



Native Fish Management and Recovery Strategy

Native Fish Management and Recovery Strategy: Draft Framework

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Acknowledgement of the Traditional Owners of the Murray–Darling Basin

Basin governments pay respect to the Traditional Owners and their Nations of the Murray–Darling Basin. We acknowledge their deep cultural, social, environmental, spiritual and economic connection to their lands and waters.

The guidance and support received from the Murray Lower Darling Rivers Indigenous Nations, the Northern Basin Aboriginal Nations and our many Traditional Owner friends and colleagues is very much valued and appreciated.

Aboriginal people should be aware that this publication may contain images, names or quotations of deceased persons.



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Introduction

Australia is the driest inhabited continent on earth—this means water is our most precious resource. Years of drought are affecting the amount of water available in the Murray–Darling Basin and the quality of water. Less rainfall and hot temperatures result in dry conditions—this results in less water flowing through from Queensland and the Snowy Mountains right down to South Australia. It also results in less water being stored for drinking and farming and less water seeping into the ground and supporting the environment.

The mass fish death events in the summer of 2018–19 serve as a visible warning of the significant pressure experienced by native fish in the Basin. When there is less water flowing through our rivers, the system starts to disconnect making it challenging for fish to feed, grow and breed. The water that is available can become stagnant, resulting in poor water quality and creating prime conditions for blue-green algae to thrive. These conditions can result in mass fish deaths.

The Australian Government is working with New South Wales, Queensland, South Australia, Victoria and the Australian Capital Territory, along with other partners to find solutions that could mitigate further fish death events across the Basin, as we look towards another hot and dry summer.

While planning for the immediate future is vital for native fish populations, Basin governments know a long-term approach is needed. Basin governments need to determine how we can make enduring changes that will support healthy native fish populations into the future. An integrated, coordinated approach is needed to ensure our fish survive the variable climate that is seen across the Basin.

This framework sets out the approach for developing the Native Fish Management and Recovery Strategy, including addressing threats to native fish. This strategy will be a long-term plan to protect our native fish in both times of drought and flood.

The proposed strategy will aim to protect and restore native fish populations of the Basin over the long-term, and will be developed and implemented collaboratively with the Basin states, Traditional Owners and wider community, building on existing native fish programs, projects and initiatives across the Basin.



Background

Healthy and diverse populations of native fish in the Murray–Darling Basin provide important ecosystem functions, cultural, social and economic services. Native fish support recreational and tourism activity, with direct expenditure by recreational anglers in the Basin approximately \$1.3 billion per year. Native fish also underpin unique connections across the Basin. Iconic fish species, such as the Murray cod, also provide cultural keystones that link people with their culture and sense of place in the Basin.

Native fish populations have significantly declined across the Basin in recent decades—2001 estimates indicate that native fish were at 10% of their natural population levels¹. Over the summer of 2018–19, three major native fish mortality events occurred along a 40 kilometre section of the Lower Darling River, near the town of Menindee, New South Wales. Occurring in rapid succession, over ten thousand dead fish (of multiple native species) were reported on 15 December 2018, followed by another event on 6 January 2019, and a subsequent mass fish death event on 28 January 2019. The exact number of fish deaths is unknown. Anecdotal estimates ranged from hundreds of thousands to at least three million. In considering this issue an independent panel, chaired by Professor Rob Vertessy, concluded that ‘over a million’ fish may have died in the series of fish death events. An analysis by the Murray–Darling Basin Authority (MDBA) and Basin governments suggested the potential for similar mass fish mortality events occurring in four other catchments of the Basin².

While fish mortality events are by no means unprecedented in the Murray–Darling waterways, the scale of affected river, breadth and body size of affected species and the rapid escalation of the 2018–19 events, means the recent mass mortalities are widely considered to be some of the most serious on record. The summer 2018–19 mass fish mortality events serve as a visible warning of the significant pressure experienced by native fish in the Basin.

