Barwon-Darling Watercourse (SS19)

INITIAL SDL ASSESSMENT RESULT

The Authority has **identified a risk** that environmental outcomes are not being met for this Unit. Further work is required to assess whether the SDL reflects an environmentally sustainable level of take.

The initial assessment indicates that *ecosystem function* and *native fish* outcomes are at risk in this Unit. Pattern of flow is the **likely** leading driver of risk.

The Authority is **proposing to work further with the New South Wales and Queensland governments** through 2026 to understand contributing factors and consider the most appropriate response to address these risks. This work will include an examination of flow drivers and water management settings to inform the Authority's recommendation on response.

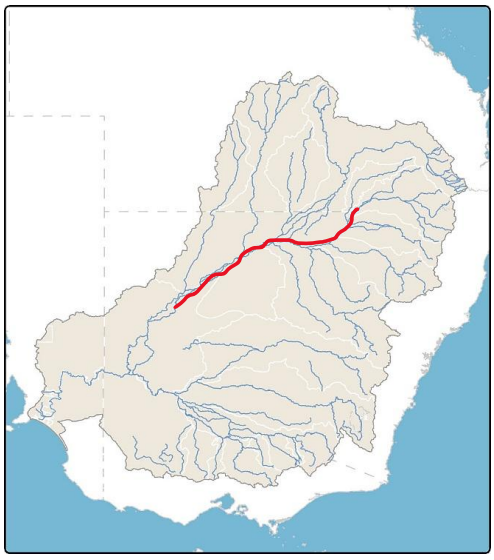

Figure 1: Barwon-Darling Watercourse SDL Resource Unit

The Authority is assessing whether the Sustainable Diversion Limit (SDL) for the Barwon-Darling Watercourse SDL Resource Unit (the **Unit**) continues to support environmental outcomes and reflect an environmentally sustainable level of take (ESLT).

This Assessment Summary provides an overview of the factors which are relevant to that work and the Authority's initial view. The summary draws on three 'Lines of Enquiry', engaging with the likelihood that flow regimes support environmental outcomes, the Authority's confidence in that assessment, and the consequence of an at-risk finding. Line of Enquiry 2 – full Basin Plan implementation – has been considered as the primary line of enquiry. Assumptions for each Line of Enquiry are documented in the *Summary of Assessment Approach* available on the MDBA website.

Information on the Lines of Enquiry and methodology used in this assessment is available in the *Summary of Assessment Approach* and the *SDL Assessment and Response Framework*. Information on the *Basin Plan Review Discussion Paper* and process for making a submission are also available on the MDBA website.

About this Unit (as at June 2024):

Ramsar sites	None
Contribution to Basin water	2.8 % of the total water available in the Murray-Darling Basin
Key waterways	Barwon River, Darling River
Water storages	None
Significant groundwater connections	Upper Darling Alluvium (GS42)

The Water Resource Plan (WRP) that supports this Unit commenced on 19 June 2024. The WRP includes the rules and arrangements that New South Wales are using to manage this Unit and

maintain sustainability. The Barwon-Darling WRP remains recognised under the Basin Plan, however the state-level water sharing plan that gives legal effect to many WRP provisions in NSW expired in June 2025 and is currently lapsed.

Further information on water recovery for this SDL Resource Unit is available at the Department of Climate Change, Energy, the Environment and Water's Barwon-Darling Surface Water Recovery factsheet.

Current condition

Figure 2 below summarises the observed environmental condition in the Unit (as at June 2024).

The Authority assessed *flows and connectivity*, *ecosystem functions* and *native vegetation* to be in **moderate** condition, while *waterbirds* and *native fish* were assessed as being in a **poor** condition. The Authority had a low to medium level of confidence in the condition assessment.

In this Unit, *other species* is not a target objective and there is no monitoring data to support a condition assessment. Due to this, *other species* were not assessed in this Unit and as such is graded as Not Assessed (N/A).

