



Snapshot:

Independent Assessment of the 2018–19 fish deaths in the lower Darling

The lower Darling was subject to three tragic fish death events in December 2018 and January 2019. The large fish death events covered a 40 kilometre stretch of the Darling River, downstream of Menindee Lakes.

An Independent Panel was appointed by the Australian Government to determine the cause of the fish deaths and what actions can be taken to manage future events.

The independent panel was tasked with:

- assessing the water management, events, and conditions leading up to the 2018–19 fish deaths to identify likely causes
- assessing the effectiveness of existing fish management responses to manage fish death risks in the lower Darling River
- providing recommendations to the Australian Government Minister for Agriculture and Water Resources, David Littleproud MP, the MDBA and Basin governments on strategies to prevent similar events in the future, enhance native fish recovery in the lower Darling River and inform the recently announced Murray–Darling Basin Native Fish Management and Recovery Strategy.

This document is a summary of the panel's findings and recommendations.

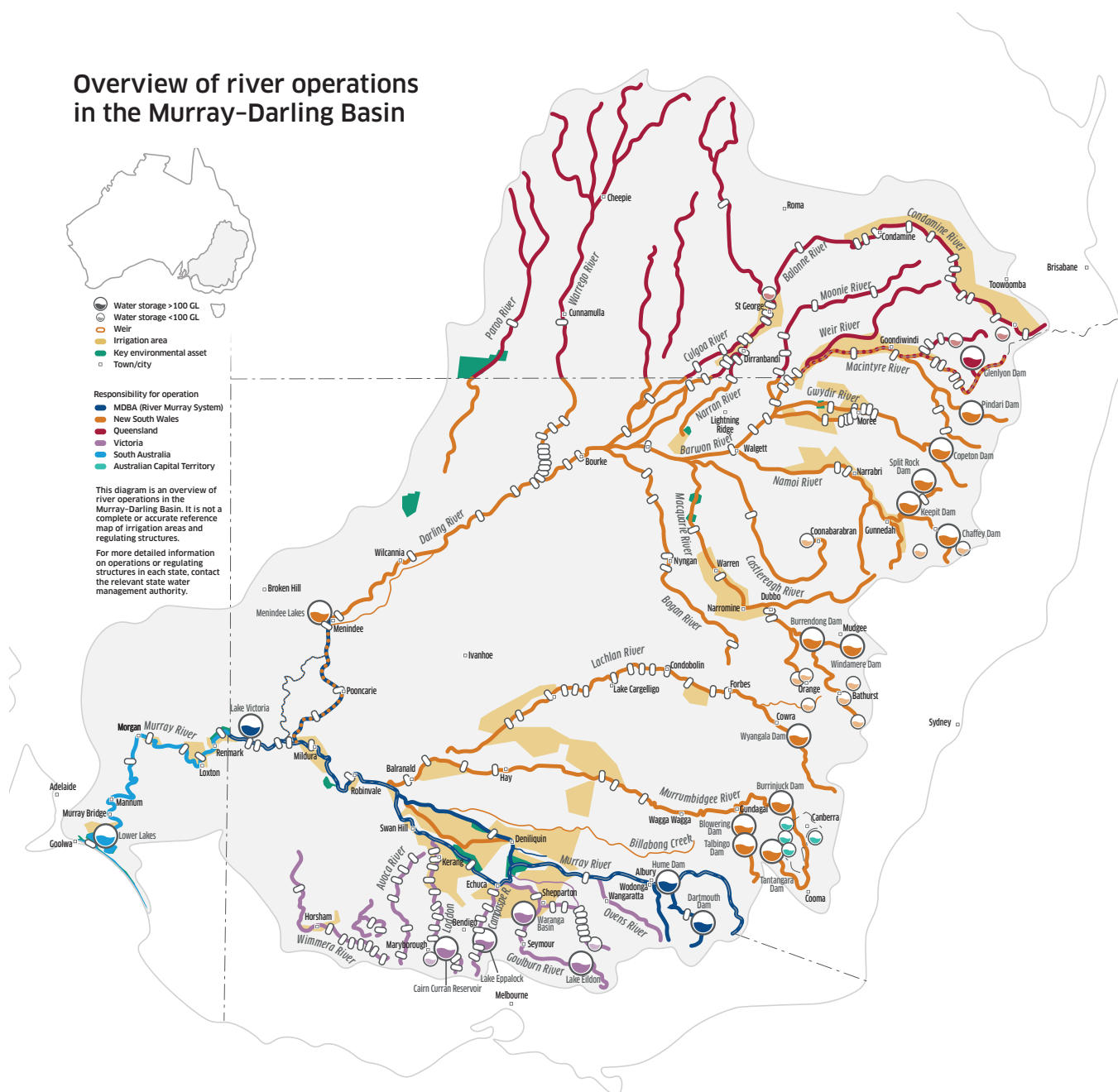
The Independent Panel includes the following professionals, possessing a range of expertise and experience in water, fisheries, ecology, hydrology and river management:

