely	more likely than not	likely	very unlikely	more likely than not	likely	Low
Native Fish	Moderate	Medium	more likely than not	Medium	more likely than not	Medium	unlikely	more likely than not	likely	very unlikely	about as likely as not	likely	Low
Native Vegetation	Moderate	Medium	more likely than not	Medium	more likely than not	Medium	unlikely	more likely than not	likely	very unlikely	more likely than not	likely	Low
Other species	Moderate	Low	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	Low

Table B- 37 NSW Border Rivers Post Moderation

	LoE 1				LoE 2		LoE 3						LoE 3
Theme	Default Statement LoE 1 (condition)	Default Confidence LoE1 (condition)	Default Statement LoE 1 (likelihood score)	Default Confidence LoE1 (likelihood score)	Default Statement LoE 2 (likelihood score)	Default Confidence LoE 2 (likelihood score)	2030s - Warmer & Much Drier	2030s - Warmer & Drier (Median)	2030s - Warmer & Wetter	2050s - Hotter & Much Drier	2050s - Hotter & Drier (Median)	2050s - Hotter & Wetter	Default Confidence LoE3 (likelihood score)
Flows & Connectivity	Moderate	Low	more likely than not	Medium	more likely than not	Medium	unlikely	more likely than not	more likely than not	very unlikely	more likely than not	likely	Low
Ecosystem Functions	Moderate	Low	more likely than not	Medium	more likely than not	Medium	unlikely	more likely than not	likely	very unlikely	about as likely as not	likely	Low
Waterbirds	Moderate	Low	more likely than not	Medium	more likely than not	Medium	unlikely	more likely than not	likely	very unlikely	more likely than not	likely	Low
Native Fish	Moderate	Low	more likely than not	Medium	more likely than not	Medium	unlikely	more likely than not	likely	very unlikely	about as likely as not	likely	Low
Native Vegetation	Moderate	Low	more likely than not	Medium	more likely than not	Medium	unlikely	more likely than not	likely	very unlikely	more likely than not	likely	Low
Other species	Not Assessed	NA	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	Low

NSW Border Rivers Line of Enquiry Moderation

The LoE 1, 2 and 3 were moderated down from *Highly* to *Partially Effective* due to the uncertainty around outcomes reliant on overbank flows being supported over the long term. There are limitations in supporting lateral connectivity at ecologically critical times and this is expected to impact resilience and ability to maintain condition over the long-term.

QLD Border Rivers

Due to the large extent of crossover between the objectives for QLD and NSW Border Rivers, the best available data for both the monitoring and modelling grades has been used where appropriate to inform the outcomes. For Qld Border Rivers, this has generally meant an adoption of the NSW Border Rivers monitoring grades noting:

- Monitoring grades: For Qld Border Rivers, the monitoring outcomes are primarily driven by a flow-based risk assessment based on modelling data, whereas monitoring outcomes in NSW Border Rivers are more heavily grounded in observational survey data. Due to the stronger information base, NSW outcomes are used preferentially.
- Modelling grades: Modelling of regulated entitlements have targeted delivery of e-water to NSW EWRs rather than Qld EWRs, while un-regulated entitlements are left in river and do not target any particular EWRs. Expected improvements are more aligned and better indicated by NSW EWR results. However, both NSW and Qld results are considered in the synthesis process. In addition to the above consideration, there are no EWRs mapped to two (i.e. waterbirds and native vegetation) of the five themes that are assessed in Qld, and so NSW results for these are used as an indication.
- Planning unit scale outcomes are checked to ensure no Qld specific reach risks are missed.

The MDBA has engaged with Qld and they have supported this approach.

Post moderation results are the same for QLD Border Rivers and NSW Border Rivers. Initial results for QLD were overridden (due to the above logic).

Table B- 38 QLD Border Rivers Pre Moderation

	LoE 1				LoE 2								LoE 3
Theme	Default Statement LoE 1 (condition)	Default Confidence LoE1 (condition)	Default Statement LoE 1 (likelihood score)	Default Confidence LoE1 (likelihood score)	Default Statement LoE 2 (likelihood score)	Default Confidence LoE 2 (likelihood score)	2030s - Warmer & Much Drier	2030s - Warmer & Drier (Median)	2030s - Warmer & Wetter	2050s - Hotter & Much Drier	2050s - Hotter & Drier (Median)	2050s - Hotter & Wetter	Default Confidence LoE3 (likelihood score)
Flows & Connectivity	Good	Medium	likely	High	likely	High	more likely than not	likely	likely	more likely than not	likely	likely	Low
Ecosystem Functions	Moderate	Medium	more likely than not	Medium	more likely than not	Medium	more likely than not	more likely than not	more likely than not	more likely than not	more likely than not	more likely than not	Low
Waterbirds	Moderate	Medium	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	Low
Native Fish	Good	Medium	likely	High	likely	High	about as likely as not	likely	very likely	unlikely	more likely than not	very likely	Low
Native Vegetation	Moderate to Good	Medium	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	Low
Other species	Moderate	Medium	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	Low

Table B- 39 QLD Border Rivers Post Moderation

	LoE 1				LoE 2		LoE 3						LoE 3
Theme	Default Statement LoE 1 (condition)	Default Confidence LoE1 (condition)	Default Statement LoE 1 (likelihood score)	Default Confidence LoE1 (likelihood score)	Default Statement LoE 2 (likelihood score)	Default Confidence LoE 2 (likelihood score)	2030s - Warmer & Much Drier	2030s - Warmer & Drier (Median)	2030s - Warmer & Wetter	2050s - Hotter & Much Drier	2050s - Hotter & Drier (Median)	2050s - Hotter & Wetter	Default Confidence LoE3 (likelihood score)
Flows & Connectivity	Moderate	Low	more likely than not	Medium	more likely than not	Medium	unlikely	more likely than not	more likely than not	very unlikely	more likely than not	likely	Low
Ecosystem Functions	Moderate	Low	more likely than not	Medium	more likely than not	Medium	unlikely	more likely than not	likely	very unlikely	about as likely as not	likely	Low
Waterbirds	Moderate	Low	more likely than not	Medium	more likely than not	Medium	unlikely	more likely than not	likely	very unlikely	more likely than not	likely	Low
Native Fish	Moderate	Low	more likely than not	Medium	more likely than not	Medium	unlikely	more likely than not	likely	very unlikely	about as likely as not	likely	Low
Native Vegetation	Moderate	Low	more likely than not	Medium	more likely than not	Medium	unlikely	more likely than not	likely	very unlikely	more likely than not	likely	Low
Other species	Not Assessed	NA	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	Low

QLD Border Rivers Line of Enquiry Moderation

The LoE 1, 2 and 3 were moderated down from *Highly* to *Partially Effective* due to the uncertainty around outcomes reliant on overbank flows being supported over the long term. There are limitations in supporting lateral connectivity at ecologically critical times and this is expected to impact resilience and ability to maintain condition over the long-term.

Condamine-Balonne

For flows & connectivity and ecosystem functions, monitoring grade confidence was lowered due to reasons outlined in *Moderation of Queensland monitoring confidence levels across most themes*. This same logic was applicable for the modelling results and hence the confidence in likelihood ratings for LoE 1 and 2 were also lowered to 'Low'.

For waterbirds the monitoring grade confidence was lowered due to reasons outlined in *Moderation of Queensland monitoring confidence levels across most themes.*

For native fish, in addition to reasons outlined in *Moderation of Queensland monitoring confidence levels across most themes*, the low confidence also accounts for species-specific variability in responses to drought and environmental change. Bony bream and golden perch have shown an ability to survive and recover from harsh drought conditions (2018-2020 Tinder Box Drought) using limited and contracting drought refuge waterholes. Native fish populations also maintained genetic diversity across this drought period. However, small-bodied native fish species were disproportionately affected and remain at critically low abundance. Carp rebounded rapidly after the drought and outnumbered native species in many areas. Fish recruitment of most native fish species is in a poor condition and has been declining since 2009. This 'Low' confidence was applicable for LoE 1 and 2 likelihood grades and adjusted accordingly.

Other species was deemed not appropriate for assessment through the 'Data Paucity Investigation and so shifted to 'Not Assessed' category.

Table B- 40 Condamine-Balonne Pre Moderation

	LoE 1				LoE 2								LoE 3
Theme	Default Statement LoE 1 (condition)	Default Confidence LoE1 (condition)	Default Statement LoE 1 (likelihood score)	Default Confidence LoE1 (likelihood score)	Default Statement LoE 2 (likelihood score)	Default Confidence LoE 2 (likelihood score)	2030s - Warmer & Much Drier	2030s - Warmer & Drier (Median)	2030s - Warmer & Wetter	2050s - Hotter & Much Drier	2050s - Hotter & Drier (Median)	2050s - Hotter & Wetter	Default Confidence LoE3 (likelihood score)
Flows & Connectivity	Moderate	Medium	more likely than not	Medium	more likely than not	Medium	about as likely as not	more likely than not	likely	unlikely	more likely than not	likely	Low
Ecosystem Functions	Moderate	Medium	more likely than not	Medium	more likely than not	Medium	about as likely as not	more likely than not	likely	unlikely	more likely than not	likely	Low
Waterbirds	Moderate	Medium	likely	High	likely	High	likely	likely	likely	more likely than not	likely	likely	Low
Native Fish	Moderate	Medium	more likely than not	Medium	more likely than not	Medium	about as likely as not	more likely than not	likely	unlikely	more likely than not	likely	Low
Native Vegetation	Moderate	Medium	more likely than not	Medium	likely	High	more likely than not	likely	likely	about as likely as not	likely	likely	Low
Other species	Moderate	Low	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	Low

