



Department of  
Primary Industries

# Designing a safer future for native fish:

The history, impact and future of innovative fish-protection  
screening in Australia

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Charles Sturt  
University



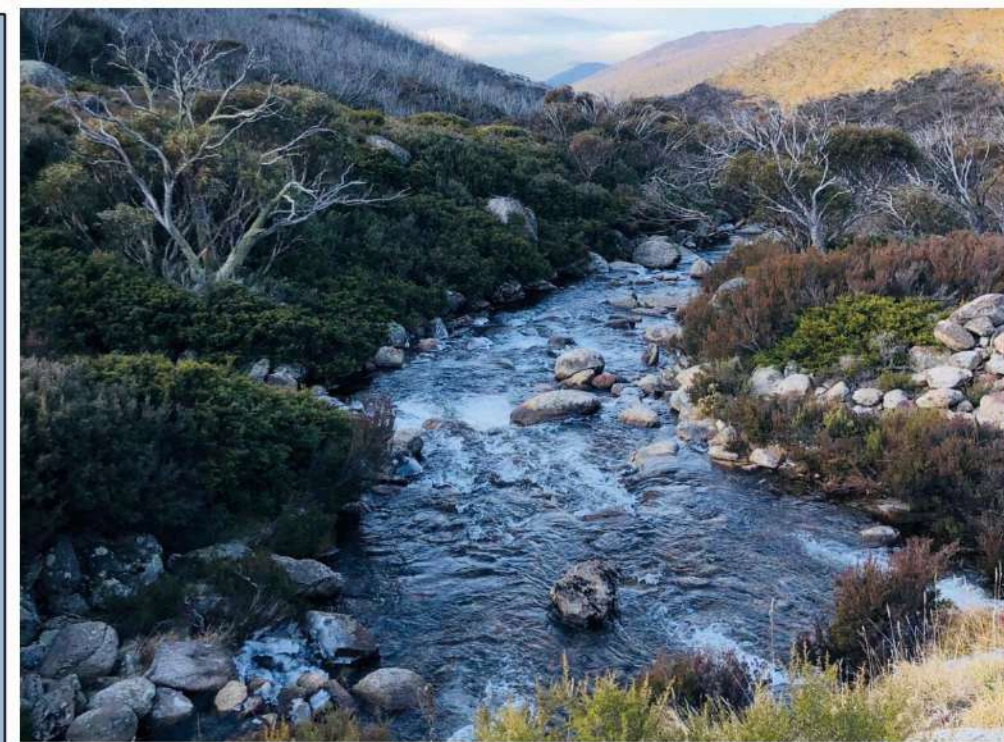


