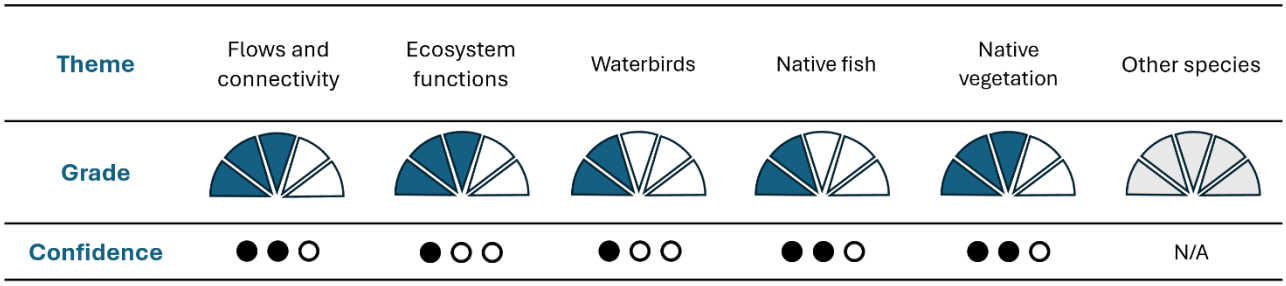

Figure 2. Environmental condition assessment in the Unit. Across each theme environmental condition is graded as *Very Poor, Poor, Moderate, Good* or *Very Good* (as indicated by segments) and confidence in this grading is assessed as *Low, Medium* or *High* (as indicated by dots). 'Other species' refers to animals including frogs, platypuses and turtles.

Environmental outcomes under a fully implemented Basin Plan

Table 1 presents a compilation of:

- the *likelihood* that flows will support environmental outcomes for the five surface water themes for this Unit; and
- the Authority's *confidence* in that assessment, i.e. low (L), medium (M) or high (H) surety of the finding.

The findings in Table 1 consider condition monitoring, assessment of the relative achievement of Environmental Watering Requirements (EWRs) under river model scenarios, and other relevant evidence that provided additional information. Information on the methodology and EWRs used in this assessment is available in the *Summary of Assessment Approach* and the *SDL Assessment and Response Framework*.

Theme	The *likelihood* that the pattern and volume of flow will support the objectives for each ecological theme							
	Line of enquiry	Very unlikely	Unlikely	About as likely as not	More likely than not	Likely	Very likely	Confidence
Flows and connectivity	LoE 1				●			●●○
	LoE 2					●		●●○
Ecosystem functions	LoE 1			●				●●○
	LoE 2				●			●●○
Waterbirds	LoE 1		●					●●○
	LoE 2		●					●●○
Native fish	LoE 1			●				●○○
	LoE 2					●		●○○
Native vegetation	LoE 1				●			●●○
	LoE 2				●			●●○
Other species	LoE 1							N/A
	LoE 2							

Table 1: Initial likelihood assessment of whether the pattern and volume of flow supports the objectives for ecological themes in Unit. Note: LoE 1 refers to Line of Enquiry 1 - current Basin Plan implementation and LoE 2 refers to Line of Enquiry 2 - full Basin Plan implementation. Confidence in this grading is assessed as *Low, Medium* or *High*. 'Other species' refers to animals including frogs, platypuses and turtles.

Under both Line of Enquiry 1 and Line of Enquiry 2 it is assessed as **unlikely** that the flow requirements are supporting objectives for *waterbirds*, and that there is a medium level of confidence in that assessment. This assessment also reflects that it is **about as likely as not** that the flow requirements are supporting objectives for *ecosystem function* (with a medium confidence) and *native fish* (with a low confidence), while under Line of Enquiry 2 flows are likely to support *native Fish* (with a low confidence).

For those themes in which the likelihood assessment is rated **about as likely as not**, the MDBA have explored additional lines of evidence to determine whether a consequence assessment is warranted. This process drew on a broader suite of available information to further explore whether there is risk or compromise to the ESLT and the relative influence of the level of take or other identified drivers. This step applied Authority expertise and insight – based on a range of considerations, options, and trade-offs in light of the Basin's contextual operating environment – to determine the best available information.

A comparison of the Line of Enquiry 1 and Line of Enquiry 2 results in Table 1 indicates that full implementation of the Basin Plan (specifically, water recovery in the northern Basin to contribute towards the additional 450 GL target) could substantially improve the likelihood of flow supporting ecological objectives. This conclusion is based on the improvement in the *ecosystem functions* and *native fish* themes between these two lines of enquiry.

