

Review of the regulated Broken River system

Summary of system information

The review of the regulated Broken River System is looking at the impact of ongoing dry conditions and recent reduced inflows to identify water management changes that may be required to deal with the changing climate.

This summary document provides information about how the system is currently operating and outlines the approach to undertaking the review.

A Project Steering Group (PSG) of seven local entitlement holders – together with representatives from the Goulburn Broken Catchment Management Authority, North East Water, and the Victorian Environmental Water Holder - has been formed to lead a review of the Broken River system and make recommendations to the Minister for Water on future water management.

The PSG is being supported by Goulburn-Murray Water (GMW) and the Department of Environment, Land, Water and Planning (DELWP). The PSG is aiming to come up with ways to improve the viability and sustainability of the Broken River system so that water users in the valley have certainty to plan for the future.

What is the regulated Broken River system?

The regulated part of the Broken basin is where the flow of waterways can be regulated through the operation of major storages or weirs to secure water supplies. The regulated Broken River system includes the Broken River – from Lake Nillahcootie to where it flows into the Goulburn River at Shepparton – and the Upper Broken Creek, which extends from the Broken River confluence at Casey's Weir to Waggarandall Weir (Figure 1).

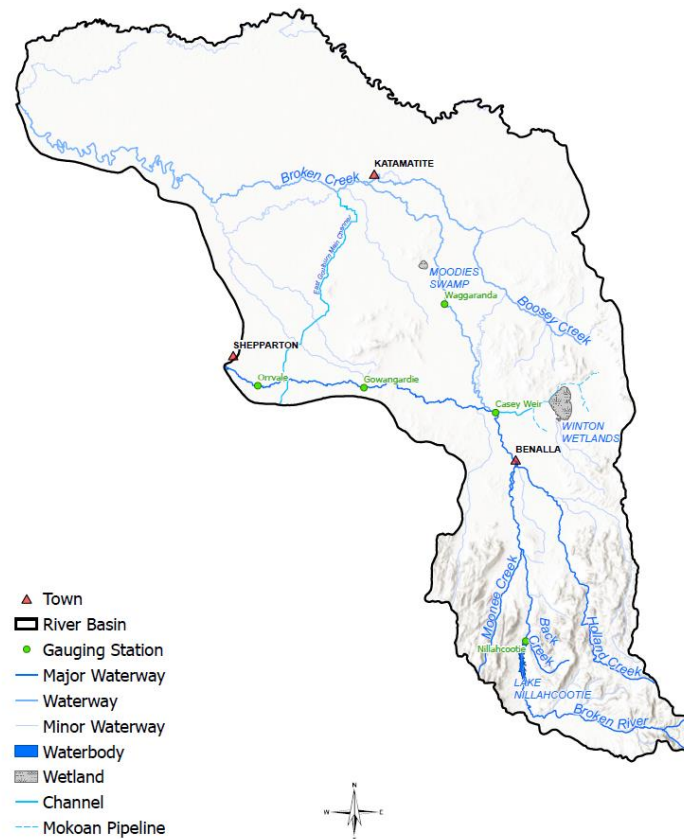


Figure 1: Map of the regulated Broken River system

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Surface water in the system is accounted for and managed through water shares (or entitlements) and seasonal determinations (which define allocations). Water availability varies year to year, with water allocations each year mainly relying on inflows into storage as well as utilisation of unregulated flows¹ in the river.

As of August 2021, there are **17.6 GL** of high-reliability water shares (HRWS) and **3.3 GL** of low-reliability water shares (LRWS) held in the Broken System. **90 per cent of HRWS and 97 per cent of LRWS in the system is held privately for consumptive use** (Figure 2). The remainder is held by water corporations and environmental water holders.

