BARWON-DARLING WATER

SUBMISSION to

Independent inquiry into Menindee fish deaths

Office of the NSW Chief Scientist & Engineer

July 2023

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Executive Summary

- This fish death event is a wake-up call for water managers about the need for all water policy executives and water manager to look beyond the current focus on water quantity, and to also focus on water quality and the various complementary measures required to achieve positive environmental outcomes.

- Water reform in recent times have focussed almost completely on 'rebalancing' water volumes to the exclusion of a focus on complementary measures such as improving water quality, habitat for aquatic life, fishways and carp control. Neglecting these critically important measures has contributed to the magnitude of this fish death event. This narrow political focus on water volumes via the 'just add water' approach of buybacks, has distracted from the need for investment and attention to complementary measures to make the most of the growing portion of environmental water.

- Huge volumes of water were flowing through the Darling River and Menindee Lakes prior to and during the fish deaths. Irrigation diversions are a small proportion of the total water balance, particularly in wet periods and during major flooding such as experienced at Menindee Lakes in 2022.

- The NSW Fish Passage Strategy should be adequately funded to provide a coordinated, strategic approach to fish passage remediation to improve native fish access to nearly 9000 km of rivers and off-channel habitats below all major storage State dams. Current arrangements in IPART pricing determinations to recover costs from water users are prohibitive and have hindered progression of these measures.

- We recommend measures to address invasive species such as carp including expediting the recommendations of the National Carp Control Program. It is important that the OCSE investigate the impact that high carp populations have had on this fish death event. The proliferation of carp probably created an overwhelming demand on dissolved oxygen in the river and lakes, contributing to the fish death event.

- Our members are bemused by public comments trying to link this event to irrigation farming or water diversions upstream. Data from government agencies demonstrates that:

    (i) there was ample water available during and preceding this event. These fish deaths had nothing to do with insufficient quantities of water;

(ii) diversions are a small proportion of the total water balance; and
(iii) significant Held Environmental Water (HEW) is available on this system, particularly below Menindee where environmental water holders own 85% of the Lower Darling's water entitlements.

Our members are concerned by the potential for misinformation, and we trust that this Inquiry will remain scientifically robust, with rigorous fact-checking, using verifiable data that can be cross-checked against official sources of information from government agencies.

Background

A public consultation forms part of the independent review by the NSW Chief Scientist and Engineer into the February-March 2023 fish deaths in the Darling-Baaka River around Menindee.

In April 2023, the Hon. Rose Jackson MLC, Minister for Water and the Hon. Penny Sharpe MLC, Minister for the Environment requested that the Office of the NSW Chief Scientist & Engineer (OCSE) conduct an Independent Review into the February-March 2023 fish deaths in the Darling-Baaka River, Menindee

The event occurred on 17th March 2023, downstream of Lake Pamamaroo and Lake Wetherell, in a 35km stretch of river that extends beyond the Menindee township to the confluence of Menindee Creek.

Reports indicate that an estimated 20 million fish died.

The CSE will present the Final Report, with any recommendations, to government by 31 August 2023.

The report and any recommendations would be made publicly available on the Office of the Chief Scientist & Engineer website.

Terms of Reference

In undertaking the Review, the CSE will consider:

1. Likely cause/s of the fish death event, including
   a. Environmental conditions in the lead up to the event
   b. Assessment of relevant monitoring data, including water data, to assist with determining likely causes
   c. Management and sufficiency of water flow at the time of the event

2. Response to the fish death event, including:
   a. Role of the different agencies/departments when responding to the event

b. Action taken by agencies/departments (including public health response) and others when responding to the event
c. Role of the State Emergency Management Framework for responding to the event
d. d. Communication with the community during the event, including consultation with First Nations people and organisations

3. Recommendations should consider:
    a. Monitoring data and other information that can assist with predicting and responding to fish death events
    b. Appropriateness of the response during the event and potential steps/action that could be taken to enhance the effectiveness of future responses (including preparedness, training, communication and collaboration across groups)
    c. Appropriateness of the State Emergency Management Framework to respond to the event
    d. Local or other interventions that should be considered to mitigate or avoid future events
    e. Any other matters that the Chief Scientist & Engineer considers relevant.

Barwon Darling Water

Barwon-Darling Water Inc (BDW) is the peak body representing water users on the unregulated Barwon-Darling River.

BDW is an independent, apolitical body, funded by its members.