- Prof Rob Vertessy (Chair)
- Daren Barma
- Associate Professor Lee Baumgartner
- Professor Nick Bond
- Associate Professor Simon Mitrovic
- Professor Fran Sheldon

The Darling River system

The Darling River and its tributaries cover approximately 1,100 kilometres—this is about half of New South Wales and one tenth of Queensland. The main trunk of the river system rises in the Great Dividing Range, close to the border of New South Wales and Queensland, and travels south-west for 2,700 km before it empties into the Murray at Wentworth. This makes it the longest river in Australia. Along this river system are some of Australia's significant rural communities, large industries and vital lakes and wetlands. Due to its flat nature and variable rainfall across the area, flows into the Darling system are much more variable than other systems in Australia, such as the Murray.

Overview of river operations in the Murray-Darling Basin



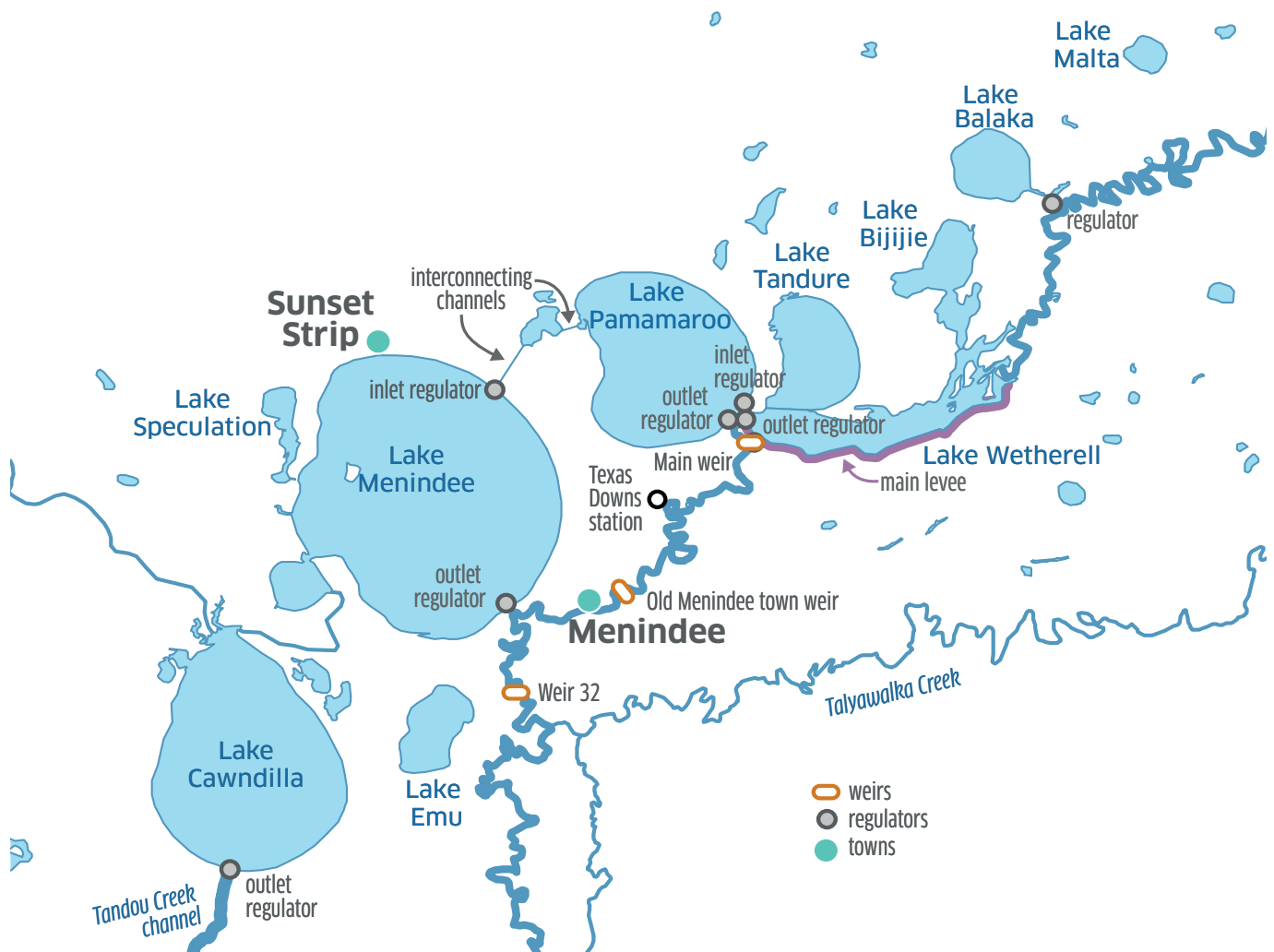


Menindee Lakes

The Menindee Lakes system is at the end of the Darling River and is comprised of seven natural lakes that have been artificially connected to the lower Darling River through a series of weirs, channels and levees. The lakes include Menindee, Cawndilla, Pamamaroo and Wetherell.

The Menindee Lakes are important to local Aboriginal people with cultural sites dating back over 13,000 years. It is estimated that Aboriginal people have lived in the area for 35,000 years. The lakes are also an important waterbird habitat, with more than 30 species of waterbirds recorded on the main lakes, including a number of threatened species such as freckled duck and migratory waders. Kinchega National Park, near Menindee, covers more than 440 km² and includes 62 km of the Darling River. It is one of only two large conservation areas along the Darling River, and protects substantial areas of river red gums, and rare acacia and bluebush communities.

The Menindee Lakes are important for local communities in the area, supplying water for irrigation and stock and domestic use in the region. They provide water for the towns of Broken Hill, Menindee and Pooncarie and provide for stock and domestic use via a pipeline in the Great Darling Anabranch.





Events in December & January 2018-2019

The main native fish species involved in the fish death events included:

-  Murray Cod
-  Silver Perch
-  Golden Perch
-  Bony Herring

The three events took place within two adjacent weir pools in a 40 km reach of river between Texas Downs Station and Weir 32, with fish mortality estimates in the range of hundreds of thousands to more than a million.




Causes of the Menindee fish death events

Immediate causes

The panel considered a wide range of technical evidence regarding river operations, climatic conditions, fish research and monitoring, water quality monitoring, use of environmental water, and diversions by water users. Looking back over the past seven years of diversions, fish breeding and growth patterns, and river operations, the panel gained a thorough understanding of the situation leading up to three fish death events.

There were extremely large numbers of juvenile and mature fish in the Menindee Lakes system and in the river channel due to two major high-flow events in 2012 and 2016. When the lakes are full they are significant nursery habitats for some species of native fish, and due to these high-flow events there was a substantial increase in the numbers of fish living in the Barwon-Darling.

The panel found there were three main immediate causes of the fish death events:

-  low flows
-  poor water quality
-  sudden change in temperature.