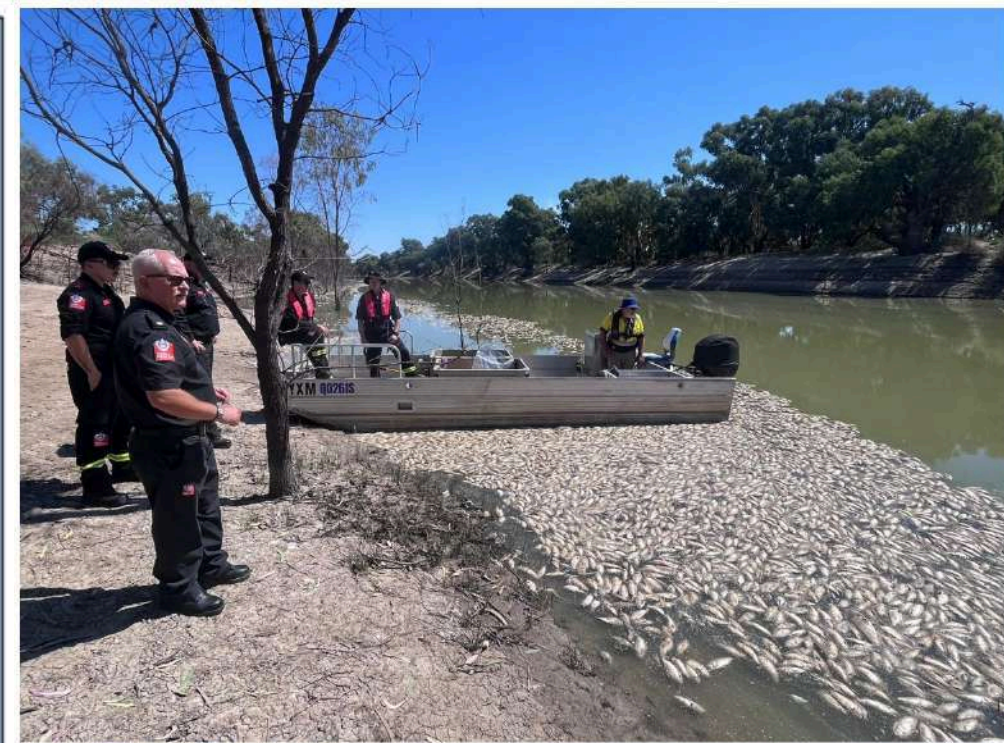


**40%** of ~350 freshwater fish species  
are **threatened**

Today we have  
**90% fewer** native fish



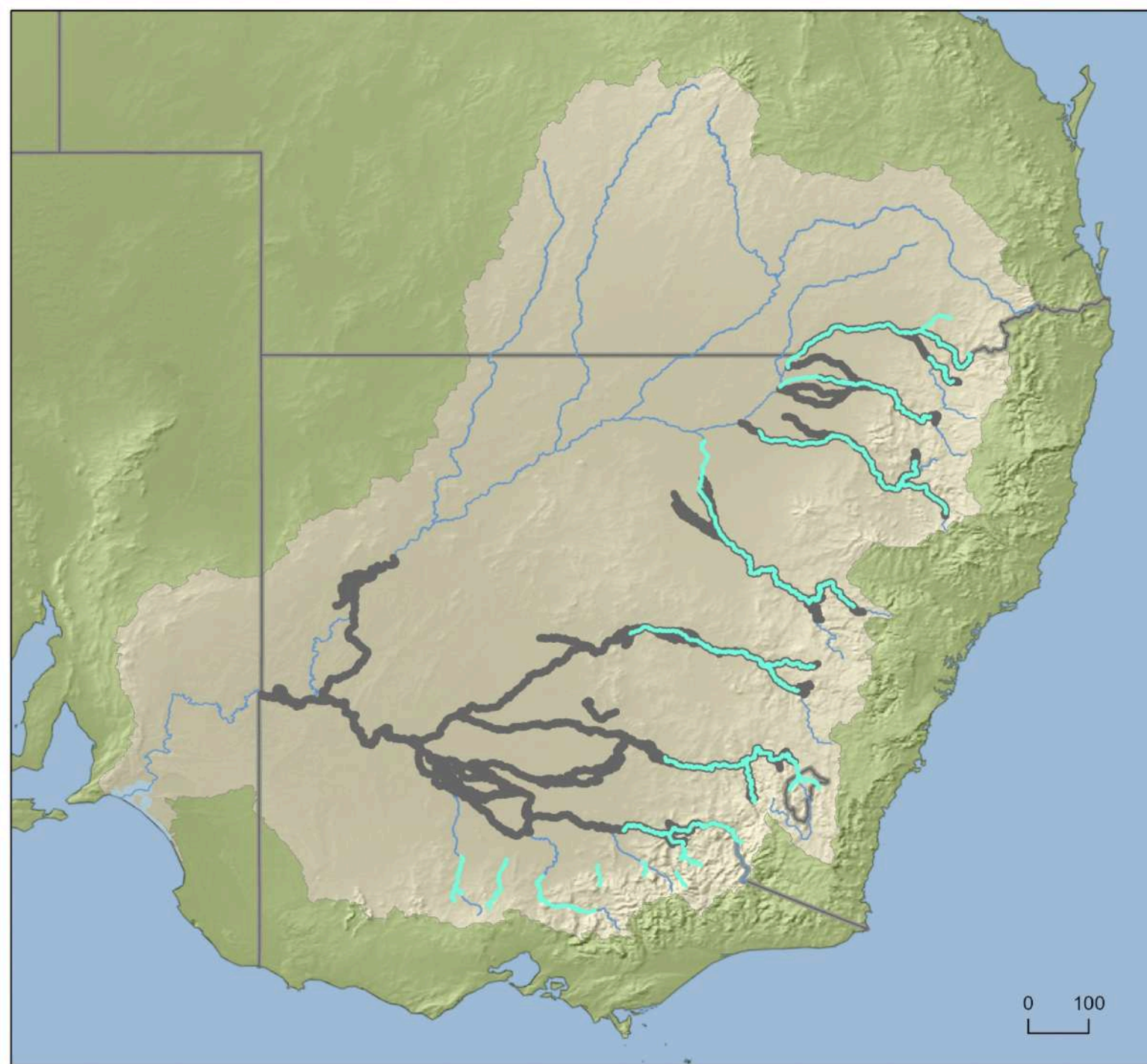




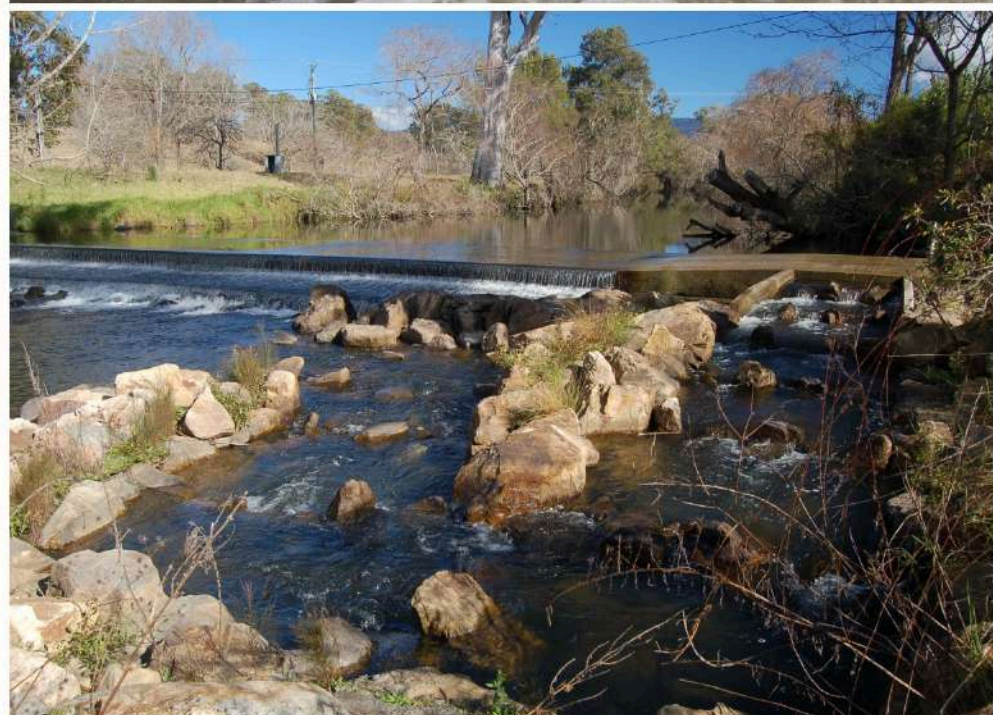
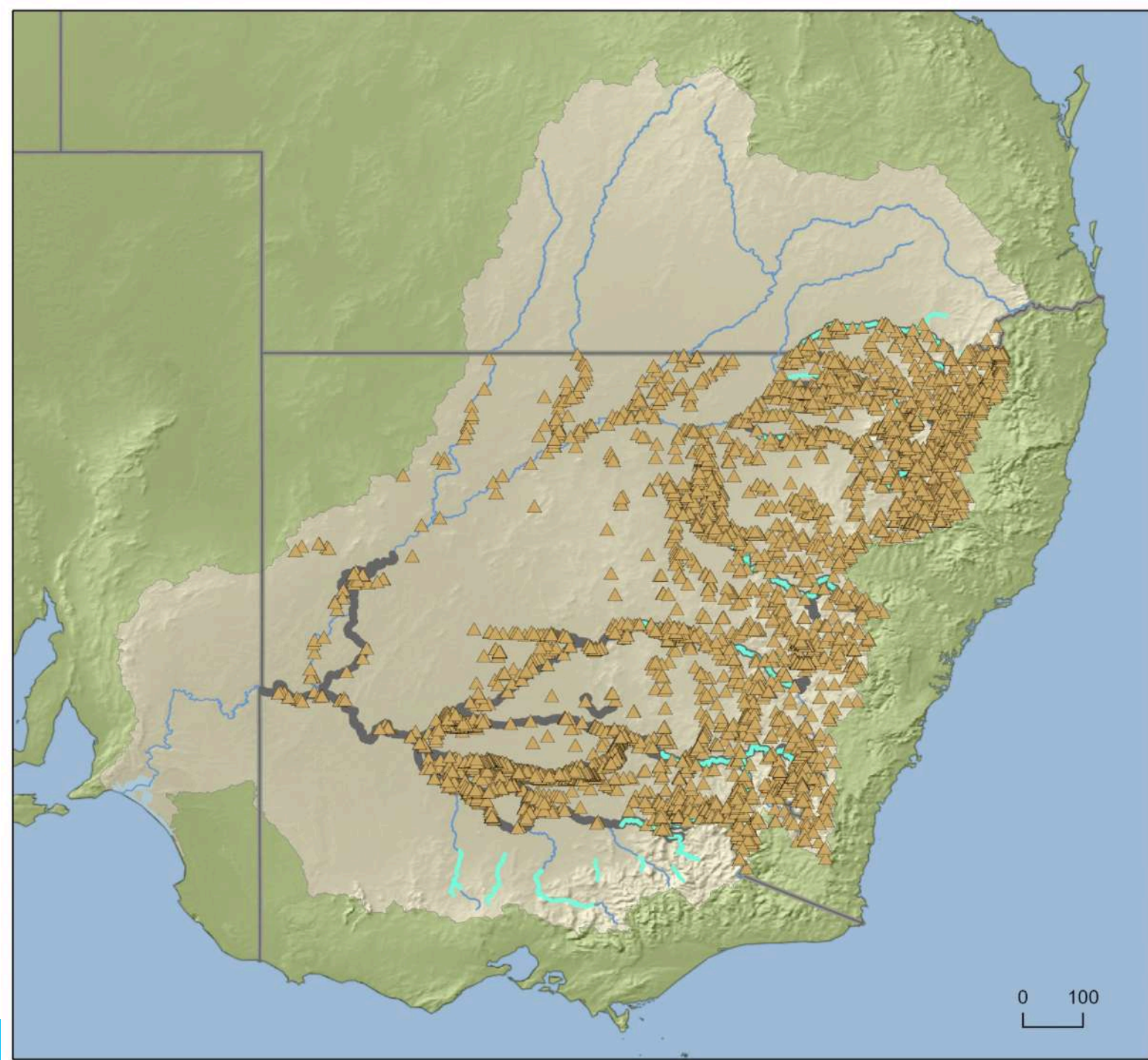