Table B- 41 Condamine-Balonne Post Moderation

	LoE 1				LoE 2								LoE 3
Theme	Default Statement LoE 1 (condition)	Default Confidence LoE1 (condition)	Default Statement LoE 1 (likelihood score)	Default Confidence LoE1 (likelihood score)	Default Statement LoE 2 (likelihood score)	Default Confidence LoE 2 (likelihood score)	2030s - Warmer & Much Drier	2030s - Warmer & Drier (Median)	2030s - Warmer & Wetter	2050s - Hotter & Much Drier	2050s - Hotter & Drier (Median)	2050s - Hotter & Wetter	Default Confidence LoE3 (likelihood score)
Flows & Connectivity	Moderate	Low	more likely than not	Low	more likely than not	Low	about as likely as not	more likely than not	likely	unlikely	more likely than not	likely	Low
Ecosystem Functions	Moderate	Low	more likely than not	Low	more likely than not	Low	about as likely as not	more likely than not	likely	unlikely	more likely than not	likely	Low
Waterbirds	Moderate	Low	likely	High	likely	High	likely	likely	likely	more likely than not	likely	likely	Low
Native Fish	Moderate	Low	more likely than not	Medium	more likely than not	Medium	about as likely as not	more likely than not	likely	unlikely	more likely than not	likely	Low
Native Vegetation	Moderate	Medium	more likely than not	Low	likely	Low	more likely than not	likely	likely	about as likely as not	likely	likely	Low
Other species	Not Assessed	NA	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	Low

Condamine-Balonne Line of Enquiry Moderation

The LoE 1, 2 and 3 were moderated down from *Highly* to *Largely Effective* due to the uncertainty around outcomes reliant on lateral and longitudinal connectivity may not be well supported over the long term.

Appendix C: Surface water Lines of Enquiry Modelling

Three lines of enquiry have been developed to guide how the surface water assessment will occur:

1. **Basin Plan 2024 (**At the commencement of the review, 30 June 2024)
    a. A scenario that represents water management arrangements and Basin Plan implementation to 30 June 2024 to provide understanding of the outcomes we would expect to see from the Basin Plan to date.
    b. This Basin Plan 2024 scenario aims to update river system models to best represent the management and conditions including:
        i. Representation of water recovery as at the 30 June 2024 by both the Commonwealth Environmental Water Holder (CEWH) and state environmental water holders, by entitlement type in each SDL resource unit.
        ii. Plausible representation of use and delivery of held environmental water (HEW) to achieve environmental outcomes
        iii. Inclusion of 14 SDLAM projects completed and operational at 30 June 2024
        iv. Best available representation of irrigation development reflective of 2024 conditions
        v. The level of consumptive water use in the models has approximated the SDL for modelled forms of take over the July 1895 – June 2009 period
    c. This enquiry recognises that the Basin Plan implementation is ongoing and provides important context for the SDL Assessment
2. **Basin Plan Fully Implemented** (BPFI)
    a. This scenario has updated river system models from the Basin Plan 2024 scenario, represented to assume the following inclusions:
        i. Water for the environment recovered to address shortfalls in Bridging the Gap (BtG) recovery that existed as of June 2024
        ii. Water for the environment recovered to represent the 450 GL. This has been assumed to have been recovered in proportion to use based on current modelled BDL estimates which results in a split between the Northern Basin and Southern Basin. Existing recovery above the BtG in individual SDL resource units contribute to the 450 GL target. It also factors in excess recovery of water beyond BtG targets as contributions to this volume
        iii. Inclusion of SDLAM projects expected to be included in reconciliation at 30 June 2026, assuming an estimated offset of 305 GL/y based on expert opinion. This is assumed to result in a shortfall of 300 GL from the original offset of 605 GL. This shortfall will be represented as recovery in the Southern Basin consistent with the apportionment decision at BOC meeting 53 – 27 September 2017.
    b. This enquiry represents if under a fully implemented Basin Plan, the SDLs will support the desired Basin Plan environmental outcomes, noting this representation is for the purposes of BPR only
3. **Basin Plan fully Implemented under a range of plausible future hydroclimates** (what does the future hold?)
    a. provides a view of potential long-term impacts of climate change to desired Basin Plan environmental outcomes under full Basin Plan implementation and plausible future hydroclimate sequences through to the next Basin Plan Review (2036), and towards the planning horizon of 2050.
    b. The difference between the modelled scenarios used for line of enquiries 2 and 3 are the inflow sequences, with those for Line of Enquiry 3 adjusted in line with the future climate scenarios. Otherwise, the two model scenarios use the same scenario assumptions of a BPFI, including assumed water recovery volumes.

Australian Capital Territory (Surface Water) SDL resource unit (SS1)

Line of Enquiry 1 Basin Plan implementation as at 30 June 2024			
		Assumed Recovery volumes (total represented in model for the *at commencement of review* scenario)	
Recovery Type	**Bridging the Gap**	00.0 GL/y	
	Additional 450 GL/y	0.00 GL/y	
Total		**00.0 GL/y**	
Note – All water recovery volumes as at 30 June 2023. This represents the best available data at the time these assumptions were prepared.			
Line of Enquiry 2 & 3 Fully Implemented Basin Plan			
BDL for watercourse **(for 2023-24 water year, excluding interceptions)**		42.70 GL/y **(**volume used to determine proportional distribution of additional 450 GL/y water recovery in model assumptions)	
		Assumed Recovery volumes (total represented in model for the *Fully Implemented Basin Plan* scenario)	
Recovery Type	**Bridging the Gap**	4.90 GL/y	
	Additional 450 GL/y	1.62 GL/y	This volume is 0.16 GL/y greater than current recovery and based on a proportional distribution of the additional 450 GL/y recovery volume
Total		**6.52 GL/y**	

Current Water Recovery Progress As at 30 September 2025			
BDL estimate (all forms of take)	**BDL (total)**	58.30 GL/y	
		Recovery Progress	
Recovery Type	**Bridging the Gap**	4.90 GL/y	
	Additional 450 GL/y	1.46 GL/y	There are no SDL resource unit specific targets for recovery of the additional 450 GL/y, in line with DCCEEW's *Framework for delivering the 450 GL of additional environmental water*.
Total		**6.36 GL/y**	

- An entitlement that was acquired in 2014 to meet the ACT shared reduction target was recovered from the NSW Murrumbidgee. At the time of the purchase, it was intended to meet the ACT's shared reduction amount target. Until this entitlement could be traded from NSW into the ACT it was shown as a recovery in the NSW Murrumbidgee. As at 30 September 2025 this entitlement remains in the NSW Murrumbidgee.
- A 6.36 GL/y entitlement was contracted on 14 March 2024 to satisfy the ACT's shared reduction target; on 30 May 2024, 1.46 GL/y of this entitlement was nominated by the water Minister as additional HEW as per Basin Plan s7.08B.

Victorian Murray SDL resource unit (SS2)

Line of Enquiry 1 Basin Plan implementation as at 30 June 2024			
		Assumed Recovery volumes (total represented in model for the *at commencement of review* scenario)	
Recovery Type	**Bridging the Gap**	392.90 GL/y	
	Additional 450 GL/y	9.40 GL/y	
Total		**402.30 GL/y**	
Note – All water recovery volumes as at 30 June 2023. This represents the best available data at the time these assumptions were prepared.			
Line of Enquiry 2 & 3 Fully Implemented Basin Plan			
BDL for watercourse **(for 2023-24 water year, excluding interceptions)**		1,673.20 GL/y **(**volume used to determine proportional distribution of additional 450 GL/y water recovery in model assumptions)	
		Assumed Recovery volumes (total represented in model for the *Fully Implemented Basin Plan* scenario)	
Recovery Type	**Bridging the Gap**	427.10 GL/y	This volume is 36.07 GL/y greater than current recovery progress
	Additional 450 GL/y	63.34 GL/y	This volume is 49.94 GL/y greater than current recovery and based on a proportional distribution of the additional 450 GL/y recovery volume
Total		**490.44 GL/y**	

Current Water Recovery Progress As at 30 September 2025			
BDL estimate (all forms of take)	**BDL (total)**	1,718.00 GL/y	
		Recovery Progress	
Recovery Type	**Bridging the Gap**	391.03 GL/y	
	Additional 450 GL/y	13.40 GL/y	In this SDL resource unit, there are specific targets for recovery of the additional 450 GL/y, in line with DCCEEW's *Framework for delivering the 450 GL of additional environmental water*.
Total		**404.43 GL/y**	

As at 30 September 2025, no further bridging the gap recovery is required. Pending the SDL adjustment mechanism (SDLAM) reconciliation outcomes, changes to water recovery outcomes may occur.

Victoria made requests to re-allocate their shared reduction amounts in December 2018 that were agreed by the Authority in March 2019 (253.0 GL/y local recovery amount and 210.8 GL/y shared recovery amount).

As part of the decommissioning of Greens Lake, 9 GL of unregulated entitlement was created and incorporated into environmental entitlements in the Victorian Murray. This unregulated entitlement has no equivalent modelled under BDL. The water savings volume of 8.3 GL is a modelled outcome resulting from an increase of 7.1 GL/y and 1.2 GL/y in end of valley flows from Goulburn and Loddon respectively.

The Commonwealth has contracted or agreed to purchase volumes through the 450 GL voluntary water purchase program in the Victorian Murray.