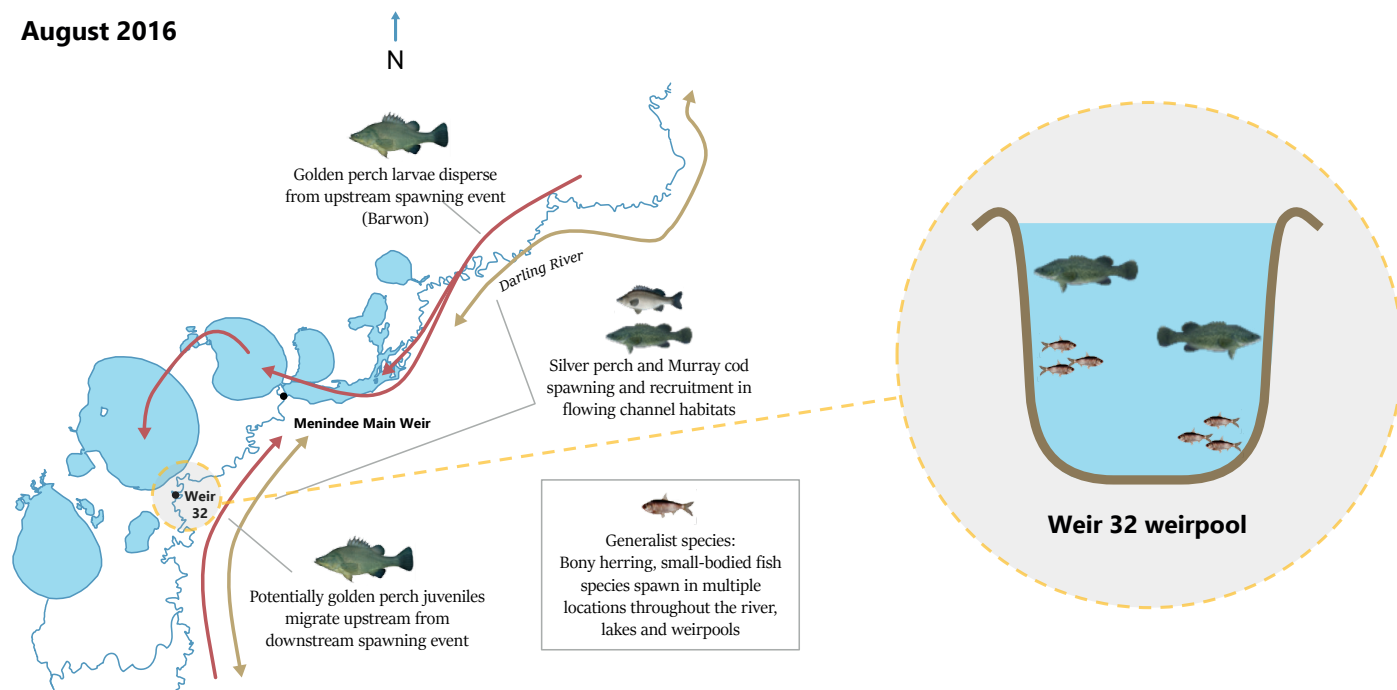
Drought conditions in the northern Basin have had a major impact on inflows. After the 2016 high inflow event, there were no further inflows into the Menindee Lakes. Low or no flows, combined with extended hot and dry weather conditions, resulted in poor water quality issues. Algal blooms developed over time, and by late November 2018 water quality in the lower Darling reached a 'red alert' level.