It was set up to provide advice on the Barwon-Darling River to members and decision-makers, to assist with policy development, and to advocate on behalf of its members.

BDW membership is made up of local water user groups – including local government, irrigators, and basic right users. We represent all licence holders and water users on the Barwon-Darling – from Mungindi on the Queensland border to the Menindee Lakes.

BDW members have been involved in the water reform process, especially in relation to the unregulated Barwon-Darling River, for many years. This work has included:

- Co-operating with other stakeholders to create a set of environmental flow rules for the Barwon-Darling via the first Barwon-Darling River Management Committee.
- Assisting in development of the Barwon-Darling Cap Management Strategy 2007.
- Assisting with the development of the Barwon-Darling Water Sharing Plan 2012.
- Representation on the Barwon-Darling Customer Advisory Group of WaterNSW.
- Working with DPIE Water on development of the Floodplain Harvesting Strategy;

- Working as part of the Stakeholder Advisory Panel on development of the Barwon-Darling Water sharing Plan and Barwon-Darling Water Resource Plan 2020.
- Responding to Basin Plan issues over the years.

We have also been involved in discussions regarding water reform in the northern basin and specifically on the Barwon-Darling River since the mid 1990's.

Barwon-Darling Water is a member of NSW Irrigators Council and the National Irrigators Council and has strong connections with other valley and industry groups including the Northern Irrigators Group and Cotton Australia.

Our members welcome the opportunity to comment on this Independent Review into the February-March 2023 fish deaths in the Darling-Baaka River, Menindee.

Irrigation Farming

Irrigation provides more than 90% of Australia's fruit, nuts, and grapes; more than 76% of vegetables; 100% of rice and more than 50% of dairy and sugar (2018-19).

Irrigation farmers in Australia are recognised as world leaders in water efficiency.

For example, according to the Australian Government Department of Agriculture, Water, and the Environment:

"Australian cotton growers are now recognised as the most water-use efficient in the world and three times more efficient than the global average".

"The Australian rice industry leads the world in water use efficiency. From paddock to plate, Australian grown rice uses 50% less water than the global average."

Our water management legislation prioritises all other users – critical human needs, stock and domestic, and the environment - before agriculture. This hierarchy of water use means our industry only has water access when all other needs are satisfied.

Many common crops we produce are annual crops that can be grown in wet years, and not grown in dry periods, which complements Australia's variable climate.

Irrigation farming in Australia is also subject to strict regulations to ensure sustainable and responsible water use.

This includes all extractions being capped at a sustainable level, a hierarchy of water access priorities, and strict monitoring and measurement requirements.

Submission

There was significant water in the system prior to and during this event.

La Nina conditions in the last three years resulted in significant rainfall and widespread flooding across the Murray-Darling Basin.

There was no shortage of water in the northern basin down to from the top of the system in Queensland, right down to Menindee Lakes and beyond.

In fact, there was major flooding and significant flows in both the Barwon-Darling system flowing into the Menindee Lakes, and in the Lower-Darling downstream of the Lakes. Data from the WaterNSW Water Insights website shows that cumulative inflows over the last three years was massive.

Following the record drought period with El Nino conditions in 2018 2019 and 2020, the swing back to La Nina from early 2021 generated significant inflows that have persisted to recent times. Consequently, the Menindee Lakes have been full and/or near full. Further data from Water Insights shows significant inflows, with the volume of water in storage exceeding the Lakes' total capacity for much of recent times.

Most water licences on the Lower Darling are held for environmental purposes.

Most water licences on the Lower-Darling are now held by environmental bodies for environmental purposes.

In the Lower-Darling water source, 85% of water licences are now owned by state and commonwealth environmental water holders. These licences have been bought back from irrigators in recent times.

Upstream water use is a very small portion of total flows

Contrary to recent misinformed claims of over-extraction in the Northern Basin, upstream water use is a small portion of total flows.

We refer the CSE to WaterNSW's Water Insights site, particularly the 'comparing water usage in prior years' diagrams for each water source, which show the composition of the full water balance.

These diagrams show that water diversions are a very small proportion of the total water balance in each tributary of the Barwon-Darling. Peaks in diversions in these diagrams show water being drawn down from public storages filled in earlier flood periods, reducing pressure on rivers in low flow periods. Most of the water is not diverted but flows downstream into the Barwon-Darling and on to the Menindee Lakes. This is more evident in wet years like the 2022/23 water year.