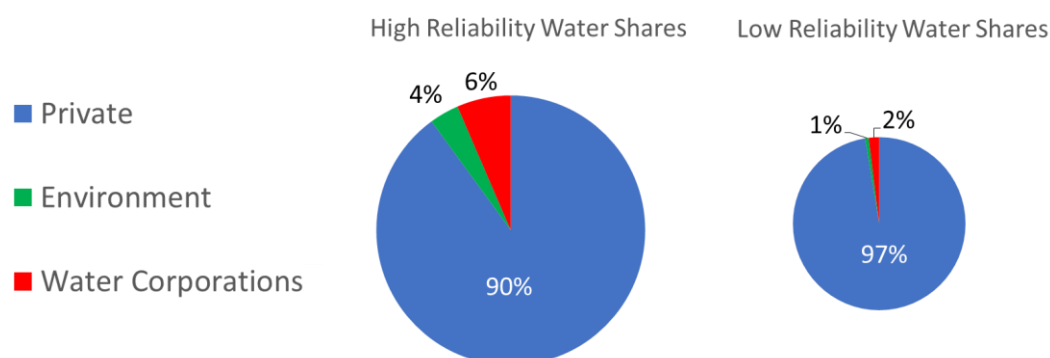


Figure 2: Ownership of High Reliability and Low Reliability Water entitlements in the Broken System

What are the challenges facing water users in the Broken system?

The review has identified a number of challenges which are facing water users in the Broken River system, making it difficult to operate their businesses and plan for the future:

- Overall water availability is declining
- Water availability is highly variable between years
- Early season allocations are low
- There is limited trade activity between users within the system – including in dry years

Overall water availability in the Broken River system

Water availability and inflows in the Broken River system are already being impacted by climate change. This trend reflects what is being observed across other river systems in northern Victoria, including the River Murray system. Reduced inflows due to climate change will intensify the impacts that we are already seeing.

Inflows to storage (Lake Nillahcootie)

Since 2004-05, inflows to Lake Nillahcootie have declined by 42 per cent from the historic average (Figure 3). These reductions are having significant impacts on the water availability to entitlement holders, as well as the amount of flow through the catchment.

¹ 'Unregulated flow' occurs when rainfall leads to flows in waterways downstream of storages that cannot be captured. This is different to 'regulated flow' which occurs when water is actively released from storages to meet a downstream commitment.

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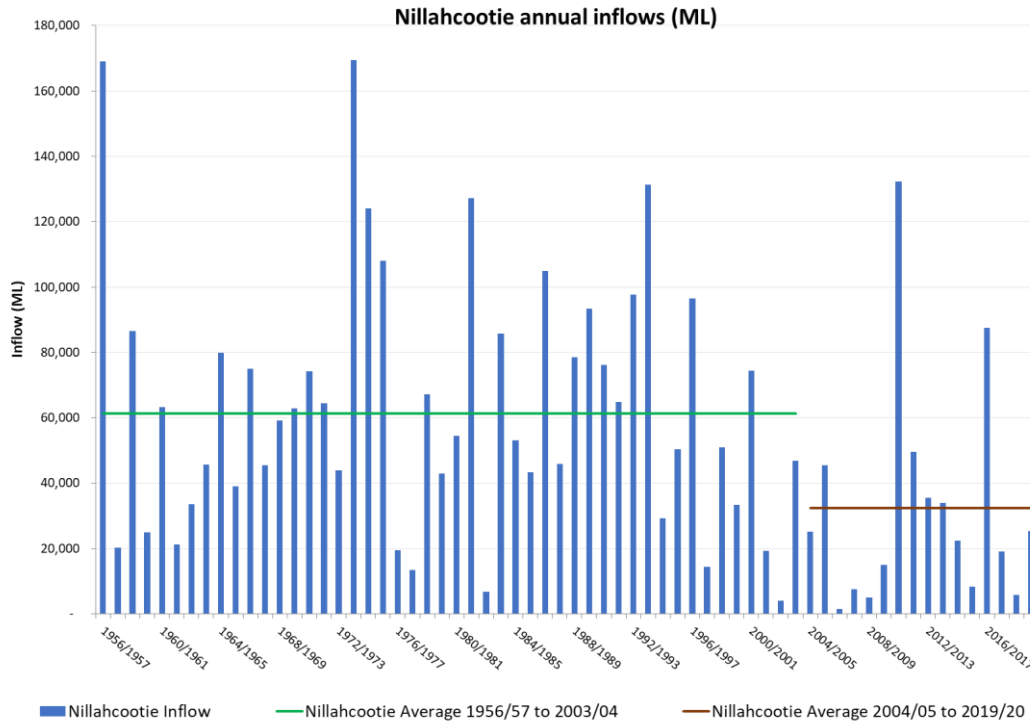


Figure 3: Annual inflows to Lake Nillahcootie 1956-57 to 2019-20

Seasonal determinations each year are dictated by available water resources, mainly the inflows to Lake Nillahcootie. However, estimates of the reliability of entitlements can be used to represent the security of the system in terms of water availability. These estimates are defined as the percentage of years when 100% allocations are expected to be reached.