Kiewa SDL resource unit (SS3)

Line of Enquiry 1 Basin Plan implementation as at 30 June 2024			
		Assumed Recovery volumes (total represented in model for the *at commencement of review* scenario)	
Recovery Type	**Bridging the Gap**	0.00 GL/y	
	Additional 450 GL/y	0.00 GL/y	
Total		**0.00 GL/y**	
Note – All water recovery volumes as at 30 June 2023. This represents the best available data at the time these assumptions were prepared.			
Line of Enquiry 2 & 3 Fully Implemented Basin Plan			
BDL for watercourse **(for 2023-24 water year, excluding interceptions)**		11.20 GL/y **(**volume used to determine proportional distribution of additional 450 GL/y water recovery in model assumptions)	
		Assumed Recovery volumes (total represented in model for the *Fully Implemented Basin Plan* scenario)	
Recovery Type	**Bridging the Gap**	0.44 GL/y	This volume is 0.44 GL/y greater than current recovery progress
	Additional 450 GL/y	0.42 GL/y	This volume is 0.42 GL/y greater than current recovery and based on a proportional distribution of the additional 450 GL/y recovery volume
Total		**0.87 GL/y**	
Note: Not utilised in the simplified SDL assessment approach			
Current Water Recovery Progress As at 30 September 2025			
BDL estimate (all forms of take)	**BDL (total)**	27.70 GL/y	
		Recovery Progress	
Recovery Type	**Bridging the Gap**	0.00 GL/y	No recovery has occurred
	Additional 450 GL/y	0.00 GL/y	There are no SDL resource unit specific targets for recovery of the additional 450 GL/y, in line with DCCEEW's *Framework for delivering the 450 GL of additional environmental water*.
Total		**0.00 GL/y**	

The Victorian shared reduction request (as agreed by the Authority) produces small negative amount in two valleys totalling 0.5 GL/y (Kiewa 0.2 GL/y and Ovens 0.3 GL/y) for the required reduction from the BDL to the SDL when applied in conjunction with the apportioned supply contribution.
Due to the shared reduction anomalies, Kiewa's target is currently -0.2 GL/y, however there is no specific programs targeted for water recovery in this resource unit.
Resolution of any anomalies will be considered as further recoveries are secured and / or at the 2026 reconciliation of SDLAM.

Ovens SDL resource unit (SS4)

Line of Enquiry 1 Basin Plan implementation as at 30 June 2024			
		Assumed Recovery volumes (total represented in model for the *at commencement of review* scenario)	
Recovery Type	**Bridging the Gap**	0.10 GL/y	
	Additional 450 GL/y	0.00 GL/y	
Total		**0.10 GL/y**	
Note – All water recovery volumes as at 30 June 2023. This represents the best available data at the time these assumptions were prepared.			
Line of Enquiry 2 & 3 Fully Implemented Basin Plan			
BDL for regulated river (for 2023-24 water year, excluding interceptions)		25.40 GL/y **(**volume used to determine proportional distribution of additional 450 GL/y water recovery in model assumptions)	
		Assumed Recovery volumes (total represented in model for the *Fully Implemented Basin Plan* scenario)	
Recovery Type	**Bridging the Gap**	1.19 GL/y	This volume is 1.13 GL/y greater than current recovery progress
	Additional 450 GL/y	0.96 GL/y	This volume is 0.96 GL/y greater than current recovery and based on a proportional distribution of the additional 450 GL/y recovery volume
Total		**2.15 GL/y**	
Note: Not utilised in the simplified SDL assessment approach			
Current Water Recovery Progress As at 30 September 2025			
BDL estimate(all forms of take)	**BDL (total)**	85.80 GL/y	
		Recovery Progress	
Recovery Type	**Bridging the Gap**	0.06 GL/y	
	Additional 450 GL/y	0.00 GL/y	In this SDL resource unit, there are specific targets for recovery of the additional 450 GL/y, in line with DCCEEW's *Framework for delivering the 450 GL of additional environmental water*.
Total		**0.06 GL/y**	

Victoria made requests to re-allocate their shared reduction amounts in December 2018 that were agreed by the Authority in March 2019.
The Victorian shared reduction request (as agreed by the Authority) produces small negative amounts in two valleys totalling 0.5 GL/y (Kiewa 0.2 GL/y and Ovens 0.3 GL/y) for the required reduction from the BDL to the SDL when applied in conjunction with the apportioned supply contribution.
Due to the shared reduction anomalies, Oven's target is currently -0.3 GL/y, however there is no specific programs targeted for water recovery in this resource unit.
Resolution of any anomalies will be considered as further recoveries are secured and / or at the 2026 reconciliation of SDLAM.

Broken SDL resource unit (SS5)

Line of Enquiry 1 Basin Plan implementation as at 30 June 2024			
		Assumed Recovery volumes (total represented in model for the *at commencement of review* scenario)	
Recovery Type	**Bridging the Gap**	0.40 GL/y	
	Additional 450 GL/y	0.00 GL/y	
Total		**0.40 GL/y**	
Note – All water recovery volumes as at 30 June 2023. This represents the best available data at the time these assumptions were prepared.			
Line of Enquiry 2 & 3 Fully Implemented Basin Plan			
BDL for regulated river and watercourse (for 2023-24 water year, excluding interceptions)		13.20 GL/y **(**volume used to determine proportional distribution of additional 450 GL/y water recovery in model assumptions)	
		Assumed Recovery volumes (total represented in model for the *Fully Implemented Basin Plan* scenario)	
Recovery Type	**Bridging the Gap**	0.75 GL/y	This volume is 0.55 GL/y greater than current recovery progress
	Additional 450 GL/y	0.50 GL/y	This volume is 0.34 GL/y greater than current recovery and based on a proportional distribution of the additional 450 GL/y recovery volume
Total		**1.25 GL/y**	

Current Water Recovery Progress As at 30 September 2025			
BDL estimate (all forms of take)	**BDL (total)**	49.30 GL/y	
		Recovery Progress	
Recovery Type	**Bridging the Gap**	0.20 GL/y	
	Additional 450 GL/y	0.16 GL/y	In this SDL resource unit, there are specific targets for recovery of the additional 450 GL/y, in line with DCCEEW's *Framework for delivering the 450 GL of additional environmental water*.
Total		**0.36 GL/y**	

Victoria made requests to re-allocate their shared reduction amounts in December 2018 that were agreed by the Authority in March 2019 (1.3 GL/y shared recovery amount only).

As at 30 September 2025, no further bridging the gap recovery is required. Pending the SDL adjustment mechanism (SDLAM) reconciliation outcomes, changes to water recovery outcomes may occur.

The Commonwealth has contracted or agreed to purchase volumes through the 450 GL voluntary water purchase program in the Broken.

Goulburn SDL resource unit (SS6)

Line of Enquiry 1 Basin Plan implementation as at 30 June 2024			
		Assumed Recovery volumes (total represented in model for the *at commencement of review* scenario)	
Recovery Type	**Bridging the Gap**	368.80 GL/y	
	Additional 450 GL/y	6.80 GL/y	
Total		**375.60 GL/y**	
Note – All water recovery volumes as at 30 June 2023. This represents the best available data at the time these assumptions were prepared.			
Line of Enquiry 2 & 3 Fully Implemented Basin Plan			
BDL for regulated river and watercourse (for 2023-24 water year, excluding interceptions)		1,552.70 GL/y **(**volume used to determine proportional distribution of additional 450 GL/y water recovery in model assumptions)	
		Assumed Recovery volumes (total represented in model for the *Fully Implemented Basin Plan* scenario)	
Recovery Type	**Bridging the Gap**	442.43 GL/y	This volume is 86.53 GL/y greater than current recovery progress
	Additional 450 GL/y	58.78 GL/y	This volume is 26.41 GL/y greater than current recovery and based on a proportional distribution of the additional 450 GL/y recovery volume
Total		**501.21 GL/y**	
Current Water Recovery Progress As at 30 September 2025			
BDL estimate (all forms of take)	**BDL (total)**	1,651.20 GL/y	
		Recovery Progress	
Recovery Type	**Bridging the Gap**	355.90 GL/y	
	Additional 450 GL/y	32.37 GL/y	In this SDL resource unit, there are specific targets for recovery of the additional 450 GL/y, in line with DCCEEW's *Framework for delivering the 450 GL of additional environmental water*.
Total		**388.27 GL/y**	

As at 30 September 2025, no further bridging the gap recovery is required. Pending the SDL adjustment mechanism (SDLAM) reconciliation outcomes, changes to water recovery outcomes may occur.

Victoria made requests to re-allocate their shared reduction amounts in December 2018 that were agreed by the Authority in March 2019 (344.0 GL/y local recovery amount and 186.4 GL/y shared recovery amount).

As part of the decommissioning of Greens Lake, 9 GL of unregulated entitlement was created and incorporated into environmental entitlements in the Victorian Murray. This unregulated entitlement has no equivalent modelled under BDL. The water savings volume of 8.3 GL is a modelled outcome resulting from an increase of 7.1 GL/y and 1.2 GL/y in end of valley flows from Goulburn and Loddon respectively.

The Commonwealth has contracted or agreed to purchase volumes through the 450 GL voluntary water purchase program in the Goulburn.