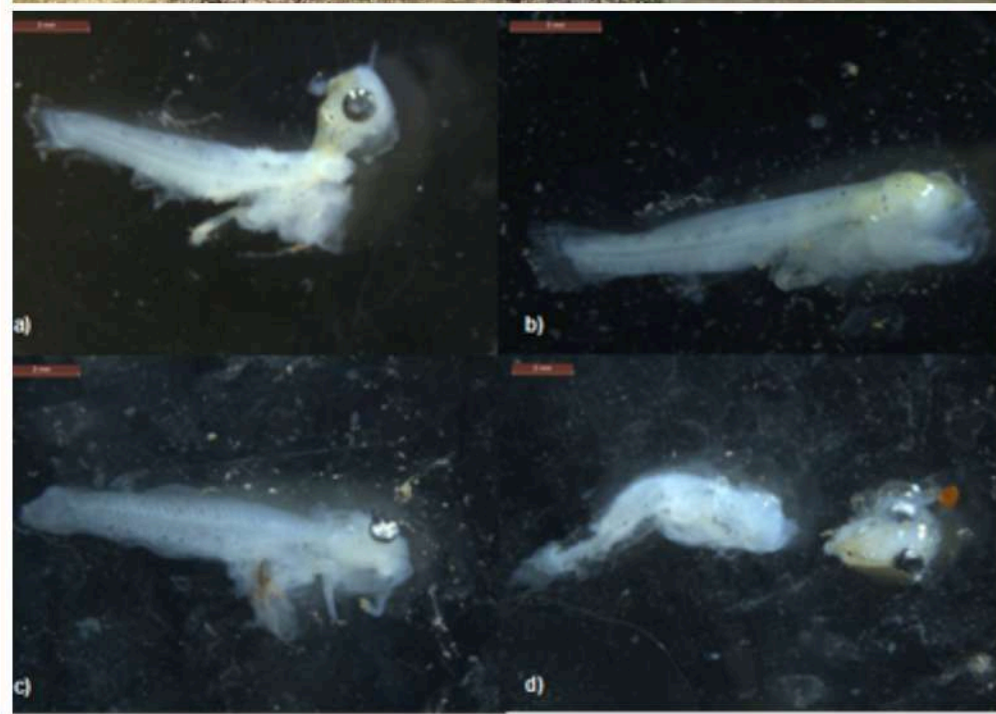
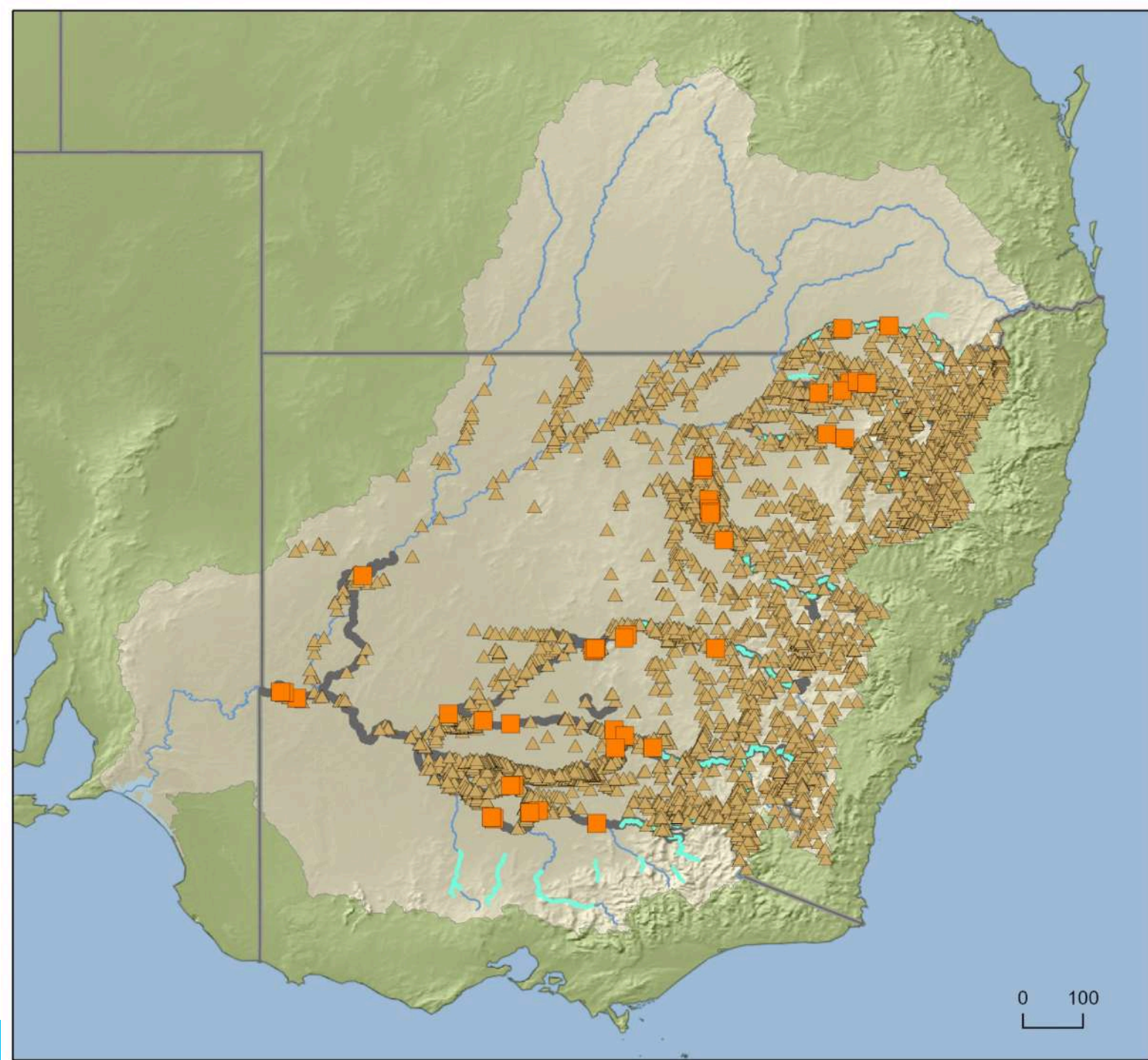