The most recently published estimates of the reliability of Broken HRWS were published in the *Review of trading and allocation rules for the Broken system* in 2012 based on the approach in the Northern SWS. At that time, Broken HRWS were estimated to reach 100 per cent allocations in **89 out of 100 years**.

Updated modelling completed in 2020 for this review estimates that Broken HRWS can now be expected to reach 100 per cent in **79 out of 100 years**.

This estimate has changed due to:

- an updated modelling approach to better predict future water availability, including using adjusted historical inflows that reflect the recent reductions in inflows
- the incorporation of recent data from 2010 to 2019 which includes several very dry years with low inflows as shown in Figure 3.

Reduced inflows to storage mean reduced seasonal determinations. Lower inflows in the future will mean less years when seasonal determinations reach 100% of HRWS, reducing the reliability of entitlements.

Unregulated flows

Unregulated flows from tributaries can also support water availability for Broken entitlement holders. If diverters have an allocation - through carryover or seasonal determinations - and take water when there is unregulated flow in the river system, their use can be accounted for against their entitlements. This then improves water availability in storage.

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Flows from the unregulated tributaries of the Broken River system have been declining, with a reduction of 46% in flows from the Moonee Creek and Holland Creek since 2004/05 (Figure 4).

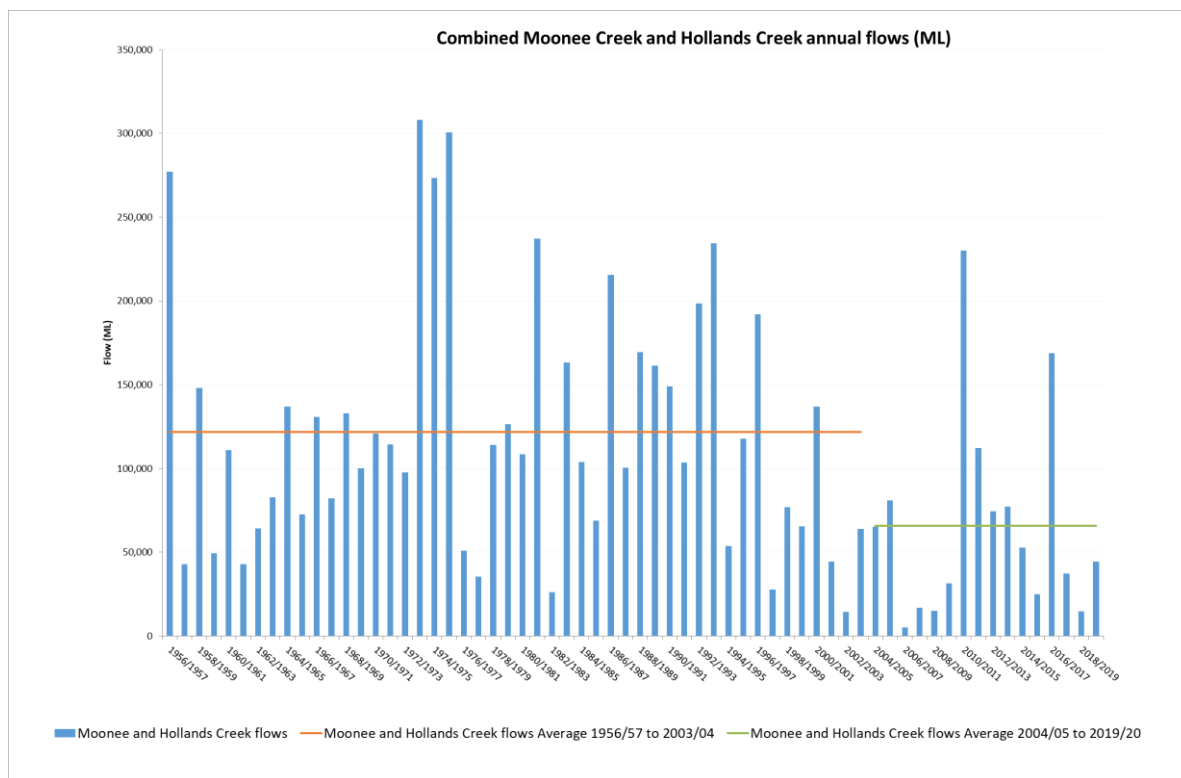


Figure 4: Combined annual flows in the Moonee Creek and Hollands Creek 1957 to 2019-20

Timing of tributary flows is also important. 64% of annual tributary inflows from the Moonee Creek and Holland Creek have occurred from June to September, on the fringes of the irrigation season.