Response to the 2018–19 fish deaths

The Australian Government and Basin state governments launched a multi-faceted response to manage the 2018–19 fish deaths, including immediate emergency management and critical incident responses, and longer term actions. Immediate responses to the recent mortality events included an independent technical assessment of the likely causes of these mortalities by a diverse panel of experts and a plan to mitigate the risk of other major mortality events in the immediate future.

*The Independent Panel Assessment of the 2018–19 Fish Deaths in the Lower Darling*³, found that the main causes of the fish deaths were likely a combination of factors, including low inflows due to drought, water extraction and river and water management, and the prevailing weather conditions⁴. The final report made 27 recommendations to support native fish populations and prevent further mass fish deaths, including the establishment of a coordinated Native Fish Management and Recovery Strategy⁵. The panel assessed that an adequately resourced

¹ Murray-Darling Basin Authority (2003) Native Fish Strategy for the Murray-Darling Basin 2003-2013, Commonwealth Government

² Vertessy, R., Mitrovic, S., Bond, N. and Sheldon, F. (2019), *Independent Assessment of the 2018-19 Fish Deaths in the Lower Darling*, Australian Government, Canberra; MDBA (2019) *Response to recent fish death events*, Murray-Darling Basin Authority (publication no. 03/19), Canberra.

³ Littleproud, D. (2019), Media Release: Independent assessment of fish deaths, 22 January

⁴ Vertessy, R. et al (2019), *Independent Assessment of the 2018-19 Fish Deaths in the Lower Darling: Interim Report with Provisional Findings and Recommendations*

⁵ Vertessy, R. et al (2019), *Independent Assessment of the 2018-19 Fish Deaths in the Lower Darling: Final Report*



strategy would build on existing and lapsed native fish programs to enhance and support native fish recovery through genuine collaboration.

The Australian Government Minister responsible for water, The Hon. David Littleproud MP, committed \$5 million of Murray–Darling Basin Commonwealth joint program funding for the development and initial implementation of a strategy⁶. The proposed strategy aims to protect and restore native fish populations of the Basin over the long-term, and will be developed and implemented collaboratively with the Basin governments, Traditional Owners and the wider community. It will also build on existing native fish programs, projects and initiatives across the Basin.

Initial scoping has informed the potential objectives and principles, which would underpin a successful strategy. This is presented below as a draft framework, which establishes a starting point for deliberative consultation on the development of the strategy with Basin stakeholders.

⁶ Littleproud, D. (2019), Media Release: Statement regarding recent fish kills, 14 January 2019



Strategy objectives

Basin governments are committed to protecting native fish in the Basin. There are 7 key objectives of the Native Fish Management and Recovery Strategy.

The strategy will ensure:

- healthy and diverse native fish populations are supported and are resilient to extreme events
- flows are managed to mitigate extreme events
- critical native fish habitats are protected and effectively managed
- native fish research and activities are resourced to develop Basin-scale knowledge
- monitoring is complementary and provides long-term insights and supports decision-making
- commitments by Basin governments to restore native fish populations are well coordinated
- communities are engaged and able to take an active role in supporting fish recovery.

The strategy will be achieved by:

- providing a framework for better coordination and leveraging off existing native fish management programs in priority areas, as well as enabling a coordinated approach to addressing gaps where additional investment may be required
- providing a long term, proactive and whole-of-Basin approach to recovering healthy native fish populations in the Basin, addressing both the immediate needs of native fish, as well as averting or mitigating future threats
- building on the work of the original Native Fish Strategy, incorporating updated science and current best-practice actions
- initiating broad and inclusive consultation to build a strategy, which incorporates the views of Traditional Owners and communities, and harnesses existing capacity and traditional ecological knowledge to support fish recovery actions
- providing a Framework to guide and integrate new investment
- being flexible and responsive to updated knowledge and changing circumstances, particularly emergency events.



Implementation themes and actions

The strategy will describe a range of actions designed to alleviate key threats to the processes that support native fish survival and recovery in the Murray-Darling Basin.

A high-level summary of these processes and key threats to those processes is illustrated conceptually in Figure 1. This threats framework provides a valuable foundation for the prioritisation of key challenges to restoring and managing fish communities.