Campaspe SDL resource unit (SS7)

Line of Enquiry 1 Basin Plan implementation as at 30 June 2024			
		Assumed Recovery volumes (total represented in model for the *at commencement of review* scenario)	
Recovery Type	**Bridging the Gap**	28.90 GL/y	
	Additional 450 GL/y	0.00 GL/y	
Total		**28.90 GL/y**	
Note – All water recovery volumes as at 30 June 2023. This represents the best available data at the time these assumptions were prepared.			
Line of Enquiry 2 & 3 Fully Implemented Basin Plan			
BDL for regulated river and watercourse (for 2023-24 water year, excluding interceptions)		115.8 GL/y **(**volume used to determine proportional distribution of additional 450 GL/y water recovery in model assumptions)	
		Assumed Recovery volumes (total represented in model for the *Fully Implemented Basin Plan* scenario)	
Recovery Type	**Bridging the Gap**	29.89 GL/y	This volume is 1.28 GL/y greater than current recovery progress
	Additional 450 GL/y	4.38 GL/y	This volume is 4.07 GL/y greater than current recovery and based on a proportional distribution of the additional 450 GL/y recovery volume
Total		**34.27 GL/y**	

Current Water Recovery Progress As at 30 September 2025			
BDL estimate (all forms of take)	**BDL (total)**	140.60 GL/y	
		Recovery Progress	
Recovery Type	**Bridging the Gap**	28.61 GL/y	
	Additional 450 GL/y	0.31 GL/y	There are no SDL resource unit specific targets for recovery of the additional 450 GL/y, in line with DCCEEW's *Framework for delivering the 450 GL of additional environmental water*.
Total		**28.92 GL/y**	

On 28 Feb 2025, 0.12 GL of Campaspe SDL resource unit high reliability entitlement water shares were nominated as additional Held Environmental Water. Department of Climate Change, Energy, the Environment and Water confirmed the nominated entitlement volume specified is to be 0.11 GL and no additional entitlements would be nominated.

As at 30 September 2025, no further bridging the gap recovery is required. Pending the SDL adjustment mechanism (SDLAM) reconciliation outcomes, changes to water recovery outcomes may occur.

Victoria made requests to re-allocate their shared reduction amounts in December 2018 that were agreed by the Authority in March 2019 (18.0 GL/y local recovery amount and 13.2 GL/y shared recovery amount).

Loddon SDL resource unit (SS8)

Line of Enquiry 1 Basin Plan implementation as at 30 June 2024			
		Assumed Recovery volumes (total represented in model for the *at commencement of review* scenario)	
Recovery Type	**Bridging the Gap**	12.40 GL/y	
	Additional 450 GL/y	0.00 GL/y	
Total		**12.40 GL/y**	
Note – All water recovery volumes as at 30 June 2023. This represents the best available data at the time these assumptions were prepared.			
Line of Enquiry 2 & 3 Fully Implemented Basin Plan			
BDL for regulated river and watercourse (for 2023-24 water year, excluding interceptions)		85.80 GL/y **(**volume used to determine proportional distribution of additional 450 GL/y water recovery in model assumptions)	
		Assumed Recovery volumes (total represented in model for the *Fully Implemented Basin Plan* scenario)	
Recovery Type	**Bridging the Gap**	16.30 GL/y	This volume is 5.40 GL/y greater than current recovery progress
	Additional 450 GL/y	3.25 GL/y	This volume is 1.86 GL/y greater than current recovery and based on a proportional distribution of the additional 450 GL/y recovery volume
Total		**19.55 GL/y**	

Current Water Recovery Progress As at 30 September 2025			
BDL estimate (all forms of take)	**BDL (total)**	139.70 GL/y	
		Recovery Progress	
Recovery Type	**Bridging the Gap**	10.90 GL/y	
	Additional 450 GL/y	1.39 GL/y	In this SDL resource unit, there are specific targets for recovery of the additional 450 GL/y, in line with DCCEEW's *Framework for delivering the 450 GL of additional environmental water*.
Total		**12.29 GL/y**	

As at 30 September 2025, no further bridging the gap recovery is required. Pending the SDL adjustment mechanism (SDLAM) reconciliation outcomes, changes to water recovery outcomes may occur.

Victoria made requests to re-allocate their shared reduction amounts in December 2018 that were agreed by the Authority in March 2019 (12.0 GL/y local recovery amount and 9.8 GL/y shared recovery amount).

As part of the decommissioning of Greens Lake, 9 GL of unregulated entitlement was created and incorporated into environmental entitlements in the Victorian Murray. This unregulated entitlement has no equivalent modelled under BDL. The water savings volume of 8.3 GL is a modelled outcome resulting from an increase of 7.1 GL/y and 1.2 GL/y in end of valley flows from Goulburn and Loddon respectively.

The Commonwealth has contracted or agreed to purchase volumes through the 450 GL voluntary water purchase program in the Loddon.

Wimmera-Mallee (Surface Water) SDL resource unit (SS9)

Line of Enquiry 1 Basin Plan implementation as at 30 June 2024			
		Assumed Recovery volumes (total represented in model for the *at commencement of review* scenario)	
Recovery Type	**Bridging the Gap**	23.20 GL/y	
	Additional 450 GL/y	0.00 GL/y	
Total		**23.20 GL/y**	
Note – All water recovery volumes as at 30 June 2023. This represents the best available data at the time these assumptions were prepared.			
Line of Enquiry 2 & 3 Fully Implemented Basin Plan			
BDL for regulated river, watercourse (for 2023-24 water year, excluding interceptions)		68.20 GL/y **(**volume used to determine proportional distribution of additional 450 GL/y water recovery in model assumptions)	
		Assumed Recovery volumes (total represented in model for the *Fully Implemented Basin Plan* scenario)	
Recovery Type	**Bridging the Gap**	23.00 GL/y	This volume is 0.02 GL/y greater than current recovery progress
	Additional 450 GL/y	2.58 GL/y	This volume is 2.38 GL/y greater than current recovery and based on a proportional distribution of the additional 450 GL/y recovery volume
Total		**25.58 GL/y**	

Current Water Recovery Progress As at 30 September 2025			
BDL estimate (all forms of take)	**BDL (total)**	99.10 GL/y	
		Recovery Progress	
Recovery Type	**Bridging the Gap**	22.98 GL/y	0.02 GL/y local recovery remaining (local reduction amount 23.0 GL/y, no shared reduction amount)
	Additional 450 GL/y	0.20 GL/y	There are no SDL resource unit specific targets for recovery of the additional 450 GL/y, in line with DCCEEW's *Framework for delivering the 450 GL of additional environmental water*.
Total		**23.18 GL/y**	

As at 30 September 2025, 0.02 GL/y bridging the gap recovery is required.
Victoria made requests to re-allocate their shared reduction amounts in December 2018 that were agreed by the Authority in 2018 (23.0 GL/y local recovery amount and no shared recovery amount).

SA Non-Prescribed Areas SDL resource unit (SS10)

Line of Enquiry 1 Basin Plan implementation as at 30 June 2024			
		Assumed Recovery volumes (total represented in model for the *at commencement of review* scenario)	
Recovery Type	**Bridging the Gap**	0.00 GL/y	
	Additional 450 GL/y	0.00 GL/y	
Total		**0.00 GL/y**	
Note – All water recovery volumes as at 30 June 2023. This represents the best available data at the time these assumptions were prepared.			
Line of Enquiry 2 & 3 Fully Implemented Basin Plan			
BDL for watercourse **(for 2023-24 water year, excluding interceptions)**		00.0 GL/y **(**volume used to determine proportional distribution of additional 450 GL/y water recovery in model assumptions)	
		Assumed Recovery volumes (total represented in model for the *Fully Implemented Basin Plan* scenario)	
Recovery Type	**Bridging the Gap**	0.00 GL/y	
	Additional 450 GL/y	0.00 GL/y	
Total		**0.00 GL/y**	

Current Water Recovery Progress As at 30 September 2025			
BDL estimate (all forms of take)	**BDL (total)**	55.20 GL/y	
		Recovery Progress	
Recovery Type	**Bridging the Gap**	0.00 GL/y	No recovery has occurred.
	Additional 450 GL/y	0.00 GL/y	There are no SDL resource unit specific targets for recovery of the additional 450 GL/y, in line with DCCEEW's *Framework for delivering the 450 GL of additional environmental water*.
Total		**0.00 GL/y**	
There are no BDL modelled components in the SA Non-Prescribed Areas SDL resource unit. All forms of take are estimated. There is no local or shared recovery targets and no held environmental water in the SA Non-Prescribed Areas, therefore there is no target for recovery and/or recovery progress to report.			

SA Murray SDL resource unit (SS11)

Line of Enquiry 1 Basin Plan implementation as at 30 June 2024			
		Assumed Recovery volumes (total represented in model for the *at commencement of review* scenario)	
Recovery Type	**Bridging the Gap**	141.00 GL/y	
	Additional 450 GL/y	2.70 GL/y	
Total		**143.70 GL/y**	
Note – All water recovery volumes as at 30 June 2023. This represents the best available data at the time these assumptions were prepared.			
Line of Enquiry 2 & 3 Fully Implemented Basin Plan			
BDL for regulated river and watercourse (for 2023-24 water year, excluding interceptions)		681.10 GL/y **(**volume used to determine proportional distribution of additional 450 GL/y water recovery in model assumptions)	
		Assumed Recovery volumes (total represented in model for the *Fully Implemented Basin Plan* scenario)	
Recovery Type	**Bridging the Gap**	151.61 GL/y	This volume is 19.81 GL/y greater than current recovery progress
	Additional 450 GL/y	25.78 GL/y	This volume is 13.62 GL/y greater than current recovery and based on a proportional distribution of the additional 450 GL/y recovery volume
Total		**177.39 GL/y**	

Current Water Recovery Progress As at 30 September 2025			
BDL estimate (all forms of take)	**BDL (total)**	681.06 GL/y	
		Recovery Progress	
Recovery Type	**Bridging the Gap**	131.80 GL/y	
	Additional 450 GL/y	12.16 GL/y	In this SDL resource unit, there are specific targets for recovery of the additional 450 GL/y, in line with DCCEEW's *Framework for delivering the 450 GL of additional environmental water*.
Total		**143.96 GL/y**	

South Australia made a request to re-allocate the shared reduction amount within their state in June 2018 (101.0 GL/y local recovery amount and 82.8 GL/y shared recovery amount)

5.29 GL/y of the Basin Plan recovery target consists of a contribution from the Augmentation of Adelaide Desalination plant

As at 30 September 2025, no further bridging the gap recovery is required. Pending the SDL adjustment mechanism (SDLAM) reconciliation outcomes, changes to water recovery outcomes may occur.