Abrupt reductions in air temperature, and increased wind associated with storms, caused the weir pools to suddenly de-stratify, resulting in low oxygen water and no escape for the fish. The panel is confident this was the primary cause of the fish death events.

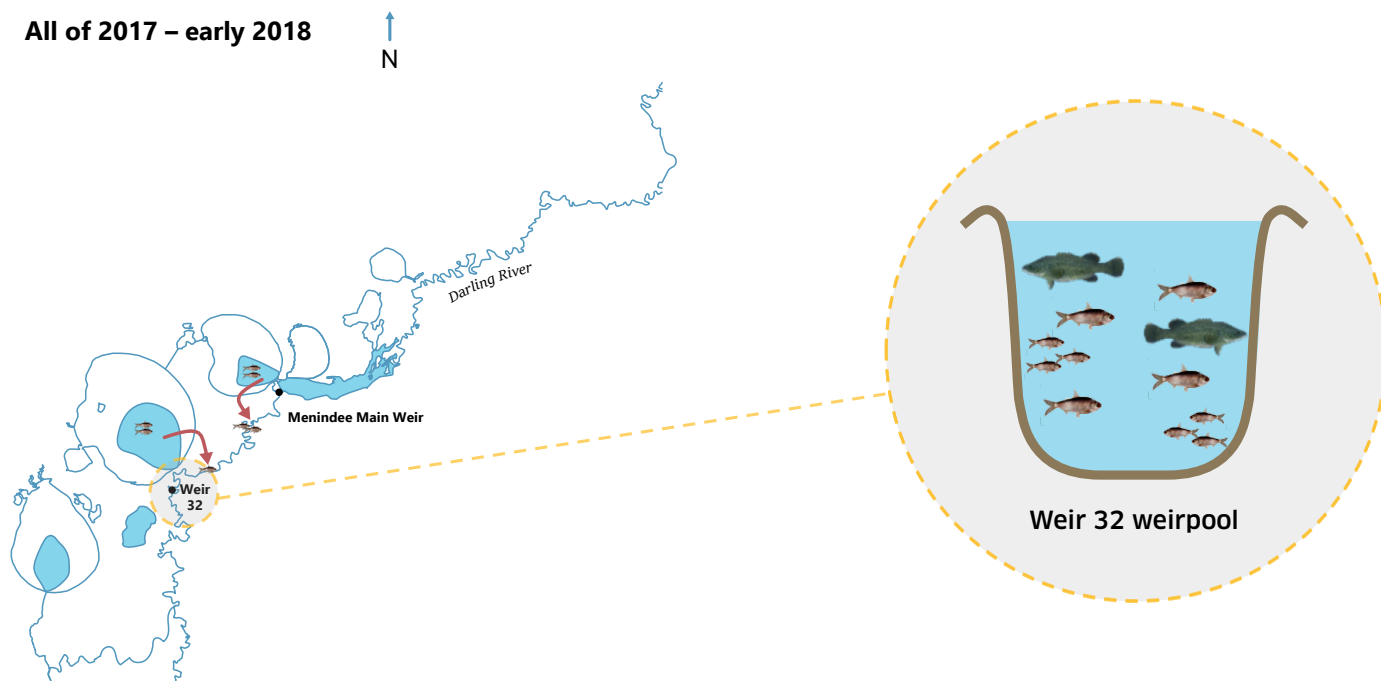
The panel has prepared a visual summary of four time periods leading up to the fish kill events of water levels, water quality, and fish activity.