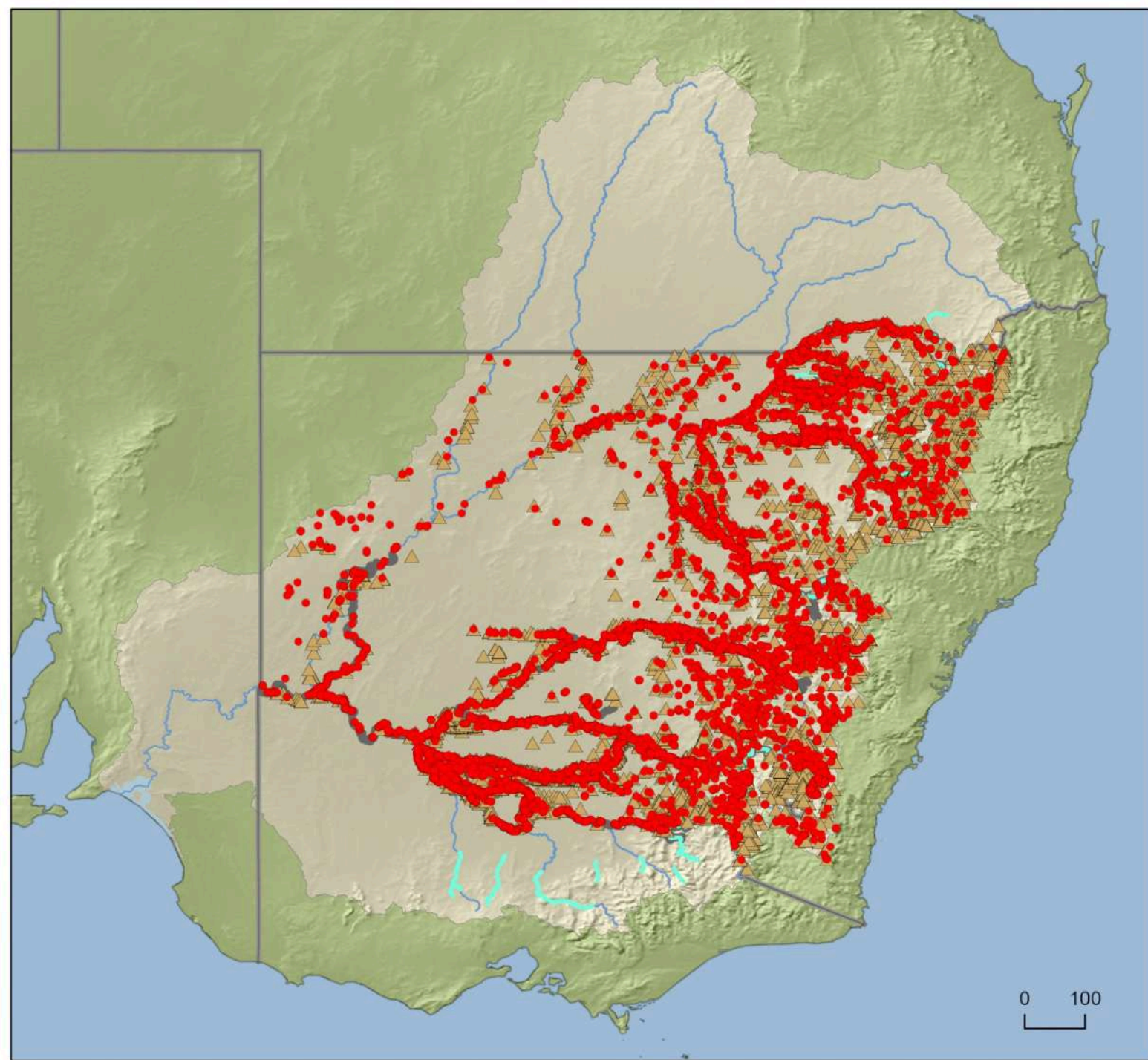




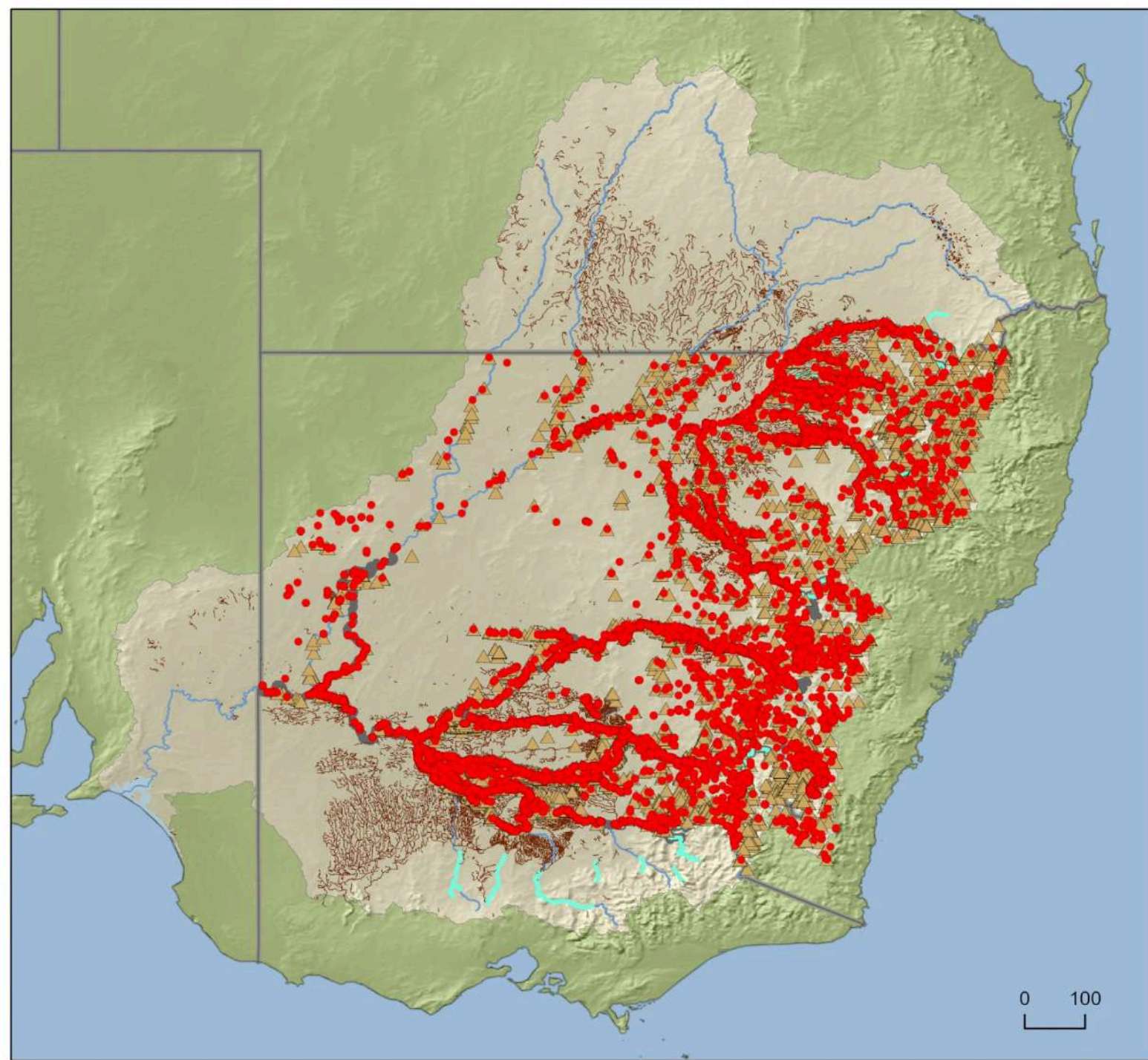




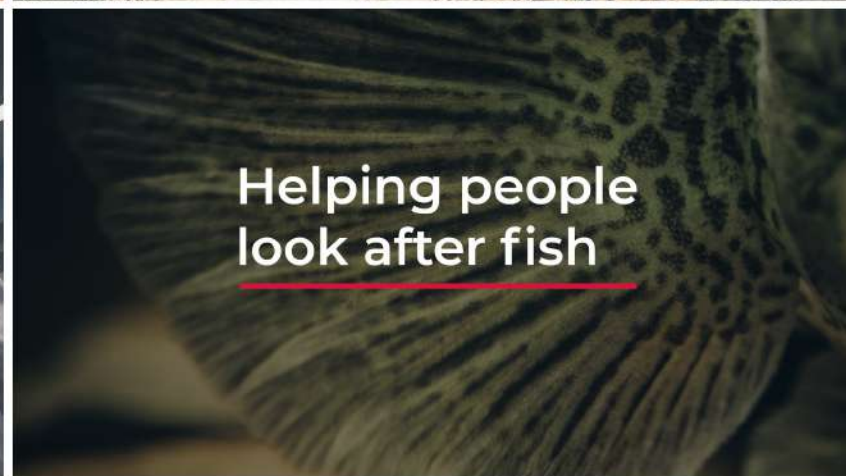


















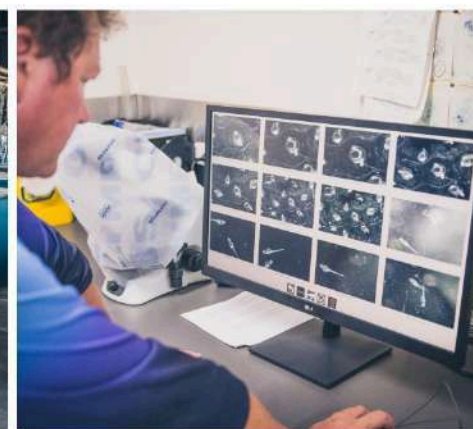
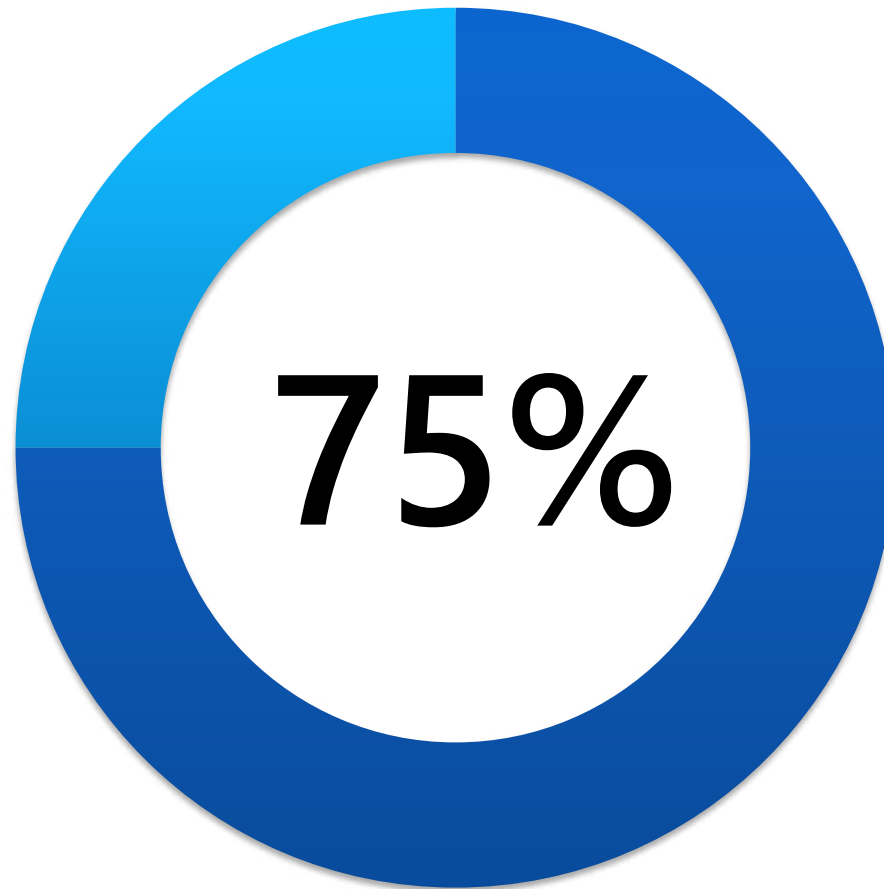
97 million  
native fish/yr





(Bretzel et al. In review)







# Visit Of The Fisheries Superintendent

## INTERESTING DISCUSSIONS ON VANISHING COD AND CANALS AS HATCHERIES

AFTER a keen and interesting discussion on the depletion of the Murray cod and the proposal to transfer young fish from the canals to the river, Mr. T. C. Roughley (Superintendent of the Fisheries Department of New South Wales) informed a representative meeting of anglers at the Council Chambers on Tuesday night, that if there were large quantities of cod in the channels it would be a wonderful source of supply for re-stocking without expensive hatcheries and he intended to go into the matter very thoroughly, making an early trial survey with the object of carrying out extensive investigations next season as soon as the water in the canals was lowered.

Mr. D. Hughes (president of the Progress Association, who organised, presided) and welcomed Mr. Roughley, who was accompanied by Mr. Judd (fisheries inspector).

### THREE IMPORTANT ANGLES

Mr. Roughley said he would like the meeting to discuss matters from three angles.

Firstly, he would like them to tell him if they were of opinion there had been a serious decline in the edible fishes of the Murrumbidgee over the years.

If the answer to that question was yes, he would like to ask them the reason for it, in their opinion.

Thirdly, he would like to ask them what they considered might be measures to help restore the stocks.

Mr. Roughley added that he would like them to speak freely, and if they had any criticism to give expression to it. It was the truth he was trying to get at and he asked them not to exaggerate, but to give a close and true a picture of the position as possible. Could anybody give evidence that the fish had become reduced in numbers.

Mr. J. Washington said that 20 years ago anybody could go down to the river with a line and a couple of hooks and get a feed. To-day if you wanted a feed you must go down with as many lines as you could buy and all sorts of bait.

### WAGGA PEOPLE LAUGHED

Mr. G. Morris said he had been in Wagga that day and he was told that

that he had caught tenured in the river so that when his mother wanted a fish all he had to do was to go down and bring one out. Now if they caught a fish they killed and ate it straight away. When he was a boy he could go four miles with a spinner and land eight or nine fish. Now you had to go 24 miles with a spinner for one or two fish.