This result is consistent with the MDBA's advice to the Department of Climate Change, Energy, the Environment and Water (DCCEEW) on implementing the Water Recovery Program. This advice noted that recovering regulated entitlements in specific catchments would provide environmental water holders with greater flexibility and capacity to support critical connectivity flows across the northern Basin during dry periods.

Line of Enquiry 2 is based on a model scenario which includes assumptions around the location and entitlement type of water recovered for the 450 GL target — these assumptions are documented in the *Summary of Assessment Approach* available on the MDBA website. The on-ground environmental benefits to be realised in practice for the Barwon–Darling specifically, and the northern Basin more generally, will depend on the characteristics of any future recovery under the Water Recovery Program, which is still in progress.

Furthermore, a deeper examination of the analysis underlying Table 1 and other lines of evidence (see 'Evidence summary' section below) demonstrates there is a strong upstream-to-downstream declining trend in the underlying ecological results for *ecosystem functions* and *native fish*, and this trend is not adequately displayed in the whole-of-Unit metrics in Table 1.

Over the past 25 years, river connectivity through the Barwon–Darling has declined and cease-to-flow events have increased in frequency and duration, particularly towards the downstream end of the system — the combined effect of water resource development, management practices, and the prevailing climate. Multiple reviews have noted that mass fish deaths are strongly tied to insufficient low flows, and resultant water quality issues, during critical periods. The NSW long-term watering plan for the Barwon–Darling notes that cease-to-flow events lasting longer than around 100-150 days (depending on the location) are associated with a range of water quality and ecosystem issues. There is evidence that links low ecosystem resilience, localised species collapse and a continuing vulnerability of fish in northern rivers to prolonged dry spells.

Hence, whilst Line of Enquiry 2 indicates that flows are **likely** to support *native fish* outcomes (and **more likely than not** to support *ecosystem functions*) at the Unit scale, this result does not capture the more localised impacts experienced at the end of system during dry periods. Risks remain under current Basin Plan implementation for *ecosystem functions* and *native fish* themes.

The *waterbirds*, *ecosystem function* and *native fish* themes are considered 'at risk' and were taken through to a further consequence assessment step.

Outcomes for all other themes have been identified as **more likely than not** or **likely** to be supported by the pattern and volume of flow under Lines of Enquiry 1 and 2, with medium confidence, and are considered 'not at risk'.

Consequence assessment

Condition and likelihood assessments (Figure 2 and Table 1) indicate potential risks to the *waterbirds*, *ecosystem function* and *native fish* themes. A consequence assessment, primarily considering Line of Enquiry 2, has been undertaken for these themes (Table 2).

Theme	Nature of impact	Spatial scale of impact	Impact on key values	Final Rating
Waterbirds	Insufficient floodplain and wetland habitat inundation and resulting habitat loss, leading to reduced waterbird abundance and diversity. This impact is unlikely to improve in response to additional water recovery under full Basin Plan implementation.	**Low** – local or site scale	**No** – connected to an important bird-breeding site (Talyawalka system; a key environmental asset), but the Basin-wide Environmental Watering Strategy (BWS) notes that water recovery under the	**LOW**

			Basin Plan has little ability to influence flows at this site.	
Ecosystem function	Reduced longitudinal and lateral connectivity and ecosystem resilience due to insufficient flows.	**Moderate** – SDL unit impact	**Yes** - one or more BWS key ecosystem function outcomes affected	**HIGH**
Native Fish	Lack of longitudinal connectivity during dry periods; reduced access to waterhole refugia, effects of poor water quality during cease-to-flow periods; lack of connection with Menindee Lakes to allow for fish movement.	**High** – Basin scale impact	**Yes** - more than one significant site, or community affected and related to multiple BWS outcomes for native fish abundance, movement and recruitment	**CRITICAL**

Table 2: Consequence assessment results

Drivers of impact

In this Unit, *native fish* have been identified to be at **critical** risk and *ecosystem functions* have been identified to be at **high** risk. The initial assessment has identified flow as a leading driver of this outcome, characterised by risks to low flows and longitudinal connectivity primarily in the downstream reaches of the river.