On the Barwon-Darling, the Long-Term Annual Average Extraction Limit (LTAAEL) for the Barwon-Darling is just 6% of the long-term average annual flow, thereby protecting 94% of flows.

The key point shown in these diagrams is that water diversions are a very small proportion of the total water balance.

In addition to the actual diversion data available from WaterNSW, the New South Wales Water Sharing Plans (WSPs) set the Long-Term Annual Average Extraction

Limit (LTAAEL) for the water source, which reserves most of the water from each valley (or water source), for the environment.

We refer the CSE to the respective Water Sharing Plans for this information on each water source.

Three examples are included below (for an unregulated, regulated-connected, and regulated semi-terminal system), showing the LTAAEL in the WSP, the long-term average annual flow not extracted, and the percentage of long-term average annual flow not extracted.

1. On the unregulated Barwon-Darling, the Long-Term Average Annual Extraction Limit is 214,000 megalitres per year. Meanwhile, the long-term average annual flow not extracted is 2,607,000, or 94% of the long-term average annual flow not extracted.
2. On the regulated Macquarie River, the Long-Term Average Annual Extraction Limit is 391,900 megalitres per year. Meanwhile, the long-term average annual flow not extracted is 1,448,000, or 73% of the long-term average annual flow not extracted.
3. On the regulated Namoi River, the Long-Term Average Annual Extraction Limit is 238,000 megalitres per year. Meanwhile, the long-term average annual flow not extracted is 870,000, or 73% of the long-term average annual flow not extracted.

This information is highlighted to show the extent of water above the LTAAEL in each valley. It is not reflective of the full extent of environmental measures in each valley.

The volume of water which can be extracted varies each year based on water availability, subject to a climatic calculation.

The modelled volumetric calculation of LTAAEL is not explicitly written in a few WSPs but this information is held by the DPIE.

Leadup to the event

Black water was evident along the river systems – eg in the Namoi near Walgett, at Brewarrina and at Bourke, in the leadup to the fish deaths at Menindee.

In fact fish kills and yabby migration from the river were observed along the system during January and February.

Blackwater occurs when organic material, such as sticks, leaves, grass or crops are washed off the floodplain and into rivers and creeks after floods. As the organic matter decays, it releases carbon into waterways, creating ‘blackwater’. This often occurs after flooding which was experienced in the upper catchments over the last two years.

There are limited options to reduce the impact of low oxygen blackwater on native fish and aquatic life.

In times of flood, the scale of high river flows means it not possible to dilute the effects of low oxygen blackwater using water for the environment. This is because the volume of water in large floods is too great.

In some cases, oxygenated water can be delivered to small sections of a river to create refuge areas of better-quality water. Native fish and other animals able to move to these areas will improve their chances of survival.

Delivering oxygenated water depends on the availability of good quality water and whether it can be delivered quickly to the affected parts of the river system. This can be difficult during flood conditions.

We understand that extensive recent flooding at Menindee and upstream led to an immense boost in fish populations by providing suitable habitat for spawning and growth of young fish.

After the floods receded, a high concentration of organic material and sediments remained in the water. Water quality deteriorated, causing lower dissolved oxygen levels and, as water levels receded, fish became more concentrated in the main river channel essentially competing for oxygen.

River connectivity

Given the significant water availability and extensive flooding, connectivity was not a factor in the fish death event.

However, in anticipation that the issue may be raised, we wish to highlight the fact that a significant number of connectivity measures are in place in the Northern Basin. These measures are outlined in the “Stocktake of Northern Basin connectivity water management rules”, from the DPE.

These include, but are not limited to:

- Long-term average annual flow, environmental water allowances.
- Held environmental water (and its active management).
- Commence to flow and cease to flow thresholds and rules
- Annual volumetric limits in licences
- Resumption of flow rules on the Barwon-Darling
- End of system flow rules.
- Flow classes and cease to pump rules.
- Supplementary water sharing.
- The Interim Unregulated Flow Management Plan for the North West (IUFMPNW).

Since this document was developed, additional connectivity rules have been introduced (such as Individual Daily Extraction Components or IDECs). In the Border

there is now an amendment clause relating to flow targets – involving an assessment of critical needs, and the adequacy of existing targets – including an expert panel's recommendations.

While these rules assist to achieve connectivity in dry periods to meet critical needs, we should also recognise the ephemeral nature of the Barwon-Darling River system: it does dry up from time to time and ceases to flow – as outlined in the Western Water Management Strategy.