This means that in recent years, tributary flows have not provided a large benefit to water availability for Broken diverters, who have irrigation demands primarily between October and May, when tributary flows are typically lower.

Water availability between years

Figure 3 shows that the Broken River system experiences highly variable inflows between years depending on annual rainfall conditions. In wetter conditions Lake Nillahcootie often fills during the year and water availability for Broken entitlement holders is good. In dry years, allocations can remain very low throughout the season.

Figure 5 shows that in the last six years water availability for entitlement holders has fluctuated:

- average to wet years like 2016-17, 2017-18 and 2020-21 have resulted in allocations reaching **100 per cent for both HRWS and LRWS**
- dry to very dry years like 2015-16, 2018-19 and 2019-20 have resulted in allocations remaining **below 40 per cent and as low as 2 per cent.**

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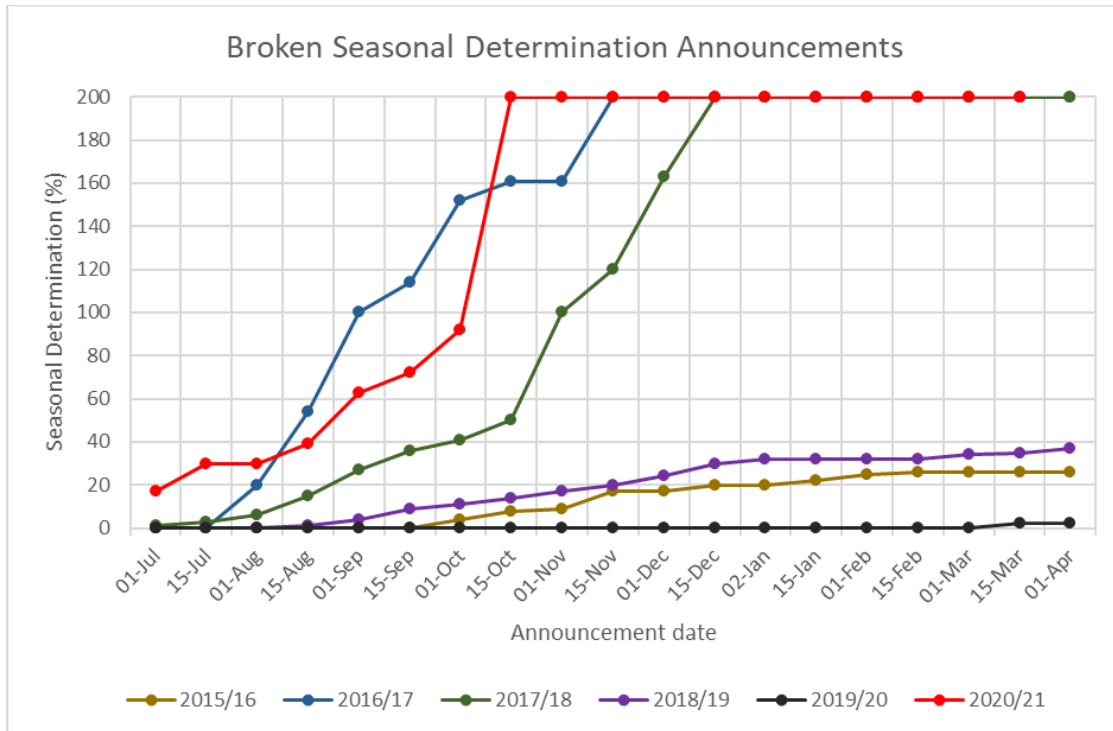


Figure 5: Seasonal determination announcements in the Broken system 2015-16 to 2020-21. Low reliability allocations are indicated as announcements above 100% on the chart.

Seasonal determinations in the Broken River system

In the Broken River system, a large proportion of the storage capacity in Lake Nillahcootie – up to 60 per cent at the start of the season – is required to meet system and river losses². This water needs to be set aside to ensure that carried over and new season allocations can be delivered to entitlement holders. Early in the season, very small volumes of water are available to be allocated to entitlements even when there is water in storage.

Improvements to seasonal determinations in average and wet years tend to occur between September and December (Figure 5).