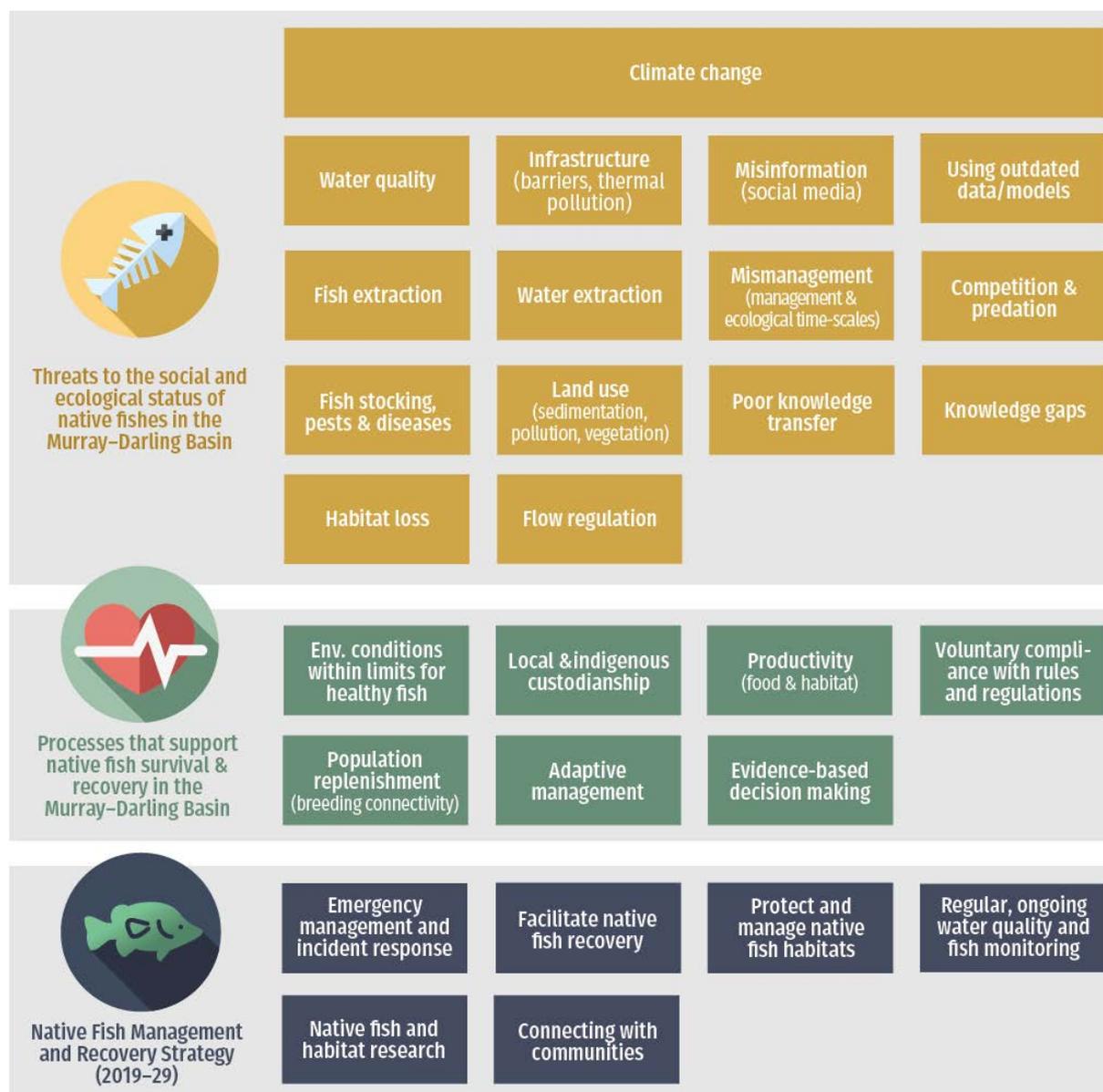


Figure 1 – Preliminary Framework outlining threats to native fish species and processes that protect native fish in the Basin.⁷

Initiatives under the strategy will identify actions that support the recovery of native fish by addressing threats to native fish communities across state borders, and at a Basin scale. The strategy is expected to set out key implementation themes, and immediate, medium-term and

⁷ 'Fish stocking' as a threat refers to stocking of alien species that predate on or compete with native species, or inappropriate stocking of native fish that reduces genetic diversity of native fish populations or introduces disease



long-term actions under each theme, to ensure progress is made towards the identified native fish objectives (Figure 2 below). These themes will be discussed and refined through considered engagement with stakeholders.