Connectivity measures for droughts have little relevance to this Inquiry, which is looking into an event that occurred during a sustained wet period. Nevertheless, we want to highlight these measures.

Government neglect of complementary measures

Water reform in the Murray-Darling Basin over the last 25 years has focused on addressing over-extraction, which was considered the biggest issue of the 1990s and early 2000s.

Since then, the Murray-Darling Basin Plan has recovered more than 2100GL of water from the irrigation pool for the environment. Combined with the 875GL recovered by reforms prior to the Basin Plan one in three litres of irrigation water has been taken from the productive pool and returned to the environment. There have also been many rule changes in various valleys which have altered water use patterns and volumes.

As a result, total diversions for irrigation, towns and industry have been reduced to just 28% of inflows. This is now well within globally-accepted standards for river water diversions, and has been a significant change.

However, while significant environmental gains have been achieved, just adding more water from farmers alone can only go so far. Scientists like Lee J. Baumgartner, P Gell, J D Thiem, C Finlayson, N Ning (2019) have rightly pointed out that:

"While recovering water will provide good outcomes, as a sole intervention, it is not enough to deliver the desired environmental benefits…

… recovering water is not enough to deliver all the anticipated environmental benefits. In a highly modified system, equal attention should be given to addressing other threats that water delivery alone cannot ameliorate."

Today, the biggest environmental degradation drivers in the Murray-Darling Basin appear to be:

- Invasive species like carp that now make up 90% of fish biomass in some areas, damaging habitat, and riverbanks, and causing poor water quality.
- Loss of habitat for native species.
- Barriers to fish passage, and lack of fish screens on pumps.
- Poor water quality (i.e., blackwater events) and cold-water pollution.

Addressing these drivers requires moving beyond just water sharing to other measures.

We at Barwon-Darling Water are deeply concerned that the focus on 'just adding water", with a fixation on recovery volumes, has distracted from the measures that are now needed to address these key ecological challenges.

Scientists have already identified the types of measures that should be used to complement environmental watering and river flows in the Basin.

For example, Baumgartner et al (2019)11 identify 10 complementary measures to assist with environmental watering programs in the Basin. These are:

- Integrated aquatic pest control (especially carp)
- Sustainable agricultural infrastructure, like fish screens
- Habitat restoration
- Addressing cold water pollution from dams
- Enhancing fish passage
- Addressing salinity
- Re-establishing threatened species
- Integrating complementary measures into Basin-scale flow delivery

Further information on each of these can be found in the peer-reviewed journal article by Baumgartner et al. Examples are highlighted below:

Fish Passage

Fish passage is important to enable native fish to migrate, which is important for key life stages.

Barriers – such as dams and weirs in NSW – physically restrict this migration, and with it, access to spawning grounds, nurseries, and preferred habitats.

We recommend the CSE investigates what role improved fish passageways could have played to mitigate this event, as well as the need for improvements to fish passage generally to boost the health of native fish populations.

We note that a NSW Fish Passage Strategy has been developed by the NSW Ministerial Task Force to deliver a coordinated, strategic approach to fish passage remediation. The strategy is a 20-year plan to restore unimpeded fish passage to 165 high priority weirs, which will significantly improve native fish access to nearly 9000 km of mainstream rivers and key off-channel habitats below all major storage dams.

However, we are concerned that insufficient government funding has been provided to fund the strategy.

Without state or federal government funding, progress on fish passage works depends on funding through IPART water user charges. Under that pricing framework, farmers pay 80% of these charges for what is an environmental strategy in the public interest.

This cost-recovery framework (based on the impactor-pays principle) is regarded as outdated, and not consistent with the National Water Initiative user-pays principle.

This framework is unable to capture or value public-interest items such as fish passageways. And in practice, with farmers' water charges already very high and rising every year to cover a wide range of operational and infrastructure costs linked to water management, the bottom line is these important environmental projects will never be sufficiently funded under this framework.

If government is serious about addressing degradation drivers contributing to fish death events, we recommend that governments fully fund the NSW Fish Passage Strategy.

Invasive species – carp

Carp (Cyprinus Carpio) is reputed to be *"one of the worst introduced pest species in Australia",* and now represents up to 90% of fish biomass in some areas of the Basin.

Following recent widespread flooding, many irrigators and landholders reported seeing a significant boom in carp numbers.