Marne Saunders SDL resource unit (SS12)

Line of Enquiry 1 Basin Plan implementation as at 30 June 2024			
		Assumed Recovery volumes (total represented in model for the *at commencement of review* scenario)	
Recovery Type	**Bridging the Gap**	0.00 GL/y	
	Additional 450 GL/y	0.00 GL/y	
Total		**0.00 GL/y**	
Note – All water recovery volumes as at 30 June 2023. This represents the best available data at the time these assumptions were prepared.			
Line of Enquiry 2 & 3 Fully Implemented Basin Plan			
BDL for watercourse **(for 2023-24 water year, excluding interceptions)**		0.00 GL/y **(**volume used to determine proportional distribution of additional 450 GL/y water recovery in model assumptions)	
		Assumed Recovery volumes (total represented in model for the *Fully Implemented Basin Plan* scenario)	
Recovery Type	**Bridging the Gap**	0.00 GL/y	
	Additional 450 GL/y	0.00 GL/y	
Total		**0.00 GL/y**	

Current Water Recovery Progress As at 30 September 2025			
BDL estimate (all forms of take)	**BDL (total)**	3.00 GL/y	
		Recovery Progress	
Recovery Type	**Bridging the Gap**	0.00 GL/y	No recovery has occurred
	Additional 450 GL/y	0.00 GL/y	There are no SDL resource unit specific targets for recovery of the additional 450 GL/y, in line with DCCEEW's *Framework for delivering the 450 GL of additional environmental water*.
Total		**0.00 GL/y**	

There are no BDL modelled components for take from watercourse in Marne Saunders SDL resource unit.
BDL estimate of 3 GL/y is for take by runoff dams.
There is no local or shared recovery targets and no held environmental water in Marne Saunders, therefore there is no target for recovery and/or recovery progress to report.

Eastern Mount Lofty Ranges SDL resource unit (SS13)

Line of Enquiry 1 Basin Plan implementation as at 30 June 2024			
		Assumed Recovery volumes (total represented in model for the *at commencement of review* scenario)	
Recovery Type	**Bridging the Gap**	0.00 GL/y	
	Additional 450 GL/y	0.00 GL/y	
Total		**0.00 GL/y**	
Note – All water recovery volumes as at 30 June 2023. This represents the best available data at the time these assumptions were prepared.			
Line of Enquiry 2 & 3 Fully Implemented Basin Plan			
BDL for watercourse **(for 2023-24 water year, excluding interceptions)**		15.30 GL/y **(**volume used to determine proportional distribution of additional 450 GL/y water recovery in model assumptions)	
		Assumed Recovery volumes (total represented in model for the *Fully Implemented Basin Plan* scenario)	
Recovery Type	**Bridging the Gap**	0.00 GL/y	
	Additional 450 GL/y	0.58 GL/y	This volume is 0.58 GL/y greater than current recovery and based on a proportional distribution of the additional 450 GL/y recovery volume
Total		**0.58 GL/y**	

Current Water Recovery Progress As at 30 September 2025			
BDL estimate (all forms of take)	**BDL (total)**	28.30 GL/y	
		Recovery Progress	
Recovery Type	**Bridging the Gap**	0.00 GL/y	No recovery has occurred
	Additional 450 GL/y	0.00 GL/y	There are no SDL resource unit specific targets for recovery of the additional 450 GL/y, in line with DCCEEW's *Framework for delivering the 450 GL of additional environmental water*.
Total		**0.00 GL/y**	

There is no local or shared recovery targets and no held environmental water in Eastern Mount Lofty Ranges, therefore there is no target for recovery and/or recovery progress to report.

NSW Murray SDL resource unit (SS14)

Line of Enquiry 1 Basin Plan implementation as at 30 June 2024			
		Assumed Recovery volumes (total represented in model for the *at commencement of review* scenario)	
Recovery Type	**Bridging the Gap**	293.00 GL/y	
	Additional 450 GL/y	0.00 GL/y	
Total		**293.00 GL/y**	
Note – All water recovery volumes as at 30 June 2023. This represents the best available data at the time these assumptions were prepared. Based on NSW interim 2018 LTDLE factors.			
Line of Enquiry 2 & 3 Fully Implemented Basin Plan			
BDL for regulated river and watercourse (for 2023-24 water year, excluding interceptions)		1,721.67 GL/y **(**volume used to determine proportional distribution of additional 450 GL/y water recovery in model assumptions)	
		Assumed Recovery volumes (total represented in model for the *Fully Implemented Basin Plan* scenario)	
Recovery Type	**Bridging the Gap**	364.88 GL/y	This volume is 61.84 GL/y greater than current recovery progress
	Additional 450 GL/y	65.18 GL/y	This volume is 43.33 GL/y greater than current recovery and based on a proportional distribution of the additional 450 GL/y recovery volume
Total		**430.06 GL/y**	
Note - Based on NSW interim 2018 LTDLE factors.			
Current Water Recovery Progress As at 30 September 2025			
BDL estimate (all forms of take)	**BDL (total)**	1,825.67 GL/y	
		Recovery Progress	
Recovery Type	**Bridging the Gap**	303.04 GL/y	
	Additional 450 GL/y	21.85 GL/y	In this SDL resource unit, there are specific targets for recovery of the additional 450 GL/y, in line with DCCEEW's *Framework for delivering the 450 GL of additional environmental water*.
Total		**324.89 GL/y**	
Water recovery volumes in NSW are currently based on interim 2018 LTDLE factors, these may change once final factors are determined, which may lead to changes in water recovery estimates. NSW made requests to re-allocate their shared reduction amounts in December 2018 that were agreed by the Authority in March 2019 (262.0 GL/y local recovery amount and 165.8 GL/y shared recovery amount) As at 30 September 2025, no further bridging the gap recovery is required. Pending the SDL adjustment mechanism (SDLAM) reconciliation outcomes, changes to water recovery outcomes may occur.			

Murrumbidgee SDL resource unit (SS15)

Line of Enquiry 1 Basin Plan implementation as at 30 June 2024			
		Assumed Recovery volumes (total represented in model for the *at commencement of review* scenario)	
Recovery Type	**Bridging the Gap**	442.40 GL/y	
	Additional 450 GL/y	5.60 GL/y	
Total		**448.00 GL/y**	
Note – All water recovery volumes as at 30 June 2023. This represents the best available data at the time these assumptions were prepared. Based on NSW interim 2018 LTDLE factors			
Line of Enquiry 2 & 3 Fully Implemented Basin Plan			
BDL for regulated river and watercourse (for 2023-24 water year, excluding interceptions)		2,121.58 GL/y **(**volume used to determine proportional distribution of additional 450 GL/y water recovery in model assumptions)	
		Assumed Recovery volumes (total represented in model for the *Fully Implemented Basin Plan* scenario)	
Recovery Type	**Bridging the Gap**	516.23 GL/y	This volume is 80.44 GL/y greater than current recovery progress
	Additional 450 GL/y	80.31 GL/y	This volume is 56.45 GL/y greater than current recovery and based on a proportional distribution of the additional 450 GL/y recovery volume
Total		**596.55 GL/y**	
Note - Based on NSW interim 2018 LTDLE factors			
Current Water Recovery Progress As at 30 September 2025			
BDL estimate (all forms of take)	**BDL (total)**	2,622.58 GL/y	
		Recovery Progress	
Recovery Type	**Bridging the Gap**	435.79 GL/y	0.11 GL/y shared recovery remaining (local reduction amount 320.0 GL/y, shared reduction amount 277.9 GL/y)
	Additional 450 GL/y	23.86 GL/y	In this SDL resource unit, there are specific targets for recovery of the additional 450 GL/y, in line with DCCEEW's *Framework for delivering the 450 GL of additional environmental water*.
Total		**459.65 GL/y**	

Water recovery volumes in NSW for Murrumbidgee were updated as at 30 September 2025, and are now based on the 2024 LTDLE factors, which has led to changes in water recovery estimates.

The BDL models for the accredited Murrumbidgee WRP, was discovered post accreditation by NSW, to be double counting a Stock & Domestic licenced 'unmodelled' take volume of 28.9 GL/y.

NSW made requests to re-allocate their shared reduction amounts in December 2018 that were agreed by the Authority in March 2019 (320.0 GL/y local recovery amount and 277.9 GL/y shared recovery amount). Pending the SDL adjustment mechanism (SDLAM) reconciliation outcomes, changes to water recovery outcomes may occur.			