### PROFESSIONAL FISHERMAN'S VIEWS

Mr. W. Lamprell said he had been fishing on the Murrumbidgee for the past 17½ years and for the last 3½ years he had been a professional fisherman. Nothing had been said about perch or bream and it appeared they were confining the discussion to cod. Before they could arrive at the reasons for the depletion of the fish they would want to know at what age the cod spawns, how it spawns and how they drop their spawn; also how the cod gets its spawn and sheds its spawn.

Mr. Hughes said Mr. Lamprell was a bit out of order. Mr. Roughley had asked them for experience of the past and experience of the present.

Mr. Roughley said there was also the question to what did they attribute the decline of fish. If the spawning came into it so much the better, because there was a whole lot that we did not know about it.



Goulburn-Murray Water

19 h · 🌐



We've been conducting some electrofishing on channels near Katunga ahead of our upcoming winter weed treatment.

Removing fish is an important part of our treatment process - native fish are released into nearby waterways with the help of the [Victorian Fisheries Authority](#).

During this electrofishing, 300 blackfish, 130 cod and 20 yellowbelly were relocated.

For more information about our 2021 winter works program, check out our website - [www.gmwater.com.au/winterworks](http://www.gmwater.com.au/winterworks)











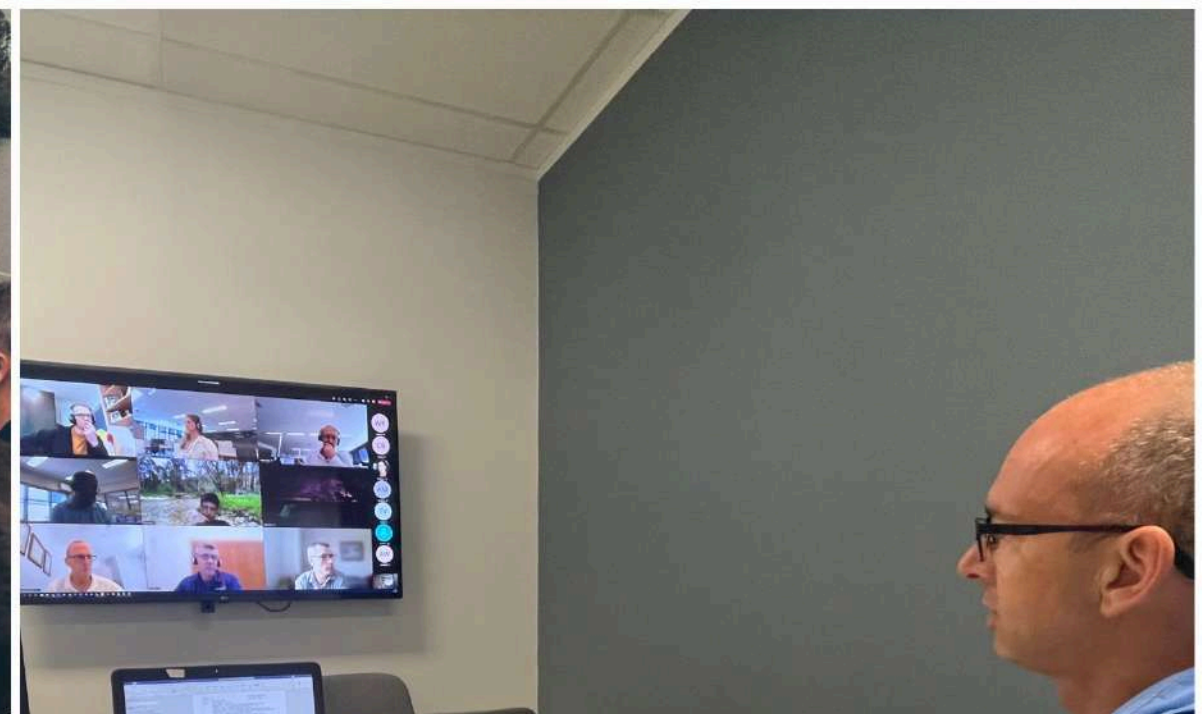








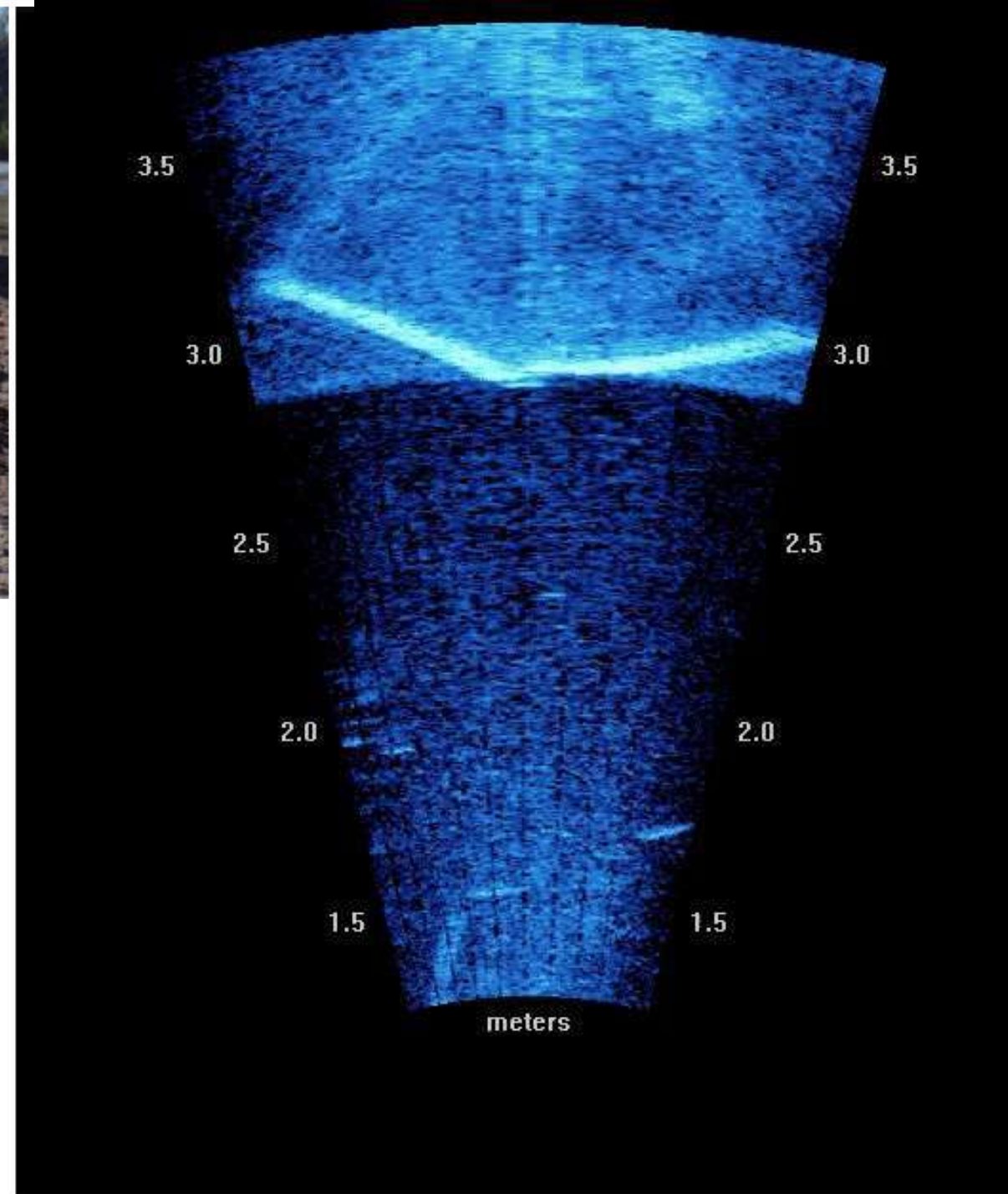
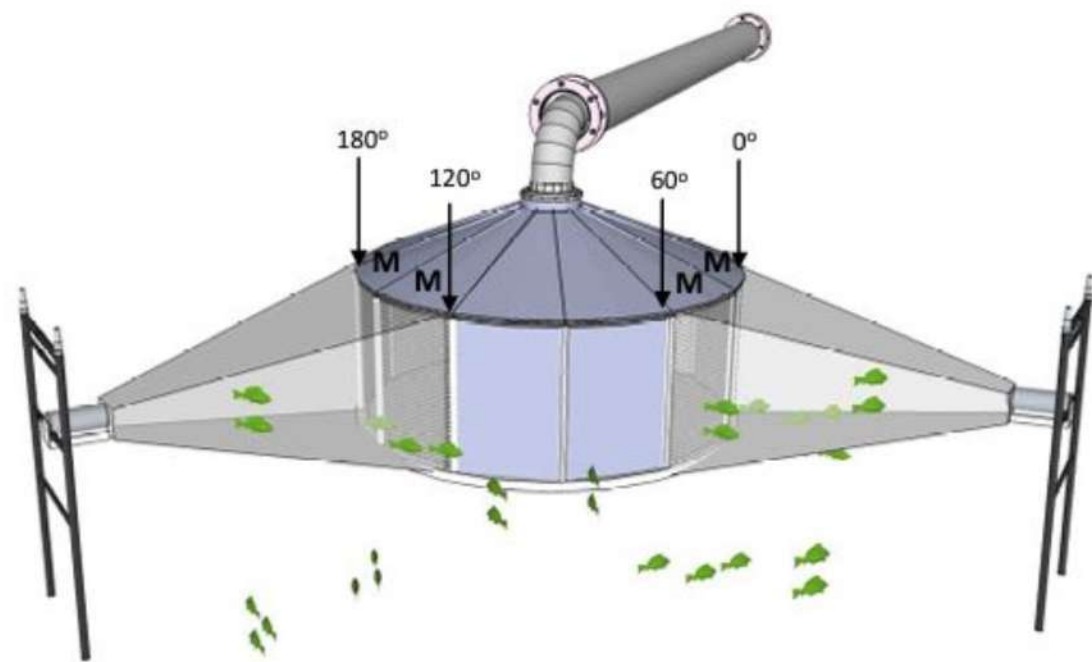