Figure 1: Native Fish Management and Recovery Strategy key themes

By necessity and preference, the development of the strategy will leverage from the existing knowledge and implementation capacities. Potential actions have already been identified in the ‘*Response to recent fish death events –recommended action plan*’, and as part of the ‘*Independent Assessment of the 2018–19 fish deaths in the Lower Darling*’⁸. Consultation will consider, add to and prioritise these potential actions. A full list of potential actions, which may be included in the strategy, is provided at *Appendix 1*.

Preliminary work and consultation has already identified immediate priority actions for implementation in 2019–20:

- continue urgent sampling of the remnant native fish populations in the Lower Darling river
- establish an emergency action plan and contingency reserve to respond to any additional native fish emergency that may occur during the development of the strategy
- develop an engagement plan for Traditional Owners and Basin communities to harness existing capacity to support fish recovery actions.

As the transition from this framework to a strategy occurs, additional immediate priority actions may be identified and implemented.

⁸ Vertessy, R. et al (2019), *Independent Assessment of the 2018-19 Fish Deaths in the Lower Darling: Final Report*



Strategy monitoring and evaluation

The strategy must be adaptive and will follow the principles of adaptive management. For example, threats to native fish populations may change, and the strategy must be adaptable to change with them. The effectiveness of the actions implemented under the strategy must be monitored and evaluated to ensure fish are being protected. This knowledge and understanding will then be built in to ongoing and future actions to protect fish across the Basin.

The strategy is expected to consider multiple lines of evidence in any monitoring and evaluation of actions. Basin stakeholders will be able to contribute to these lines of evidence. Further work on the monitoring and evaluation framework for this strategy will form part of the consultation.

Funding and program longevity

The strategy is designed to be a long-term strategy to conserve healthy and diverse populations of native fish. To achieve its objectives it will need to be implemented in full over the next decade. While \$5 million has been committed to the development and the implementation of programs to support the immediate recovery of native fish, additional resources are needed to ensure real outcomes are achieved at a Basin-scale to realise the actions set out in the strategy.

Resources should include financial and in-kind resources from Basin governments, research and development organisations and interested parties. A consideration in developing the strategy will be identifying partnerships and funding resources that could be employed to aid in effective implementation. Actions and programs outside of the Basin Plan are also likely to contribute to fish recovery—leveraging and linking with these programs will boost fish outcomes from the Basin Native Fish Management and Recovery Strategy, and it will be essential for all Basin governments to contribute in-kind for the strategy to succeed.



Appendix 1: Identified actions and recommendations to support fish recovery

SOURCE 1: Response to recent fish death events - recommended action plan

Note: these are for consideration and consultation with regard to the development of actions to be implemented under the strategy.

More information: <https://www.mdba.gov.au/publications/mdba-reports/response-recent-fish-death-events>

Theme: Emergency management and critical incident responses (<i>fast tracked</i>)	
Review of past and current fish death events and management responses, including consideration of results of the <i>Independent Panel Assessment of the 2018–19 fish deaths in the Lower Darling</i>	Immediate
Identify early warning requirements	Immediate
Identify improvements to fish death response planning and management	Immediate
Theme: Connecting with communities	
Strengthened Traditional Owner and community involvement through, for a strengthened network of 'demonstration reaches' for improving river health. Actively partnering with community members to undertake a range of activities to bring back native fish, including re-planting, re-snagging, fishway construction, fish monitoring and improving water quality.	Immediate
Theme: Facilitate native fish recovery	
Identify priority recovery actions as a result of fish deaths across the Basin including the findings of the <i>Independent Panel Assessment into the 2018-19 fish deaths in the Lower Darling</i>	Medium-term
Identify key locations and mechanisms to repopulate these locations and support Basin-wide fish populations	Medium-term
Reintroduce threatened fish to identified key sites	Medium-term
Support and enhance natural breeding and connect fish populations – link flows and flow regime management with on-ground actions in key locations	Long-term
Set up new nursery habitats for key native fish species and reconnect young fish to the river	Long-term
Boost threatened fish populations	Long-term