Lachlan SDL resource unit (SS16)

Line of Enquiry 1 Basin Plan implementation as at 30 June 2024			
		Assumed Recovery volumes (total represented in model for the *at commencement of review* scenario)	
Recovery Type	**Bridging the Gap**	47.10 GL/y	
	Additional 450 GL/y	0.00 GL/y	
Total		**47.10 GL/y**	
Note – All water recovery volumes as at 30 June 2023. This represents the best available data at the time these assumptions were prepared. Based on NSW interim 2018 LTDLE factors			
Line of Enquiry 2 & 3 Fully Implemented Basin Plan			
BDL for regulated river and watercourse (for 2023-24 water year, excluding interceptions)		296.40 GL/y **(**volume used to determine proportional distribution of additional 450 GL/y water recovery in model assumptions)	
		Assumed Recovery volumes (total represented in model for the *Fully Implemented Basin Plan* scenario)	
Recovery Type	**Bridging the Gap**	48.00 GL/y	
	Additional 450 GL/y	11.22 GL/y	This volume is 11.22 GL/y greater than current recovery and based on a proportional distribution of the additional 450 GL/y recovery volume
Total		**59.22 GL/y**	
Note - Based on NSW interim 2018 LTDLE factors			
Current Water Recovery Progress As at 30 September 2025			
BDL estimate (all forms of take)	**BDL (total)**	618.01 GL/y	
		Recovery Progress	
Recovery Type	**Bridging the Gap**	48.00 GL/y	
	Additional 450 GL/y	0.00 GL/y	There are no SDL resource unit specific targets for recovery of the additional 450 GL/y, in line with DCCEEW's *Framework for delivering the 450 GL of additional environmental water*.
Total		**48.00 GL/y**	
As at 30 September 2025 there is a small volume of incomplete recovery in the Lachlan, at this time DCCEEW considers the Lachlan to be fully recovered. This is subject to change in future reporting periods pending outcomes of the NSW LTDLE factor review.			

Water recovery volumes in NSW are currently based on interim 2018 LTDLE factors, these may change once final factors are determined, which may lead to changes in water recovery estimates.
Pending the SDL adjustment mechanism (SDLAM) reconciliation outcomes, changes to water recovery outcomes may occur.

Intersecting Streams SDL resource unit (SS17)

Line of Enquiry 1 Basin Plan implementation as at 30 June 2024			
		Assumed Recovery volumes (total represented in model for the *at commencement of review* scenario)	
Recovery Type	**Bridging the Gap**	13.80 GL/y	
	Additional 450 GL/y	0.00 GL/y	
Total		**13.80 GL/y**	
Note – All water recovery volumes as at 30 June 2023. This represents the best available data at the time these assumptions were prepared. Based on NSW interim 2018 LTDLE factors.			
Line of Enquiry 2 & 3 Fully Implemented Basin Plan			
BDL for watercourse & basic rights (for 2023-24 water year, excluding interceptions)		21.80 GL/y **(**volume used to determine proportional distribution of additional 450 GL/y water recovery in model assumptions)	
		Assumed Recovery volumes (total represented in model for the *Fully Implemented Basin Plan* scenario)	
Recovery Type	**Bridging the Gap**	13.80 GL/y	This volume is 1.99 GL/y less than current recovery progress
	Additional 450 GL/y	0.83 GL/y	This volume is 0.83 GL/y greater than current recovery and based on a proportional distribution of the additional 450 GL/y recovery volume
Total		**14.63 GL/y**	
Note - Based on NSW interim 2018 LTDLE factors.			
Current Water Recovery Progress As at 30 September 2025			
BDL estimate (all forms of take)	**BDL (total)**	132.80 GL/y	
		Recovery Progress	
Recovery Type	**Bridging the Gap**	15.79 GL/y	
	Additional 450 GL/y	0.00 GL/y	There are no SDL resource unit specific targets for recovery of the additional 450 GL/y, in line with DCCEEW's *Framework for delivering the 450 GL of additional environmental water*.
Total		**15.79 GL/y**	
Northern Basin Review did not change existing recovery targets, local reduction amount of 8.0 GL/y was retained.			

NSW shared reduction amount adjusted to 13.8 GL/y, in 2019 to ensure full recovery. Water recovery volumes in NSW for Intersecting Streams were updated as at 30 September 2025, and are now based on the 2024 LTDLE factors, which has led to changes in water recovery estimates.

Lower Darling SDL resource unit (SS18)

Line of Enquiry 1 Basin Plan implementation as at 30 June 2024			
		Assumed Recovery volumes (total represented in model for the *at commencement of review* scenario)	
Recovery Type	**Bridging the Gap**	23.20 GL/y	
	Additional 450 GL/y	0.00 GL/y	
Total		**23.20 GL/y**	
Note – All water recovery volumes as at 30 June 2023. This represents the best available data at the time these assumptions were prepared. Based on NSW interim 2018 LTDLE factors.			
Line of Enquiry 2 & 3 Fully Implemented Basin Plan			
BDL for regulated river and watercourse (for 2023-24 water year, excluding interceptions)		54.22 GL/y **(**volume used to determine proportional distribution of additional 450 GL/y water recovery in model assumptions)	
		Assumed Recovery volumes (total represented in model for the *Fully Implemented Basin Plan* scenario)	
Recovery Type	**Bridging the Gap**	22.30 GL/y	
	Additional 450 GL/y	2.05 GL/y	This volume is 1.17 GL/y greater than current recovery and based on a proportional distribution of the additional 450 GL/y recovery volume
Total		**24.35 GL/y**	
Based on NSW interim 2018 LTDLE factors.			
Current Water Recovery Progress As at 30 September 2025			
BDL estimate (all forms of take)	**BDL (total)**	59.72 GL/y	
		Recovery Progress	
Recovery Type	**Bridging the Gap**	22.30 GL/y	
	Additional 450 GL/y	0.88 GL/y	There are no SDL resource unit specific targets for recovery of the additional 450 GL/y, in line with DCCEEW's *Framework for delivering the 450 GL of additional environmental water*.
Total		**23.18 GL/y**	

Water recovery volumes in NSW are currently based on interim 2018 LTDLE factors, these may change once final factors are determined, which may lead to changes in water recovery estimates.
NSW made requests to re-allocate their shared reduction amounts in December 2018 that were agreed by the Authority in March 2019 (8.0 GL/y local recovery amount and 14.3 GL/y shared recovery amount).
Pending the SDL adjustment mechanism (SDLAM) reconciliation outcomes, changes to water recovery outcomes may occur.

Barwon–Darling Watercourse SDL resource unit (SS19)

Line of Enquiry 1 Basin Plan implementation as at 30 June 2024			
		Assumed Recovery volumes (total represented in model for the *at commencement of review* scenario)	
Recovery Type	**Bridging the Gap**	30.30 GL/y	
	Additional 450 GL/y	0.00 GL/y	
Total		**30.30 GL/y**	
Note – All water recovery volumes as at 30 June 2023. This represents the best available data at the time these assumptions were prepared. Based on NSW interim 2018 LTDLE factors.			
Line of Enquiry 2 & 3 Fully Implemented Basin Plan			
BDL for watercourse and floodplain harvesting (for 2023-24 water year, excluding interceptions)		233.10 GL/y **(**volume used to determine proportional distribution of additional 450 GL/y water recovery in model assumptions)	
		Assumed Recovery volumes (total represented in model for the *Fully Implemented Basin Plan* scenario)	
Recovery Type	**Bridging the Gap**	32.00 GL/y	This volume is 1.32 GL/y greater than current recovery progress
	Additional 450 GL/y	8.82 GL/y	This volume is 8.82 GL/y greater than current recovery and based on a proportional distribution of the additional 450 GL/y recovery volume
Total		**40.82 GL/y**	
Note - Based on NSW interim 2018 LTDLE factors.			
Current Water Recovery Progress As at 30 September 2025			
BDL estimate (all forms of take)	**BDL (total)**	233.15 GL/y	
		Recovery Progress	
Recovery Type	**Bridging the Gap**	30.68 GL/y	1.32 GL/y local recovery remaining (local reduction amount 32.0 GL/y, no shared reduction amount)
	Additional 450 GL/y	0.00 GL/y	There are no SDL resource unit specific targets for recovery of the additional 450 GL/y, in line with DCCEEW's *Framework for delivering the 450 GL of additional environmental water*.
Total		**30.68 GL/y**	

Northern Basin Review changed existing recovery targets (local reduction amount 6.0 GL/y, shared reduction amount 22.0 GL/y) to 32.0 GL/y local recovery amount only. Water recovery volumes in NSW are currently based on interim 2018 LTDLE factors, these may change once final factors are determined, which may lead to changes in water recovery volume estimates. A 3.812 GL floodplain harvesting water right from Toorale Station hasn't been included in recovery volumes because no NSW LTDLE factor currently exists for that entitlement.

Macquarie-Castlereagh SDL resource unit (SS20)

Line of Enquiry 1 Basin Plan implementation as at 30 June 2024			
		Assumed Recovery volumes (total represented in model for the *at commencement of review* scenario)	
Recovery Type	**Bridging the Gap**	95.80 GL/y	
	Additional 450 GL/y	0.00 GL/y	
Total		**95.80 GL/y**	
Note – All water recovery volumes as at 30 June 2023. This represents the best available data at the time these assumptions were prepared. Based on NSW interim 2018 LTDLE factors.			
Line of Enquiry 2 & 3 Fully Implemented Basin Plan			
BDL for regulated river, watercourse, floodplain harvesting & basic rights (for 2023-24 water year, excluding interceptions)		399.01 GL/y **(**volume used to determine proportional distribution of additional 450 GL/y water recovery in model assumptions)	
		Assumed Recovery volumes (total represented in model for the *Fully Implemented Basin Plan* scenario)	
Recovery Type	**Bridging the Gap**	57.59 GL/y	This volume is 9.34 GL/y greater than current recovery progress
	Additional 450 GL/y	38.21 GL/y	This volume is 7.12 GL/y greater than current recovery and based on a proportional distribution of the additional 450 GL/y recovery volume
Total		**95.80 GL/y**	
Note - BDL includes an additional 5 GL/y compared to 2023-24. This represents the best available data at the time these assumptions were prepared. Based on NSW interim 2018 LTDLE factors			
Current Water Recovery Progress As at 30 September 2025			
BDL estimate (all forms of take)	**BDL (total)**	717.81 GL/y	
		Recovery Progress	
Recovery Type	**Bridging the Gap**	48.25 GL/y	6.75 GL/y local recovery and 2.6. GL/y shared recovery remaining (local reduction amount 55.0 GL/y, shared reduction amount 2.6 GL/y)

	Additional 450 GL/y	31.09 GL/y	There are no further SDL resource unit specific targets for recovery of the additional 450 GL/y, in line with DCCEEW's *Framework for delivering the 450 GL of additional environmental water*.
Total		**79.34 GL/y**	9.4 GL/y remaining
Northern Basin Review changed existing recovery targets (local reduction amount 65.0 GL/y, shared reduction amount 18 GL/y) to 55.0 GL/y local recovery and 2.6 GL/y shared recovery amount. Water recovery volumes in NSW for SS20 were updated as at 30 September 2025, and are now based on the 2024 LTDLE factors, which has led to changes in water recovery estimates.			

