PASTORALISTS' ASSOCIATION OF WEST DARLING est. 1907

28th June 2023

Dr Darren Saunders
Office of NSW Chief Scientist and Engineer
Level 6, 52 Martin Place,
Sydney NSW 2000

Dear Mr Saunders,

The Pastoralists' Association of West Darling (PAWD) represents the interests of pastoralists living and working in far west NSW, including those who reside on the Darling/Baarka River and rely on it for stock and domestic water supply. The river also holds important social and cultural values for the people of western NSW. It is with this background in mind that PAWD provides the following commentary on the February-March 2023 fish kills in the Darling Baarka River at Menindee. Thank you for the opportunity to provide feedback to the Independent Review.

I will address the Terms of Reference in three parts:

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*

The cause of the fish kill event has been widely publicised as hypoxic blackwater. The 2023 flood event was reported locally as the highest flood peak since 1976, and as such inundated thousands of hectares that have been dry and had organic matter building up on them for the past 47 years. The flood event was also preceded by three years of high rainfall, which produced exceptional vegetation growth. These two factors combined to produce very high organic matter levels in the floodwaters, which naturally decayed to cause the hypoxic blackwater event.

During the flood event any blackwater occurring near the main river channel would have mixed with fresh flows coming downstream and dissipated. Blackwater on the outer reaches of the floodplain would have been held there by ongoing high flows and dissolved oxygen levels would have continued to fall as more organic material laden country was inundated. Native fish avoided the blackwater during the flood peak and prospered, as did the European Carp.

When flood levels receded, blackwater on the floodplain returned to the main channel, to be concentrated as a slug of hypoxic water possibly several hundred kilometres long and varying in dissolved oxygen levels. The extent and danger of this hypoxic water was either unknown due to insufficient water quality monitoring by Water NSW, or was ignored by the same Department. Locally, fish deaths were reported as far upstream as Tilpa and as early as the second week of January. These early warnings were dismissed by Water NSW as a "natural phenomenon".

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The hypoxic blackwater arrived at Menindee by mid-January, and was released into the Lower Darling/Baaka as there was no storage space left in the Menindee Lakes system. The blackwater forced native fish out of the main channel into the connected shallow water billabongs and lagoons that still held reasonable quality water. At the same time, Water NSW reduced flows downstream from Menindee, which disconnected shallow water refuges from the main river and trapped millions of large native fish. These fish would have normally been back in the main river channel if water quality was sufficient to support them. Weather events around January 26 devastated the shallow water lagoons with stratification and wiped these fish out. This was the first major fish kill of 2023, but it went largely unreported as it happened principally on private property and was not publically visible.

Six weeks later a more concentrated fish kill event occurred in the Weir 32 weir pool. Again, part of the cause of this fish kill can be attributed to the aforementioned hypoxic blackwater, combined with weather conditions that caused stratification turnover and a huge build-up of fish in the river reach immediately downstream of the Main Weir. This event occurred in the public eye and was widely reported in the media.

In the weeks leading up to the second event in Menindee, the numbers of carp being sighted around Menindee and downstream was staggering. I personally witnessed this one morning at the Lake Pamamaroo inlet regulator, where one could quite easily catch carp several hundred meters from shore by "dabbing" with a landing net. Closer to the regulator it was possible to land fifty or more with one scoop of the small landing net. Lots of "old timers" stated that they have never seen so many carp in the river.

From late January onwards, all fish migrating upstream were trapped below the Main Weir once the regulator gates on the Weir were lowered to reduce releases. Water velocity increased at the Weir accordingly, preventing fish passage upstream through the Weir structure. Fish densities in this reach of the river continued to increase as more fish made their way through the Weir 32 fishway and were subsequently trapped. Releases and water flow were decreased as per usual Water NSW protocol of returning flows to lower levels. At this point the situation became one of decreasing water volume, increasing fish biomass, poor quality (hypoxic) water and adverse weather conditions. The result was the worst fish kill in Australian history.

Water NSW and Fisheries NSW altered water release sequences from Menindee to try and minimise further fish deaths, but locals downstream of the Menindee Lakes believe that the Lower Darling was basically wiped clear of large native fish over the course of three months in early 2023.

- With adequate water quality monitoring relevant Departmental personnel should have been aware of the falling water quality and the impending arrival of hypoxic blackwater at Menindee.
- With advance notice of declining water quality, changes could have been made at Menindee to divert the poor quality water into the lakes and dilute it with better quality water.
- Significant increases in fish biomass, particularly European Carp, expedited the depletion of dissolved oxygen leading into the events.
- The preceding downstream fish kill event six weeks prior in January probably killed as many fish (and more large natives) than the event in Menindee in March.