To manage this, entitlement holders in the Broken system are using carryover to manage their water between seasons. In recent years, there have been substantial volumes of water carried over between seasons, particularly following wet years. Carryover against private water shares often makes up the majority of water available to irrigators in winter and spring.

Figure 6 shows that in 2018-19, while storage levels were relatively high (61%) on 3 September 2018, allocations to entitlements remained low – at 4% for HRWS – due to the need to put aside a large proportion of water in storage (19.8 GL) for storage and river losses.

The majority of the water available to private entitlement holders early in the 2018-19 season was through carryover. 4.2 GL was carried over from the previous season, the equivalent of a 24% seasonal determination for HRWS.

² Water resources are also set aside to meet passing flow obligations outlined in the [Bulk Entitlement \(Broken System – Goulburn-Murray Water\) Conversion Order 2004](#). Passing flow supports river operations, riparian rights and maintains community and environmental benefits

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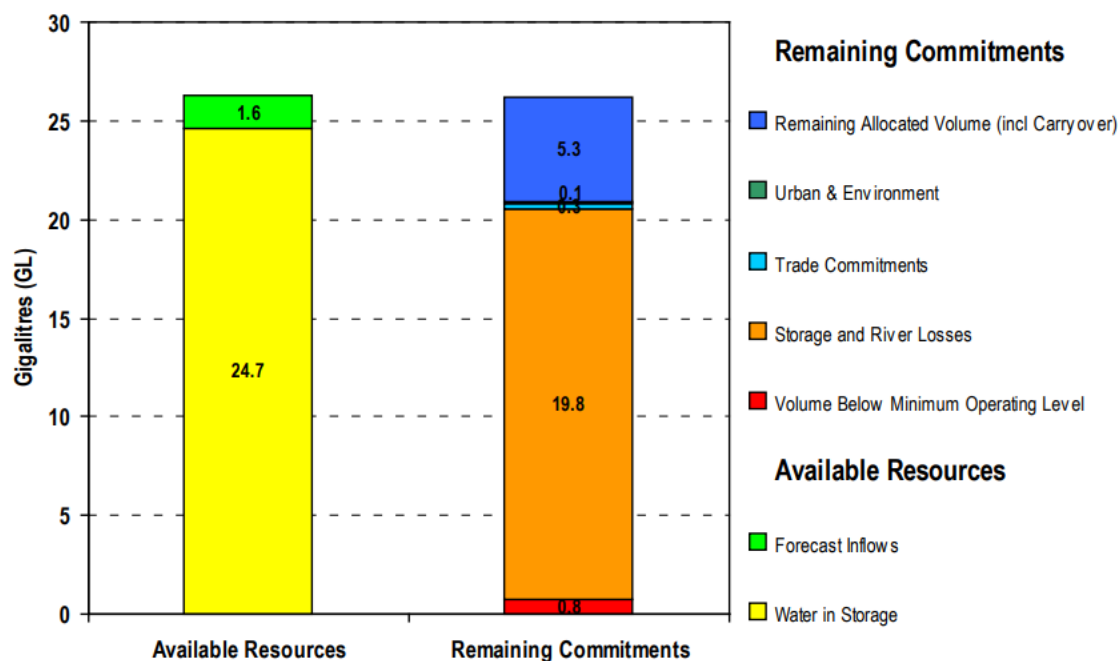


Figure 6: Water balance diagram showing available resources and commitments at 3 September 2018. The 'remaining allocated volume' includes carryover and seasonal determinations. Trade commitments represent water allocations that have been traded out of the Broken system and not yet delivered.

What are people doing with their water?

There are around 300 allocation accounts in the Broken system, of which approximately 140 of which are primarily for domestic and stock purposes. The decisions that entitlement holders are making about the use of their water changes depends on water availability, timing of allocations and seasonal conditions.

The data from recent years shows that water users in the Broken have been adapting how they use water from year to year in terms of how much is used for irrigation, how much is traded, carryover between years and the volumes of water that remain unused and are written off at the end of the season (Figure 7).

Use of water in the Broken System has been relatively low in recent years compared to the water available. For example, in 2017-18, 53% of allocation accounts in the Broken River System recorded water use, while 11% of account holders were traders of allocation only, and 36% of account holders did not use or trade any of their allocations.