Namoi SDL resource unit (SS21)

Line of Enquiry 1 Basin Plan implementation as at 30 June 2024			
		Assumed Recovery volumes (total represented in model)	
Recovery Type	**Bridging the Gap**	10.60 GL/y	
	Additional 450 GL/y	0.00 GL/y	
Total		**10.60 GL/y**	
Note – All water recovery volumes as at 30 June 2023. This represents the best available data at the time these assumptions were prepared. Based on NSW interim 2018 LTDLE factors.			
Line of Enquiry 2 & 3 Fully Implemented Basin Plan			
BDL for regulated river, watercourse, floodplain harvesting & basic rights (for 2023-24 water year, excluding interceptions)		330.32 GL/y **(**volume used to determine proportional distribution of additional 450 GL/y water recovery in model assumptions)	
		Assumed Recovery volumes (total represented in model for the *Fully Implemented Basin Plan* scenarios)	
Recovery Type	**Bridging the Gap**	20.00 GL/y	This volume is 0.61 GL/y greater than current recovery progress
	Additional 450 GL/y	12.50 GL/y	This volume is 12.50 GL/y greater than current recovery and based on a proportional distribution of the additional 450 GL/y recovery volume
Total		**32.50 GL/y**	
Note - Based on NSW interim 2018 LTDLE factors.			
Current Water Recovery Progress As at 30 September 2025			
BDL estimate (all forms of take)	**BDL (total)**	518.22 GL/y	
		Recovery Progress	
Recovery Type	**Bridging the Gap**	19.39 GL/y	0.61 GL/y local recovery remaining (local reduction amount 20.0 GL/y, shared reduction amount 0.0 GL/y)

Additional 450 GL/y	0.00 GL/y	There are no SDL resource unit specific targets for recovery of the additional 450 GL/y, in line with DCCEEW's *Framework for delivering the 450 GL of additional environmental water*.
Total	**19.39 GL/y**	

Northern Basin Review changed existing recovery targets (local reduction amount 10.0 GL/y, shared reduction amount 14 GL/y) to 20.0 GL/y local recovery amount only.

Water recovery volumes in NSW are currently based on interim 2018 LTDLE factors, these may change once final factors are determined, which may lead to changes in water recovery estimates.

The BDL, in the absence of an accredited Water Resource Plan, is as per a Bilateral agreement between NSW and MDBA.

Gwydir SDL resource unit (SS22)

Line of Enquiry 1 Basin Plan implementation as at 30 June 2024			
		Assumed Recovery volumes (total represented in model for the *at commencement of review* scenario)	
Recovery Type	**Bridging the Gap**	54.60 GL/y	
	Additional 450 GL/y	0.00 GL/y	
Total		**54.60 GL/y**	
Note – All water recovery volumes as at 30 June 2023. This represents the best available data at the time these assumptions were prepared. Based on NSW interim 2018 LTDLE factors.			
Line of Enquiry 2 & 3 Fully Implemented Basin Plan			
BDL for regulated river, watercourse, floodplain harvesting & basic rights (for 2023-24 water year, excluding interceptions)		429.71 GL/y **(**volume used to determine proportional distribution of additional 450 GL/y water recovery in model assumptions)	
		Assumed Recovery volumes (total represented in model for the *Fully Implemented Basin Plan* scenario)	
Recovery Type	**Bridging the Gap**	49.57 GL/y	This volume is 0.03 GL/y less than current recovery progress
	Additional 450 GL/y	16.27 GL/y	This volume is 11.23 GL/y greater than current recovery and based on a proportional distribution of the additional 450 GL/y recovery volume
Total		**65.84 GL/y**	
Note - Based on NSW interim 2018 LTDLE factors.			
Current Water Recovery Progress As at 30 September 2025			
BDL estimate (all forms of take)	**BDL (total)**	592.01 GL/y	
		Recovery Progress	
Recovery Type	**Bridging the Gap**	49.60 GL/y	
	Additional 450 GL/y	5.04 GL/y	There are no further SDL resource unit specific targets for recovery of the additional 450 GL/y, in line with DCCEEW's *Framework for delivering the 450 GL of additional environmental water*.
Total		**54.64 GL/y**	
Northern Basin Review changed existing recovery targets (local reduction amount 42.0 GL/y, shared reduction amount 14 GL/y) to 42.0 GL/y local recovery and 7.6 GL/y shared recovery amount. Water recovery volumes in NSW are currently based on interim 2018 LTDLE factors, these may change once final factors are determined, which may lead to changes in water recovery volume estimates.			

The BDL, in the absence of an accredited Water Resource Plan, is as per a Bilateral agreement between NSW and MDBA.

NSW Border Rivers SDL resource unit (SS23)

Line of Enquiry 1 Basin Plan implementation as at 30 June 2024			
		Assumed Recovery volumes (total represented in model for the *at commencement of review* scenario)	
Recovery Type	**Bridging the Gap**	1.90 GL/y	
	Additional 450 GL/y	0.00 GL/y	
Total		**1.90 GL/y**	
Note – All water recovery volumes as at 30 June 2023. This represents the best available data at the time these assumptions were prepared. Based on NSW interim 2018 LTDLE factors.			
Line of Enquiry 2 & 3 Fully Implemented Basin Plan			
BDL for regulated river, watercourse, floodplain harvesting & basic rights (for 2023-24 water year, excluding interceptions)		227.19 GL/y **(**volume used to determine proportional distribution of additional 450 GL/y water recovery in model assumptions)	
		Assumed Recovery volumes (total represented in model for the *Fully Implemented Basin Plan* scenario)	
Recovery Type	**Bridging the Gap**	7.00 GL/y	This volume is 4.27 GL/y greater than current recovery progress
	Additional 450 GL/y	8.60 GL/y	This volume is 8.60 GL/y greater than current recovery and based on a proportional distribution of the additional 450 GL/y recovery volume
Total		**15.60 GL/y**	
Note - Based on NSW interim 2018 LTDLE factors.			
Current Water Recovery Progress As at 30 September 2025			
BDL estimate (all forms of take)	**BDL (total)**	327.99 GL/y	
		Recovery Progress	
Recovery Type	**Bridging the Gap**	2.73 GL/y	4.27 GL/y local recovery remaining (local reduction amount 7.0 GL/y, no shared reduction amount)
	Additional 450 GL/y	0.00 GL/y	There are no SDL resource unit specific targets for recovery of the additional 450 GL/y, in line with DCCEEW's *Framework for delivering the 450 GL of additional environmental water*.
Total		**2.73 GL/y**	
Northern Basin Review changed existing recovery targets (local reduction amount 7.0 GL/y, shared reduction amount 9 GL/y) to 7.0 GL/y local recovery amount only.			

No change to targets from NSW shared reduction amount reallocation request.
Water recovery volumes in NSW for SS23 were updated as at 30 September 2025, and are now based on the 2024 LTDLE factors, which has led to changes in water recovery estimates.

Queensland Border Rivers SDL resource unit (SS24)

Line of Enquiry 1 Basin Plan implementation as at 30 June 2024			
		Assumed Recovery volumes (total represented in model for the *at commencement of review* scenario)	
Recovery Type	**Bridging the Gap**	14.50 GL/y	
	Additional 450 GL/y	0.00 GL/y	
Total		**14.50 GL/y**	
Note – All water recovery volumes as at 30 June 2023. This represents the best available data at the time these assumptions were prepared.			
Line of Enquiry 2 & 3 Fully Implemented Basin Plan			
BDL for watercourse and floodplain harvesting (for 2023-24 water year, excluding interceptions)		296.00 GL/y **(**volume used to determine proportional distribution of additional 450 GL/y water recovery in model assumptions)	
		Assumed Recovery volumes (total represented in model for the *Fully Implemented Basin Plan* scenario)	
Recovery Type	**Bridging the Gap**	14.10 GL/y	This volume is 0.10 GL/y greater than current recovery progress
	Additional 450 GL/y	11.21 GL/y	This volume is 10.79 GL/y greater than current recovery and based on a proportional distribution of the additional 450 GL/y recovery volume
Total		**25.31 GL/y**	

Current Water Recovery Progress As at 30 September 2025			
BDL estimate (all forms of take)	**BDL (total)**	377.60 GL/y	
		Recovery Progress	
Recovery Type	**Bridging the Gap**	14.00 GL/y	
	Additional 450 GL/y	0.42 GL/y	There are no further SDL resource unit specific targets for recovery of the additional 450 GL/y, in line with DCCEEW's *Framework for delivering the 450 GL of additional environmental water*.
Total		**14.42 GL/y**	

Northern Basin Review changed existing recovery targets (local reduction amount 8.0 GL/y, shared reduction amount 15 GL/y) to 14.0 GL/y local recovery amount only.

0.8 GL/y of the Basin Plan local recovery target consists of a QLD gift of unallocated water to the Commonwealth in 2008.