Upscale breeding efforts for conservation stocking (particularly for small bodied species)	Long-term
Connect rivers to connect the fish - maximise water management outcomes for fish across spatial scales - improving system-scale, multi-year and multi-species water planning and delivery for fish	Long-term
Theme: Protect and manage native fish and critical habitats	
Identify critical habitats and actions to protect and manage these habitats (incl. native fish population strongholds across the Basin)	Medium-term
Theme: Water quality and fish monitoring for adaptive management	
Conduct a stocktake of water quality and fish monitoring across the Basin	Complete
Identify priority enhancements to current monitoring capacity	Medium-term
Identify mechanisms to ensure this information is accessible for communities and agencies	Medium-term
Theme: Native fish and habitat research	
Refine knowledge of key fish habitats and management options to improve native fish outcomes (particularly refuges, nursery and breeding habitats)	Medium-term
Confirm key drought refuge sites and monitor performance of drought refuges and identify options to improve these refuge habitats in the future	Medium-term
Re-examine low-flow requirements for native fish (including oxygen and temperature) and analyse how well these are met under the current flow regime in the context of a changing climate	Medium-term
Analysis of the cultural, social and economic benefits of native fish	Medium-term
Identify and explore improved and innovative technology to support all the initiatives in this strategy	Medium-term
Improve understanding of fish population dynamics <ul style="list-style-type: none"> • sampling and analysis and research on key knowledge gaps • include refinement and application of native fish population models to support fish recovery and threatened fish reintroduction 	Long-term



SOURCE 2: *Independent Assessment of the 2018–19 Fish Deaths in the Lower Darling: Final Report*

Note: these are for consideration and consultation with regard to the development of actions to be implemented under the strategy.

More information: <https://www.mdba.gov.au/publications/mdba-reports/independent-panel-assess-fish-deaths-lower-darling>

Recommendations for Basin policy makers

Recommendation 1: NSW should modify water access arrangements under the Barwon–Darling Water Sharing Plan to protect low flows.

Recommendation 2: In preparing future Water Resource Plans for catchments in the northern Basin, QLD and NSW should ensure that they give greater attention to the need to maintain hydrologic connectivity in the Barwon–Darling River.

Recommendation 3: Basin governments should review and consider changes to the Menindee Lakes' operating procedures to provide greater drought resilience in the lower Darling region, encompassing the Menindee Lakes, the lower Darling River and the Anabranche.

Recommendation 4: NSW and the Australian government should re-evaluate the Menindee Lakes Water Saving Project to place a greater emphasis on improving water security and environmental outcomes in the lower Darling. Should the revised project contribute less to the agreed Sustainable Diversion Limits, the NSW government would need to commit to addressing the shortfall.

Recommendation 5: NSW and the Australian government should finalise arrangements to support structural adjustment of lower Darling farm enterprises with permanent/perennial crops that depend on high reliability water entitlements, including appropriately targeted strategic water acquisition and compensation for the reconfiguration of farm businesses.

Recommendation 6: NSW and QLD should adopt an active event-based management approach to providing flows through the Barwon–Darling system. Flow management strategies should be implemented as soon as possible to protect first flushes, protect low flows, shepherd environmental releases, enhance system connectivity, and improve water quality.

Recommendation 7: NSW should initiate a program to remove barriers to fish movement and enhance mobility through improved passage at existing weirs and regulators.

Recommendation 8: NSW, QLD and the MDBA should publish their joint plans for implementation of the northern Basin Toolkit Measures, and set an aggressive timeline for delivery. Immediate priority should be given to those measures that support native fish population recovery and connectivity.

