

## **Darling River fish deaths**

Submission to the inquiry by

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Dear Chief Scientist and the Inquiry

I wish to briefly make some key points from my 40+ year experience as a Fish ecologist, mainly working in the MDB- in particular on native fishes, recovery, flows, restoration, climate change, and fish kills.

During the 1980's the Darling River was considered to be relatively Ok in terms of native fish- no need to worry. The home of many Murray cod, golden perch, Silver perch. Many tourist fishers from Victoria (including Melbourne) went there- and fishes heartily. Yes, they probably took too many fish, but that was more a symptom of available abundance rather than the real problem and cause of decline. Since then, the state of fish populations has changed markedly – massive reductions, along with major changes to flows and the river system. It is this broader context, particularly changes to flows, that provide the backdrop to these recent fish kills. Also, not just the fish kill sites but there is the need to consider the whole Darling River system. Not much water is allowed over the Qld border.

When we are talking of the deaths of 18-20 M fish (2023) (or even 1-2M as per 2019/20) we have to be alarmed that something major is wrong. These are symptomatic of major ecologically structural damage that goes beyond fisheries and must be tackled within that context. Across the MDB native fishes have declined by > 90% (MDBA 2004), with about 50% conservation listed and 80% of species of some concern (Lintermans 2023). Silver perch has recently been considered to be functionally extinct in the northern MDB (Todd et al. 2023; but also evident in NMDB catchments in Crook et al. 2023). There are also huge concerns for this species in the Darling River.

There is a need for fish populations and their ecosystems to be more resilient to disturbances. If they are, then they are at less risk and can recover. The kills we have recently witnessed are not natural, they are exacerbated by a highly regulated river system where not enough water remains to sustain the environment.

Some key facts for the MDB that impact the Darling river:

- MDB now has 240 dams storing 29,893 GL of water (Kingsford et al. 2017)
- Only 40–50% of its main stem rivers remaining free-flowing (Liermann et al. 2012), and many of those having their hydrology altered to some degree by regulation or extraction

- End-of-system flows are now zero for 40% of the time, compared with 1% of the time under natural flow conditions (CSIRO 2008)
- Extensive river reaches have been converted from lotic to lentic environments by weirs and reduced flows (Maheshwari et al. 1995; Walker 2006); additions to weirs on the Darling river are likely to further exacerbate the situation
- There are more than 5,000 barriers (Lintermans 2023) that cause disruption to river connectivity (Baumgartner et al. 2014)
- There has been a significant loss of off-stream lakes and wetlands that may provide waterbird and fish nursery habitats. While the quantum (e.g. area) is not readily available, only 11 of a potential 567 golden perch (*Macquaria ambigua*) larval nursery sites have been considered to be still operating in western NSW (Sharpe 2011), often due to flow changes.
- The effects of anthropogenic flow alterations were exacerbated during the ‘Millennium Drought’ (1997–2010) (Murphy and Timbal 2008; van Dijk et al. 2013), as they will also be under projections for climate change.
- The impacts of floodplain harvesting has not even been considered yet.

In particular, in the Darling River, low water levels and critical no flow periods have increased significantly from previously naturally perennially flows (e.g.; Mallen-Cooper and Zampatti 2020). Whilst understated in previous fish kill inquiries (as this is the difficult elephant in the room) (Vertessy et al. 2019; ACA 2019), this Inquiry must address the many issues relating to flows. This is not just about water quality that causes the deaths but also the other flow changes that have greatly reduced populations through lack of spawning, recruitment and movements. Severe drought conditions will increase fish kills (we are seeing this); these will increase with climate change. Climate change has not been adequately addressed in the Basin Plan (Pittock et al. 2015; Prosser et al. 2021) with future climate-induced flow reductions negating some of the benefits of projected environmental water allocations. The Darling river is but symptomatic of many other rivers in the MDB and NSW.

Adequate flows to maintain ecosystems and riverine barriers (no adequate fish passage) must be addressed as a matter of urgency. Many of the issues raised by the SA Royal commission are relevant here (Walker (2019). Basin Plan implementation has been totally inadequate. Indeed, advice on Basin Plan implementation provided by the Murray-Darling Basin Authority provided on July 25, 2023, provides dismal reading. “Full implementation of the Basin Plan not possible by 2024 deadline. There will be a shortfall of water for the environment as set in the Basin Plan.”

- Very little progress has been made in achieving the 450 GL/y efficiency target, and this water will not be recovered by 30 June 2024 as required under current settings.
- Only 5 of 20 water resource plans in New South Wales (NSW) have been accredited. These plans are more than 4 years behind schedule, and NSW still has 7 plans to submit for assessment by the MDBA.
- Critical measures for improving outcomes in the Northern Basin will not be delivered on time. Only 2 of 6 are on track for delivery by 30 June 2024. The remaining 4 measures are expected to take longer, delaying the achievement of environmental outcomes.
- With 16 key SDLAM projects unlikely to be operable by 30 June 2024, the Authority estimates a shortfall in water recovery of between 190 and 315 gigalitres.

<https://www.mdba.gov.au/news-and-events/newsroom/authority-advice-basin-plan-implementation#msdyntrid=6pgxvlfAP0fGPIJtmrREzpWRSOJjnXYnVd1DOnxXyS0>

Together with inadequate (or missing) water plans (esp. NSW!), already reduced flow targets, therein lies a major contributing cause of the fish kills.

The large-scale kills in the lower Darling River in 2018-19 and 2023 created anger, despair and dismay within local communities and the broader Australian population. The losses included important cultural, threatened and popular, iconic and angling species that cannot be quickly regenerated. Such losses cannot be sustained, especially for long-lived species such as Murray cod (Thiem et al. 2017). These events and the publicity surrounding them (including international coverage) caused serious questions to be asked regarding the competence of the protection of fishes and of MDB water management. Numerous other fish kills have occurred but received less attention, especially during drought conditions.

Most of the values of the fishes that perished have been greatly underappreciated. Indeed ignored (Ellis et al. 2022 Koehn 2022;). Most of the lessons observed from previous fish kills have been ignored (see Koehn 2005, but also 2022). Assessment, documentation and publicly available data – is poor. Plans for recovery aside from minor amounts of stocking- non-existent. Indeed, I ask you to view the recommendations in my 2022 paper and check off how many had been addressed or implemented in 2023- they may be of use to you. Indeed, many have not been improved since 2004. Hopefully this inquiry will make improvements to that situation. Given the predicted increasing frequency and severity of fish kills under climate change, there is an imperative for greater dedication to this area of resource management.

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