Moonie SDL resource unit (SS25)

Line of Enquiry 1 Basin Plan implementation as at 30 June 2024			
		Assumed Recovery volumes (total represented in model for the *at commencement of review* scenario)	
Recovery Type	**Bridging the Gap**	2.80 GL/y	
	Additional 450 GL/y	0.00 GL/y	
Total		**2.80 GL/y**	
Note – All water recovery volumes as at 30 June 2023. This represents the best available data at the time these assumptions were prepared.			
Line of Enquiry 2 & 3 Fully Implemented Basin Plan			
BDL for watercourse and floodplain harvesting (for 2023-24 water year, excluding interceptions)		40.60 GL/y **(**volume used to determine proportional distribution of additional 450 GL/y water recovery in model assumptions)	
		Assumed Recovery volumes (total represented in model for the *Fully Implemented Basin Plan* scenario)	
Recovery Type	**Bridging the Gap**	2.10 GL/y	This volume is 0.04 GL/y greater than current recovery progress
	Additional 450 GL/y	1.54 GL/y	This volume is 0.76 GL/y greater than current recovery and based on a proportional distribution of the additional 450 GL/y recovery volume
Total		**3.64 GL/y**	

Current Water Recovery Progress As at 30 September 2025			
BDL estimate (all forms of take)	**BDL (total)**	92.00 GL/y	
		Recovery Progress	
Recovery Type	**Bridging the Gap**	2.06 GL/y	
	Additional 450 GL/y	0.78 GL/y	There are no further SDL resource unit specific targets for recovery of the additional 450 GL/y, in line with DCCEEW's *Framework for delivering the 450 GL of additional environmental water*.
Total		**2.84 GL/y**	

Northern Basin Review did not change existing recovery targets, local reduction amount 2.0 GL/y was retained.
QLD shared reduction amount adjusted to 2.06 GL/y, in 2019.
Basin Plan local recovery target includes 1.2 GL/y of QLD gift of unallocated water to the Commonwealth in 2008

Condamine–Balonne SDL resource unit (SS26)

Line of Enquiry 1 Basin Plan implementation as at 30 June 2024			
		Assumed Recovery volumes (total represented in model for the *at commencement of review* scenario)	
Recovery Type	**Bridging the Gap**	86.00 GL/y	
	Additional 450 GL/y	0.00 GL/y	
Total		**86.00 GL/y**	
Note – All water recovery volumes as at 30 June 2023. This represents the best available data at the time these assumptions were prepared.			
Line of Enquiry 2 & 3 Fully Implemented Basin Plan			
BDL for watercourse and floodplain harvesting (for 2023-24 water year, excluding interceptions)		748.0 GL/y **(**volume used to determine proportional distribution of additional 450 GL/y water recovery in model assumptions)	
		Assumed Recovery volumes (total represented in model for the *Fully Implemented Basin Plan* scenario)	
Recovery Type	**Bridging the Gap**	100.00 GL/y	This volume is 0.26 GL/y less than current recovery progress
	Additional 450 GL/y	28.32 GL/y	This volume is 28.32 GL/y greater than current recovery and based on a proportional distribution of the additional 450 GL/y recovery volume
Total		**128.32 GL/y**	

Current Water Recovery Progress As at 30 September 2025			
BDL estimate (all forms of take)	**BDL (total)**	1019.00 GL/y	
		Recovery Progress	
Recovery Type	**Bridging the Gap**	100.26 GL/y	
	Additional 450 GL/y	0.00 GL/y	There are no SDL resource unit specific targets for recovery of the additional 450 GL/y, in line with DCCEEW's *Framework for delivering the 450 GL of additional environmental water*.
Total		**100.26 GL/y**	

Northern Basin Review changed existing recovery targets (local reduction amount 100.0 GL/y, shared reduction amount 42.0 GL/y) to 100.0 GL/y local recovery amount only.

Basin Plan local recovery target includes 1.5 GL/y of QLD gift of unallocated water to the Commonwealth in 2024.

Nebine SDL resource unit (SS27)

Line of Enquiry 1 Basin Plan implementation as at 30 June 2024			
		Assumed Recovery volumes (total represented in model for the *at commencement of review* scenario)	
Recovery Type	**Bridging the Gap**	3.80 GL/y	
	Additional 450 GL/y	0.00 GL/y	
Total		**3.80 GL/y**	
Note – All water recovery volumes as at 30 June 2023. This represents the best available data at the time these assumptions were prepared.			
Line of Enquiry 2 & 3 Fully Implemented Basin Plan			
BDL for watercourse **(for 2023-24 water year, excluding interceptions)**		9.80 GL/y **(**volume used to determine proportional distribution of additional 450 GL/y water recovery in model assumptions)	
		Assumed Recovery volumes (total represented in model for the *Fully Implemented Basin Plan* scenario)	
Recovery Type	**Bridging the Gap**	3.79 GL/y	This volume is 0.05 GL/y less than current recovery progress
	Additional 450 GL/y	0.37 GL/y	This volume is 0.37 GL/y greater than current recovery and based on a proportional distribution of the additional 450 GL/y recovery volume
Total		**4.16 GL/y**	

Current Water Recovery Progress As at 30 September 2025			
BDL estimate (all forms of take)	**BDL (total)**	20.90 GL/y	
		Recovery Progress	
Recovery Type	**Bridging the Gap**	3.84 GL/y	
	Additional 450 GL/y	0.00 GL/y	There are no SDL resource unit specific targets for recovery of the additional 450 GL/y, in line with DCCEEW's *Framework for delivering the 450 GL of additional environmental water*.
Total		**3.84 GL/y**	

Northern Basin Review changed existing recovery targets (local reduction amount 1.0 GL/y, shared reduction amount 0.0 GL/y) to 1.0 GL/y local recovery amount and 2.8 GL/y shared recovery amount.
Basin Plan local recovery target of 3.8 GL/y reflects QLD gift of unallocated water to the Commonwealth in 2008.

Warrego SDL resource unit (SS28)

Line of Enquiry 1 Basin Plan implementation as at 30 June 2024			
		Assumed Recovery volumes (total represented in model)	
Recovery Type	**Bridging the Gap**	20.00 GL/y	
	Additional 450 GL/y	0.00 GL/y	
Total		**20.00 GL/y**	
Note – All water recovery volumes as at 30 June 2023. This represents the best available data at the time these assumptions were prepared.			
Line of Enquiry 2 & 3 Fully Implemented Basin Plan			
BDL for watercourse and floodplain harvesting (for 2023-24 water year, excluding interceptions)		61.90 GL/y volume used to determine proportional distribution of additional 450 GL/y water recovery	
		Assumed Recovery volumes (total represented in model for the *Fully Implemented Basin Plan* scenario)	
Recovery Type	**Bridging the Gap**	20.08 GL/y	This volume is 0.03 GL/y less than current recovery progress
	Additional 450 GL/y	2.34 GL/y	This volume is 2.3 GL/y greater than current recovery and based on a proportional distribution of the additional 450 GL/y recovery volume
Total		**22.43 GL/y**	
Note: Not utilised in the simplified SDL assessment approach			
Current Water Recovery Progress As at 30 September 2025			
BDL estimate (all forms of take)	**BDL (total)**	75.60 GL/y	
		Recovery Progress	
Recovery Type	**Bridging the Gap**	20.11 GL/y	
	Additional 450 GL/y	0.00 GL/y	There are no SDL resource unit specific targets for recovery of the additional 450 GL/y, in line with DCCEEW's *Framework for delivering the 450 GL of additional environmental water*.
Total		**20.11 GL/y**	
Basin Plan local recovery target of 8 GL/y reflects QLD gift of unallocated water to the Commonwealth in 2008. No change to recovery targets from Northern Basin Review. Approved Queensland shared reduction amount reallocation request increased shared target in Warrego by 9.6 GL/y (default shared reduction amount 2.5 GL/y)			

Paroo SDL resource unit (SS29)

Line of Enquiry 1 Basin Plan implementation as at 30 June 2024			
		Assumed Recovery volumes (total represented in model for the *at commencement of review* scenario)	
Recovery Type	**Bridging the Gap**	0.0 GL/y	
	Additional 450 GL/y	0.00 GL/y	
Total		**0.00 GL/y**	
Note – All water recovery volumes as at 30 June 2023. This represents the best available data at the time these assumptions were prepared.			
Line of Enquiry 2 & 3 Fully Implemented Basin Plan			
BDL for watercourse and floodplain harvesting (for 2023-24 water year, excluding interceptions)		0.90 GL/y **(**volume used to determine proportional distribution of additional 450 GL/y water recovery in model assumptions)	
		Assumed Recovery volumes (total represented in model for the *Fully Implemented Basin Plan* scenario)	
Recovery Type	**Bridging the Gap**	0.00 GL/y	
	Additional 450 GL/y	0.03 GL/y	This volume is 0.03 GL/y greater than current recovery and based on a proportional distribution of the additional 450 GL/y recovery volume
Total		**0.03 GL/y**	

Current Water Recovery Progress As at 30 September 2025			
BDL estimate (all forms of take)	**BDL (total)**	11.80 GL/y	
		Recovery Progress	
Recovery Type	**Bridging the Gap**	0.00 GL/y	No recovery has occurred
	Additional 450 GL/y	0.00 GL/y	There are no SDL resource unit specific targets for recovery of the additional 450 GL/y, in line with DCCEEW's *Framework for delivering the 450 GL of additional environmental water*.
Total		**0.00 GL/y**	

There is no local or shared recovery targets and no held environmental water in the Paroo, therefore there is no target for recovery and/or recovery progress to report.

Northern Basin Review did not change existing recovery targets, there is no local reduction or shared reduction amounts.


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