August 2016

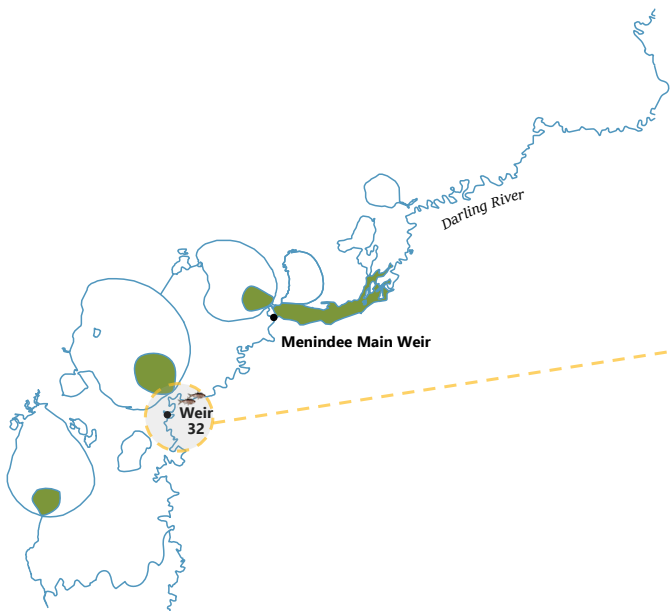


All of 2017 – early 2018





Late 2018



Weir 32 weirpool

**Fish deaths
(Dec 2018 and Jan 2019)**



Weir 32 weirpool



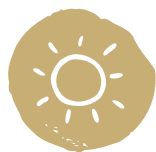
Contributing factors

In the lead up to the fish death events, there were other influencing factors that the panel also considered, including:

- climatic conditions
- hydrology and water management
- Menindee Lakes operations.

Climatic conditions

Drought conditions have impacted on the northern Basin and inflows to the lower Darling. The panel noted there are long-term changes currently being observed including changing patterns of rainfall, temperature and inflows. The recent extreme hot-dry weather events in the northern Basin have been amplified by climate change.



2018 was the 8th driest year on record. The low level of rainfall sustained over the past two year period in the Murray–Darling Basin has only occurred twice since 1900 and the Federation drought.



2018 was also the hottest year on record for NSW and the Murray–Darling Basin, and the second hottest year Australia-wide. Persistently high temperatures and high winds throughout the year contributed to record rates of observed evaporation for winter and spring in New South Wales and Queensland, compounding the low river inflows.



NSW river systems typically receive 4,000 GL of inflows each year. In the first six months of the water year, they only received 30 GL of inflows (less than 1%).