Terms of Reference

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. Communication with the community during the event, including consultation with First Nations people and organisations

Estimates of the number of dead fish for the March event were put at 20 million. If these fish weighed on average 250 grams, this represents 5000 tonnes of decaying biomass in the river. Initial reports had the kill zone extending for 35kms, which represents 1.43 tonnes of dead fish for every 10 meters of the waterway.

With an event of this scale in a location as remote as Menindee, any attempt to remove a meaningful amount of dead fish in a timely manner was always going to be an impossible task. Travel times to reach the site with staff and suitable equipment were long and many of the dead fish sunk to the bottom of the river within 48 to 72 hours of dying. The clean-up teams that arrived five days after the event did the best they could and should be commended, but removed less than 20 tonnes of dead fish - or the equivalent of cleaning up approximately 140 meters of the river channel.

The public relations spin by Water NSW around the value of the clean-up actions is questionable, and left locals wondering what had been achieved.

Local emergency services groups, in particular the Rural Fire Brigade, pushed to get the town information sessions up and running quickly to disseminate information to the public. The lead agency for the supply of clean water to Menindee was Essential Water, Water NSW was responsible for water management and water quality monitoring leading into and during the event, NSW Health was monitoring public health, and Fire and Rescue NSW was tasked with the clean-up. Most Government Department representatives that attended the public meetings were open and accountable. However, the Water NSW representatives were not open or accountable. They often appeared to be dismissive, ambivalent, or condescending to the local residents.

Whilst the effort to clean up the dead fish was appreciated, it was too little too late and took on the appearance of being a public relations exercise by Government wanting to be seen to be doing something.

Menindee is a small community and emergency response processes will be the same for any community in the State, however local knowledge will help to win the day every time. This needs to be factored in by decision makers from afar. If this was the case, this event could have reduced in magnitude or even avoided.

In reference to the role of responding agencies or departments, in all likelihood a poll of Menindee residents would not be able to tell you who should do what in the event of another fish kill. This situation remains unresolved. During the March fish kill event inflated egos and bureaucratic red tape got in the way of meaningful and timely action.

Terms of Reference
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*

What lessons are there to be learnt from the 2023 fish kill? Were those same questions answered after the 2018/19 fish kill? The answer to this question is yes. In 2018/19, water quality and dissolved oxygen levels were diminished and not monitored, fish were trapped in the reach downstream of the Main Weir and better river management leading into the event could have changed the outcome.

Water quality monitoring is severely lacking. Where are the quality monitors and data for the Darling/Baarka River? Salinity, dissolved oxygen levels, flow rates, turbidity, water temperature, etc should be available from regular intervals along the length of what is one of Australia's most important rivers. This information should be easy to access online in real time, not buried under several layers of secrecy on multiple websites and only updated during business hours.

Water sharing rules in place prior to the 2018/19 event have not changed in order to prevent a future fish kill arising from low flows. Indeed, the opposite has occurred and the 195 gigalitre drought reserve for the Lower Darling/Baarka adopted by the NSW Government in 2022 will expedite the fish kill process by 4 to 5 months in the event that similar flow conditions as to those experience in 2018/19 conditions are experienced in the future.

PAWD recommendations:

- Carp herpes virus to be released as a matter of urgency. The ongoing ecological impact of this introduced fish cannot be underestimated. Carp numbers were low prior to the recent run of La Nina events. Populations should be monitored and targeted fishing or support for a carp industry should be forthcoming until such time as the virus can be released.
- That the recommendations from the Vertessy Report be implemented in full. This would help to prevent a future disaster due to low flows (which are sure to return at some point in the future).

- Improved fish passage through the Weir 32 weir pool into the Menindee Lakes system and onwards further upstream. Continued build-up of fish biomass in the Weir 32 reach of the Darling/Baarka River with no escape adds to the severity of any event. There are many fish passage structures in existence (both within Australia and internationally) that could be examined and assessed in order to guide design and construction of fishways at Menindee that work as intended.

- Water quality monitors downstream of every river confluence in the Darling system, at Wilcannia, immediately downstream of the Main Weir and midway between Menindee and Pooncarie. To be forewarned is to be forearmed. Funding for water quality monitors could be sourced by imposing a 50 cents per megalitre levy on irrigation extraction across NSW, with a view to increasing monitoring state-wide but initially focusing on remote parts of the river system first.

- Local input and knowledge must be part of any emergency response in small communities. The sooner local knowledge can be introduced and utilised during emergency situations the higher the chances of improved outcomes become.

- Water NSW has long ignored local input from Menindee and Lower Darling stakeholders, and community trust of Departmental managers is non-existent. This breakdown in communication is not helping leading into and during emergency situations. Trust needs to be restored and it needs to be driven by the Department. It must be noted that local employees of Water NSW based in Menindee are not the target of community frustration and are well respected. River managers who make decisions that cause an environmental disaster on the scale of what has been experienced at Menindee in 2018/19 and 2023 need to be held accountable.

Yours faithfully

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