Recommendation 9: Basin governments should initiate a joint program to significantly accelerate river model development to evaluate different Basin policy options.

Recommendation 10: Commonwealth and State governments should significantly increase investment in research and development, co-opting the science community, to address long-standing gaps in our knowledge of riverine hydrology and ecology. A priority focus of those new arrangements should be applied research that serves the information needs associated with Basin Plan implementation.



Recommendations for Basin managers, to be implemented within one year

Recommendation 11: NSW should continue emergency responses such as the use of aerators and fish translocations, noting that these are short-term emergency measures and may not prevent additional fish death events if adverse conditions persist or re-occur.

Recommendation 12: Once the adverse environmental conditions have abated, 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.

Recommendation 13: NSW and MDBA should jointly undertake a risk assessment to identify parts of the Darling Basin that are most at risk of future fish death events. This information should be used to inform the development of future early warning systems and emergency response plans.

Recommendation 14: NSW should review and refine the flow requirements to control stratification in weir pools deemed to be at high risk of fish deaths.

Recommendation 15: NSW and QLD should establish an agreed protocol to protect first flushes.

Recommendation 16: Basin governments should ensure that the Basin Native Fish Management and Recovery Strategy is adequately resourced and involves authentic collaboration with government water scientists, academics and consultants, local communities and Aboriginal stakeholders. This strategy should build on efforts such as the lapsed Native Fish Strategy and current State programs.

Recommendation 17: The Commonwealth Environmental Water Holder, the MDBA, the Victorian Environmental Water Holder and the NSW Department of Environmental and Heritage should cooperatively undertake a risk assessment to determine how best to manage environmental water during prolonged dry spells, taking into account uncertainty in future inflows.

Recommendation 18: The MDBA's recently announced Climate Change Research Program should be adequately resourced and supported by relevant specialist science agencies and universities. A much better understanding of how climate change threatens Basin water availability and aquatic ecosystems must be obtained ahead of the 2026 Basin Plan review.

Recommendations for Basin managers, to be implemented within two years

Recommendation 19: NSW and QLD should introduce more accurate continuous and real-time monitoring of diversions in the Barwon–Darling, to ensure protection of managed connectivity events. Compliance around all metering requirements and overland flow extractions should be strengthened expeditiously.

Recommendation 20: NSW and QLD should improve the reliability and transparency of the assessment of the hydrologic impacts of floodplain harvesting.

Recommendation 21: The MDBA should continuously update pre-development model runs developed for the Basin Plan with recent climate information to enable more rapid assessment of the effects of diversions and environmental water releases.

Recommendation 22: Commonwealth and State environmental water managers should cooperate to develop a suitable forecasting tool to support active management of environmental water.

Recommendation 23: NSW should initiate a project to establish a “demonstration reach” in the lower Darling, where multiple threats to fisheries recovery are mitigated to create beneficial conditions for long-term fish recovery. This demonstration reach should be a key feature of the



Native Fish Management and Recovery Strategy and should heavily involve the local community, including Aboriginal stakeholders.

Recommendation 24: Basin governments should ensure that the Native Fish Management and Recovery Strategy includes the appropriate elements of the Murray Cod National Recovery Plan pertaining to fish kills.

Recommendations for Basin managers, to be implemented within three years

Recommendation 25: Basin States should upgrade their Strategic Water Information Monitoring Plans to reflect the enhanced hydrologic monitoring requirements associated with the Basin Plan and the recently agreed Murray–Darling Basin Compliance Compact, and agree to commit the necessary resources to enable these plans to be fully implemented.

Recommendation 26: NSW should redress gaps in water quality monitoring (dissolved oxygen, temperature, algae) at high risk sites in the Barwon–Darling. This could include investigating and adopting emerging technologies such as remote sensing, and improving the use of real-time data to support early warning and forecasting.

Recommendation 27: NSW and QLD should improve monitoring of end-of-system tributary flows that contribute to hydrologic connectivity in the Darling system, and make that data readily available.