The DCCEEW outlines how carp contribute to environmental degradation in the Basin, with reported impacts including:

- reduced water quality;
- river-bank damage;
- contributing to algae blooms; and,
- impact on freshwater habitat at the expense of native fish species and aquatic vegetation.

We believe that booming carp numbers have caused a spike in oxygen demand, contributing to the Menindee fish death event. This hypothesis is important for the CSE to investigate.

Further, we recommend that the CSE also investigate how the proliferation of carp throughout the system has more broadly contributed to fish death events elsewhere, such as through worsening water quality, contributing to algae blooms, habitat destruction and impacts on the food chain.

While a lot of government focus and funding has gone towards water recovery from farmers to increase environmental flows, the same sense of urgency, financial investment and government attention has not gone towards carp control measures.

It would be a positive move for the CSE to recommend expediting the National Carp Control Program.

Misinformation must be corrected.

BDW is concerned about misinformation surrounding the fish deaths event, particularly relating to water management, diversions, and irrigation.

It is critical that this Inquiry is scientifically robust, evidence-based, and informed.

We would like to bring attention to two common misconceptions.

1) Water allocations

In an article authored by Richard Kingsford and published in The Conversation on March 20th, it was claimed (without context):

"Just last week, before news of the fish kills at Menindee, water allocations announced by the NSW Government in the Namoi and Gwydir Rivers were at 113% and 275% respectively."

Water allocations in wet years must be understood in the context of continuous accounting used in these valleys. This method produces apparent cumulative allocations that do not reflect the actual water individual farmers can access and limits on water in their accounts.

Continuous accounting enables irrigators to manage their allocations through wet and dry sequences, allowing them to store water when it rains to use when it doesn't. While water is allocated reflecting inflows, when an irrigator's account is full (i.e., reached its limit) that irrigator forfeits any additional water allocated, which goes to other irrigators who still have room in their account. This does not mean a greater share of flows is diverted, rather it redistributes the consumptive share amongst irrigators with capacity left in their accounts.

2) Floodplain Harvesting

There has also been unsubstantiated commentary attributing Floodplain Harvesting (FPH) to the fish deaths. These uninformed comments require scrutiny.

FPH represents a small proportion of the total water balance, which is being made even smaller because of the FPH reform.

Prior to regulation, FPH in NSW comprises just 3% of the total water balance, and in Queensland just 2% of the total water balance. Recent FPH reform has reduced FPH volumes by about one-third, to ensure total water take complies with SDLs under the Basin Plan.

For further information on FPH reform, see the NSW DPE Healthy Floodplains Library with extensive resources including myth busting documents.

We also note that little FPH occurred around the time of this event, because most on-farm storages were already full of earlier widespread flooding events. This can be verified with data from NRAR and DPE.

3) Runoff

We note concern relating to potential pollutants entering the waterways, including from agriculture.

While this concern must be thoroughly investigated, we also note that it is a legal condition for any water from an irrigation property to be held on-farm, and not re-enter natural waterways, due to the risk of contamination.

We also note that the EPA has done extensive water testing at Menindee during and after the fish death event and we look forward to seeing the results of that testing.

4) Ephemeral River System

We at BDW are concerned about public misunderstanding of the ephemeral nature of this river system, undermining confidence in the management of this system.

DPE has a range of resources to improve public water literacy on this, for example this quote from DPE in "River flows and climate over time":

"A constantly flowing river is not normal for the Barwon-Darling region. The river stopped flowing for extended periods even before there were large dams and significant agricultural water use upstream. There is a relationship between the river drying and dry climatic periods. When we don't get a lot of rain, the river is more likely to stop flowing."

The technical reports for the Western Regional Water Strategy reinforce these facts:

"During dry periods, restricting upstream access is not effective because there is no water to protect."

"Placing restrictions on low priority licences upstream – such as supplementary, floodplain harvesting, B-Class and C-Class licences – is unlikely to result in significant changes in flow downstream or at the end of the system during droughts and is unlikely to slow the depletion of water in Menindee Lakes during droughts. This is because these licences rely on large natural flow which often do not occur during droughts."

"Longer cease to-flow events are more likely to be driven by the climate, rather than irrigation development because very little inflow occurs during these extended dry events."

"Even at the turn of last century, when there was little agricultural development upstream, there were long periods when the river did not flow."

It will be critical in the CSE Inquiry that these facts are presented to correct any misinformed public perception.

Conclusion

Representatives from Barwon Darling Water are available to further discuss any of the matters raised in this submission.

Please contact Ian Cole on 0429 722 857.