Altered volume and pattern of flows have led to a reduction in the duration and frequency of flows that support in-stream and floodplain communities as well as connectivity with downstream units. Changes to hydrology, including more frequent and prolonged periods of low or no flow and the occurrence of stagnant pools, and a reduced frequency and duration of higher flow events, have adversely affected *ecosystem functions*, leading to measurable declines in habitat persistence and quality. Further drivers of poor *native fish* condition include loss of in-channel habitat (including snags and macrophytes), pumping without fish screens, barriers to fish passage and movement, impacts of carp, and water quality impacts (particularly carbon rich events).

This initial assessment has identified a **low** risk that flow is not supporting *waterbirds* outcomes due to insufficient floodplain and wetland habitat inundation, but that this risk is not consequential for the environmental objectives sought through the Basin Plan, which are part of the Basin-wide Environmental Watering Strategy.

Other risks to *ecosystem functions* and *native fish* (such as invasive species, physical barriers to movement and habitat availability) are described in the *Discussion Paper* and will be further explored with stakeholders during the Basin Plan Review consultation process. The Authority will test this assessment and the relative contribution of different drivers to this result.

Environmental outcomes under a climate impacted future

For a description of anticipated climate impacts across the Basin see the *Summary of Assessment Approach* available on the MDBA website.

The future climate is uncertain. The MDBA has applied a set of climate model scenarios to explore the ecological effects of climate change against a plausible range of future climates. Table 3 presents a summary of the anticipated environmental impacts of climate change for the Unit by reference to the likelihood of flow regimes being met for the five environmental themes. The shaded bars represent the

plausible range of future climates, and the black dots represent the anticipated likelihood under a median (50th percentile) future climate scenario.

Theme	The *likelihood* that the pattern and volume of flow will support the objectives for each ecological theme							
	Line of enquiry	Very unlikely	Unlikely	About as likely as not	More likely than not	Likely	Very likely	Confidence
Flows and connectivity	LoE 3 (~2030s)							●○○
	LoE 3 (~2050s)							●○○
Ecosystem functions	LoE 3 (~2030s)							●○○
	LoE 3 (~2050s)							●○○
Waterbirds	LoE 3 (~2030s)							●○○
	LoE 3 (~2050s)							●○○
Native fish	LoE 3 (~2030s)							●○○
	LoE 3 (~2050s)							●○○
Native vegetation	LoE 3 (~2030s)							●○○
	LoE 3 (~2050s)							●○○
Other species	LoE 3 (~2030s)							N/A
	LoE 3 (~2050s)							

Table 3: Assessment of the flows supporting the objectives for ecological themes at 2030 and 2050 levels of global warming in the Unit. Note: LoE 3 (~2030) refers to Line of Enquiry 3 - plausible future ~2030 hydroclimate sequences and LoE 3 (~2050) refers to Line of Enquiry 3 - plausible future ~2050 hydroclimate sequences. Confidence in this grading is assessed as *Low, Medium* or *High*. 'Other species' refers to animals including frogs, platypuses and turtles.

The 2025 Sustainable Yields demonstrated that the northern Basin is virtually certain to be hotter in the future. It is uncertain if long-term average rainfall will increase or decrease, but it is very likely that annual rainfall will become more variable leading to more severe and more frequent extreme droughts and floods. The 2025 MDB Outlook demonstrated that the ecosystem impacts will vary from theme to theme — for example, at the Basin-scale some native plant communities will expand, while others will shrink; *native fish* and *waterbirds* could face increased challenges due to habitat decline.

For this Unit, a consistent finding across the plausible range is that *waterbirds* and *native fish* are anticipated to be the most exposed to climate change. There is likely to be an increasing risk that *native fish* stocks will not be resilient enough to maintain viable populations through dry periods. Higher temperatures are also likely to increase the risk of water quality issues and reduced inundation of wetlands during dry periods, affecting both *waterbirds* and *native fish*.