Hydrology and water management

The panel noted the changing flows into the Barwon–Darling over the past 20 years, along with arrangements for water extraction in the northern Basin. There are different management arrangements in New South Wales and Queensland for accessing water from the rivers and storages, including unregulated extractions.

The panel considered information on water usage over the past 20 years, noting in the past two years leading up to the events, there was limited inflows and low levels of allocations and permission to access flows. The panel found that overall, water extractions from the tributaries of the Barwon–Darling have a much greater impact on Menindee inflows than extractions directly from the Barwon–Darling River.

Menindee Lakes operations

The panel considered information on the operation of Menindee Lakes, using information supplied by WaterNSW and the Murray–Darling Basin Authority (MDBA). The panel found the MDBA operated Menindee Lakes relatively conservatively in 2017–18. The rates of MDBA releases were more gradual than usual, and the pattern of release favoured maintaining storage in the upper lakes to assist communities, rather than the lower lakes.

Releases from the lakes throughout 2017–18 were lower than the minimum advised under the current Barwon–Darling water sharing plan, with the intent to prolong stock and domestic requests to meet critical human needs.



What we heard

As part of the review, the panel consulted with local communities, Traditional owners, water users, representatives from state and federal government agencies, and technical experts.



The panel toured the Menindee area in mid-February, and then followed up with teleconferences as needed. The panel encountered an engaged, well-informed, but distressed community. The fish death events, along with low water availability and drought conditions, continue to have a significant impact on the local community.

For the Aboriginal people of the region, the Barkandji, the river (the Barka) is at the heart of their culture. These Traditional Owners told the panel of the importance of the Barka in providing healthy food and medicine, as well as a physical connection to their history and culture.



The panel consulted with officials from Australian Government and Basin state agencies including the Department of Agriculture and Water Resources, the Commonwealth Environmental Water Office (CEWO), the Murray Darling Basin Authority (MDBA), the Bureau of Meteorology (BOM), NSW DPI Fisheries, NSW Office of Environment and Heritage (OEI), NSW Department of Industry (DoI), WaterNSW and the Queensland Department of Natural Resources, Mines and Energy (DNRM).



The panel convened a technical workshop in late February to discuss the scientific and policy focus of the review, and to deliberate on the analysis and specific recommendations. The panel also met multiple times with representatives from state and federal government agencies, both water management bodies and scientific technical agencies.



Recommendations

The panel has made 27 recommendations for policy makers and water managers to consider. The panel believes it is vital for these recommendations to be implemented in order to protect and restore native fish populations in the Murray–Darling Basin. More fish death events can be expected under current conditions—the panel is focused on long-term management to protect native fish species. Action is required.

Key recommendations for Basin policy makers

Basin policy makers should prioritise:

- **The protection of flows** – Basin governments should commit to protecting low flows in drier conditions, particularly in the Barwon-Darling and protecting the first flow down the river system after significant rainfall.
- **Basin connectivity** – Basin governments should develop flow management strategies and remove barriers to fish movement to protect pools for native fish habitats.
- **Improving Menindee operations** – Basin governments should review and consider changes to the Menindee Lakes' operating procedures
- **Providing joint plans for Northern Basin Toolkit Measures** – New South Wales, Queensland and the Murray–Darling Basin Authority should publish their joint plans for implementation of the northern Basin Toolkit Measures, and set an aggressive timeline for delivery.
- **Increase investment in research and development** – Basin governments should significantly increase investment in research and development to address knowledge gaps.

Key recommendations for Basin managers

Basin managers should prioritise:

- **Emergency responses and early warning systems** – Basin governments should continue using emergency responses (such as aerators) to reduce the chance of further fish death events in the current climate and establish early warning systems.
- **Ongoing monitoring** – NSW should undertake monitoring of fish populations in the lower Darling to more fully understand the impacts of the recent fish death events on fish numbers and remaining fish population status.
- **Collaboration with key stakeholders** – Basin governments must collaborate with government water scientists, academics and consultants, local communities and Aboriginal stakeholders to develop an authentic native fish management and recovery strategy.
- **Management of water for the environment** – Environmental water holders and the MDBA should undertake an assessment to determine how best to manage water for the environment during prolonged dry spells.
- **Climate change research** – Basin governments must gain an understanding of how climate change threatens Basin water availability and aquatic ecosystems. This understanding must be obtained ahead of the 2026 Basin Plan review.

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