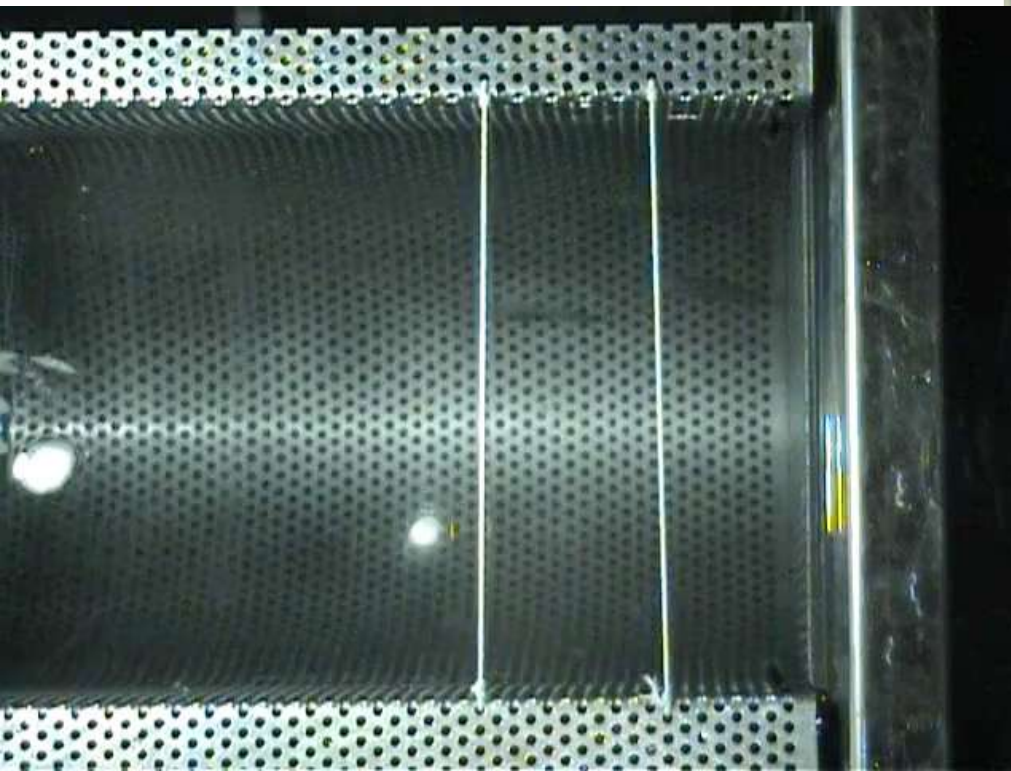
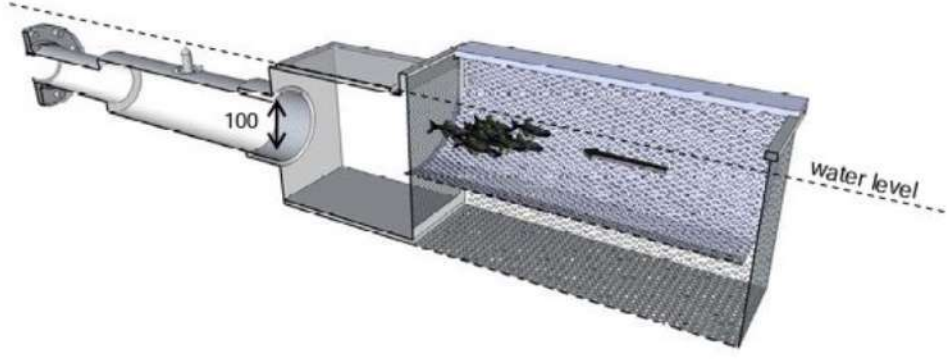