These behaviours are likely to have been influenced by the low allocations in Spring 2017, when planting decisions needed to be made for some crops. Irrigators may not have had confidence that seasonal determinations would increase from 27 per cent for HRWS on 1 September, to 100 per cent later in the season.

While there has been a relatively large volume of water allocations traded between the Broken and downstream systems in recent years, there have been much smaller volumes of local allocation trades between water users within the Broken system.

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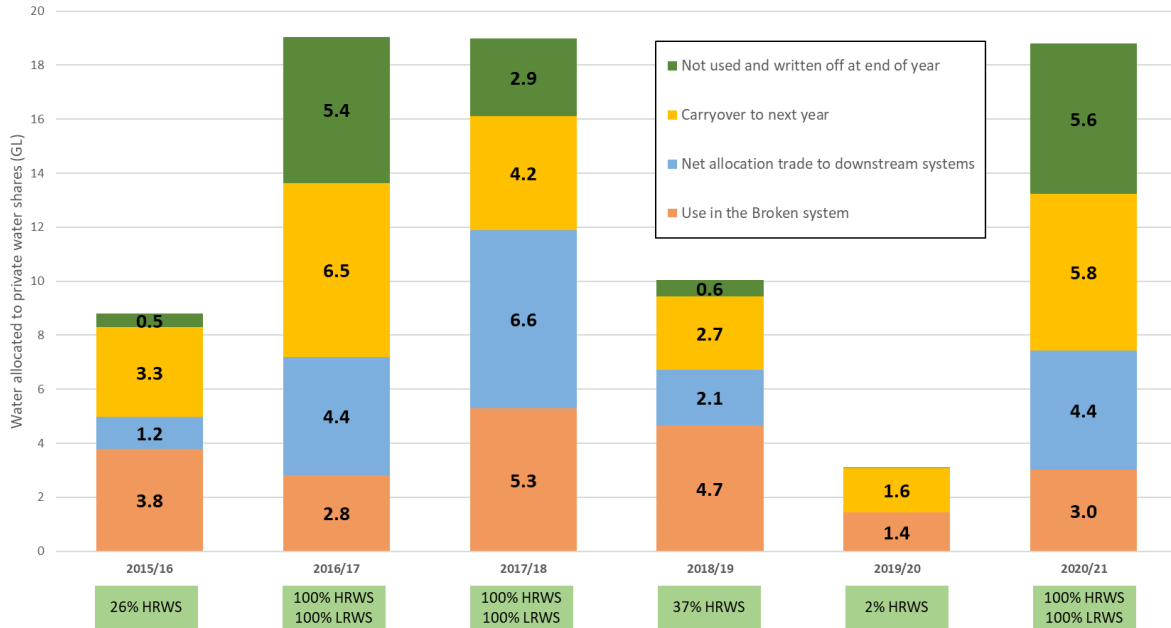


Figure 7: Relative volumes of water allocated to private water shares in the Broken system that 2015-16 to 2020-21 in gigalitres (GL). End of year seasonal determinations for each year are below the chart.

What is next for the review?

As part of the review of the Broken River System, the PSG is looking at what is occurring in the Broken system, how people are using their water, and what management changes could help put the system in a better position for the future.

Market research survey

GMW will be contacting Broken River system customers seeking their participation in a market research survey.

Results from the survey will provide the Project Steering Group with an understanding of how customers are using their water and land now, as well as their views on the future. The survey will help make sure that any recommendations are targeted towards helping water users within the Broken River system have more sustainable businesses.

Draft report and community feedback

The PSG will develop draft recommendations for the future operation of the system and prepare a summary report based on technical analysis and the results of the survey of entitlement holders.

The draft recommendations and report will be shared with Broken entitlement holders for comment before the PSG submits a final report to the Minister for Water.

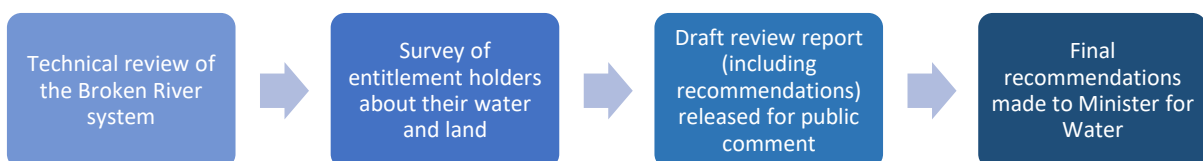


Figure 8: Broken River system review process