Initial Assessment

On the balance of all three Lines of Enquiry, **the Authority's initial assessment is that there is a risk that environmental outcomes are not being met in this Unit**. *Ecosystem functions* and *native fish* have been identified as 'at risk' themes, and it is anticipated that climate change will exacerbate the risks for *native fish* into the 2030s and beyond.

Flow has been identified as a leading driver of this finding, specifically deficiencies in low flows and connectivity flows (especially towards the downstream end of this Unit). The SDL is one factor that

determines the pattern of flow in the river and the extent to which it is supporting environmental outcomes, but there are many other important factors such as water sharing rules, management arrangements, daily extraction patterns by water users, and decisions made by environmental water holders.

Hence this initial assessment is unable to resolve whether the SDL continues to reflect an environmentally sustainable level of take and is adequately supporting Basin Plan environmental outcomes. The Authority are proposing further work is required to explore all contributing factors before a determination on the SDL can be made.

As Basin Plan implementation is still underway, the MDBA has made assumptions about water recovery under the 450GL program and how it will be implemented in the northern Basin (see the *Summary of Assessment Approach* document). The analysis demonstrates that additional water recovery in the northern Basin (beyond the recovery status as of June 2024) would yield improved environmental benefits in this Unit, especially for ecosystem functions and native fish, and hence would reduce risk for environmental outcomes.

Consideration of response

The Authority is proposing more work with New South Wales and Queensland to further explore the specific flow drivers and the most appropriate response to this initial assessment. High-level response options currently under consideration for this Unit include:

- Targeted changes to rules or management settings, for example by including dedicated connectivity objectives and outcomes in the Basin Plan and existing state frameworks.
- Environmental works, for example new infrastructure or modifications to existing infrastructure to support fish passage.
- An adjustment of the SDL for the Unit.
- Review environmental objectives and outcomes.

The Authority intends to work with Basin governments to resolve commitments to support initiatives already underway. This includes the NSW Northern Basin Connectivity program and the Commonwealth Environmental Water Holder event-based mechanisms program. The risks of a changing climate continue to be actively considered in the Basin.

Noting this finding, the Basin Plan settings in connection with monitoring, evaluation and assessment activities warrant review as they apply to this Unit. Other relevant factors include planning by the New South Wales government for the management of local and site-specific areas of concern to maintain environmental outcomes. The Authority supports the continuing efforts of environmental water managers and river operators to make the most of water delivery to support the Basin's environmental outcomes. These efforts continue to evolve in response to new techniques and emerging knowledge, and are often required to balance multiple (and sometimes competing) environmental objectives across a range of geographic scales.

As is the case at a sub-Basin scale, it will be important that water quality risks are managed.

Evidence summary

The standard evidence sources used for this assessment are described in the *Summary of Assessment Approach*, which is available on the MDBA website. Additional evidence sources include:

- Schilling, H., Crook, D. 2025. Basin Plan Fish Monitoring Summary (2014/15 – 2023/24): Water Resource Planning Area Reports. NSW Department of Primary Industries and Regional Development. Port Stephens Fisheries Institute. 625pp. (PUB25/277)
- Owen, 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.
- Dula, A., Duncan, P., Sheldon, F., Smith, C., Southwell, M., Townsend, P. (2024) NSW Northern Basin Connectivity Expert Panel final report
- Murray-Darling Basin Authority (MDBA 2025) Water Recovery Program Advice Note – September 2025
- NSW Department of Planning, Industry and Environment (2020) Barwon–Darling Long Term Water Plan Part B
- Badu Advisory (2024) Stocktake and options for improving connectivity in the northern Murray–Darling Basin
- Chiew, F. et al (2023) Evaluation of reduced flow in the northern Murray–Darling Basin (MD-WERP report)
- Vertessy, R., Barma, D., Baumgartner, L., Mitrovic, S., Sheldon, F., Bond, N. (2019) Independent assessment of the 2018–19 fish deaths in the Lower Darling

The Authority utilised the best available evidence. Through the Basin Plan Review 12-week public consultation process, and the subsequent consideration of submissions and engagements over the course of the 2026 Basin Plan Review, the Authority will continue to build on the evidence used through the initial SDL Assessments to address uncertainties and knowledge gaps.