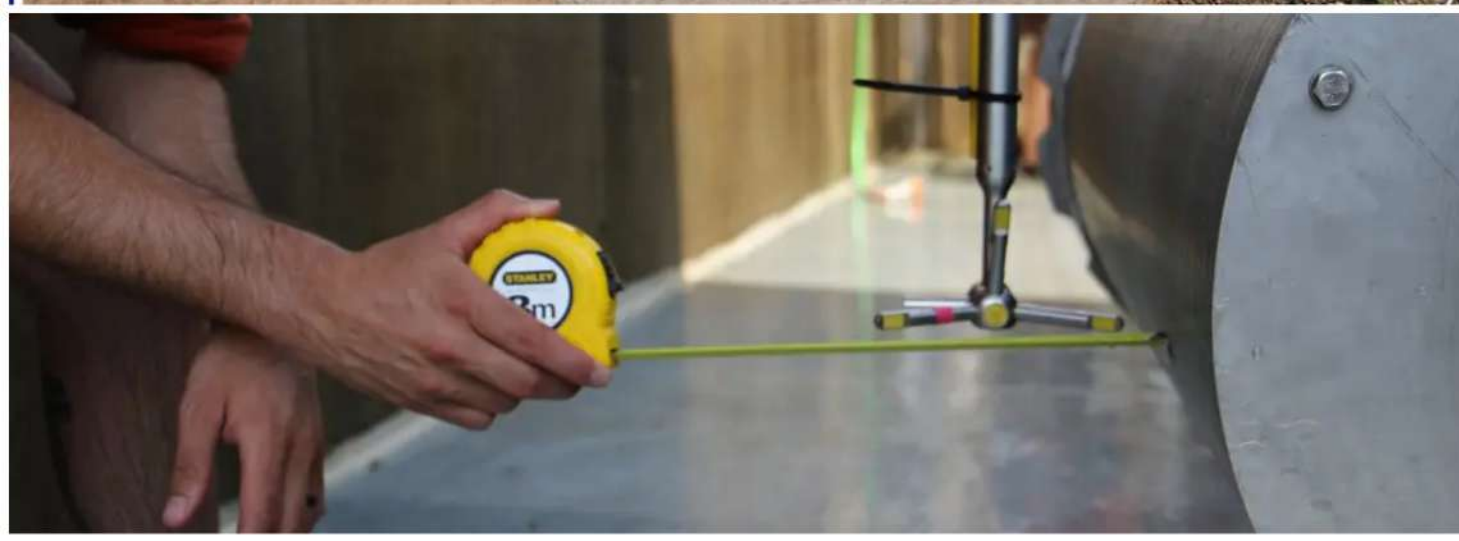
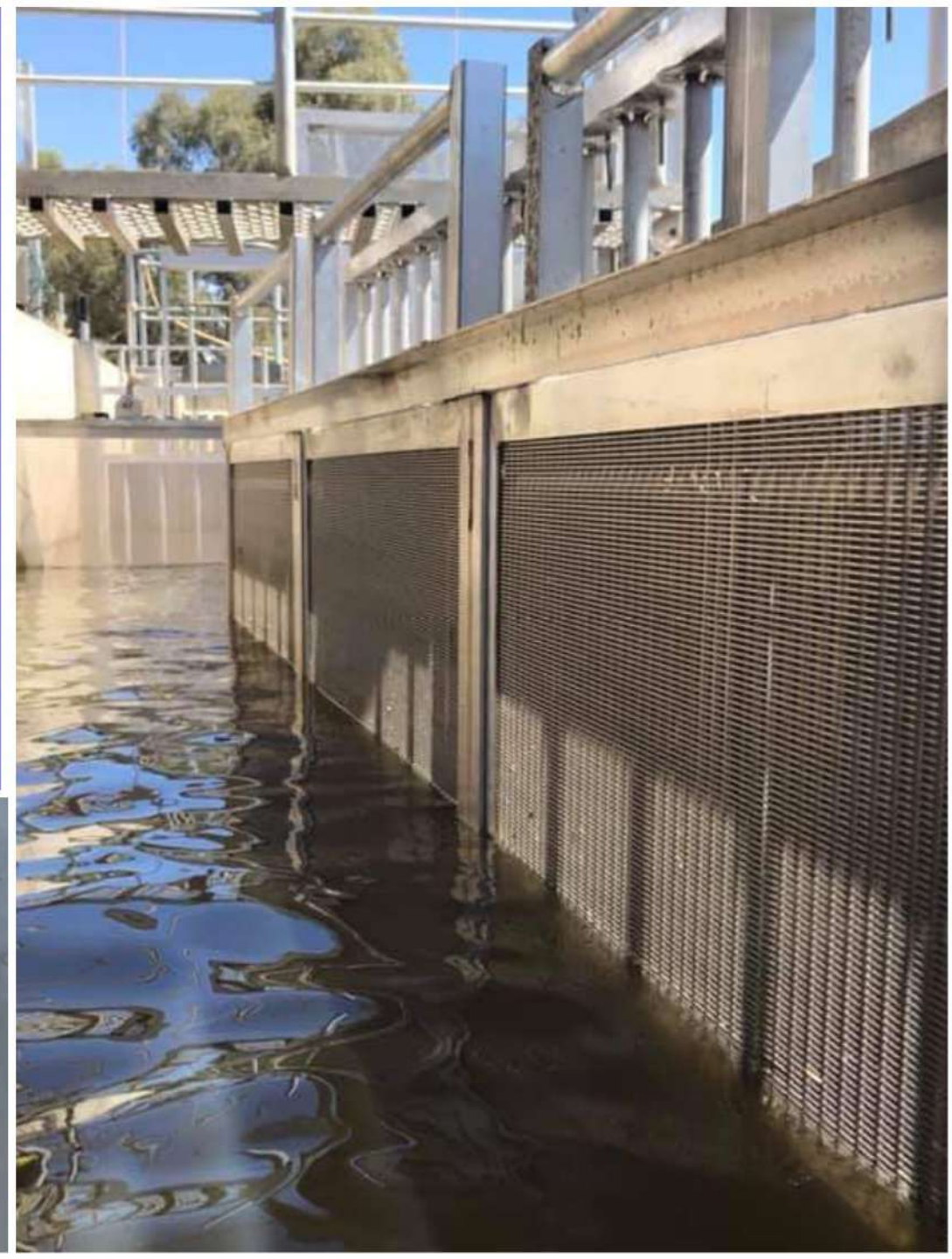


b) Cut-away view



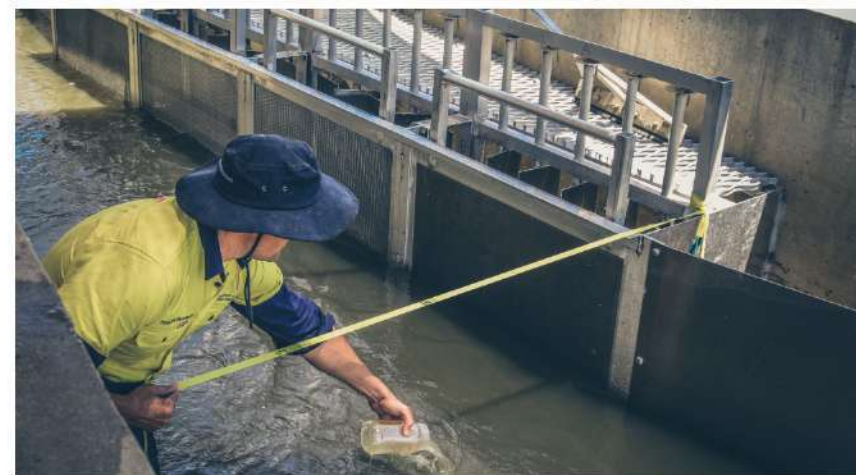
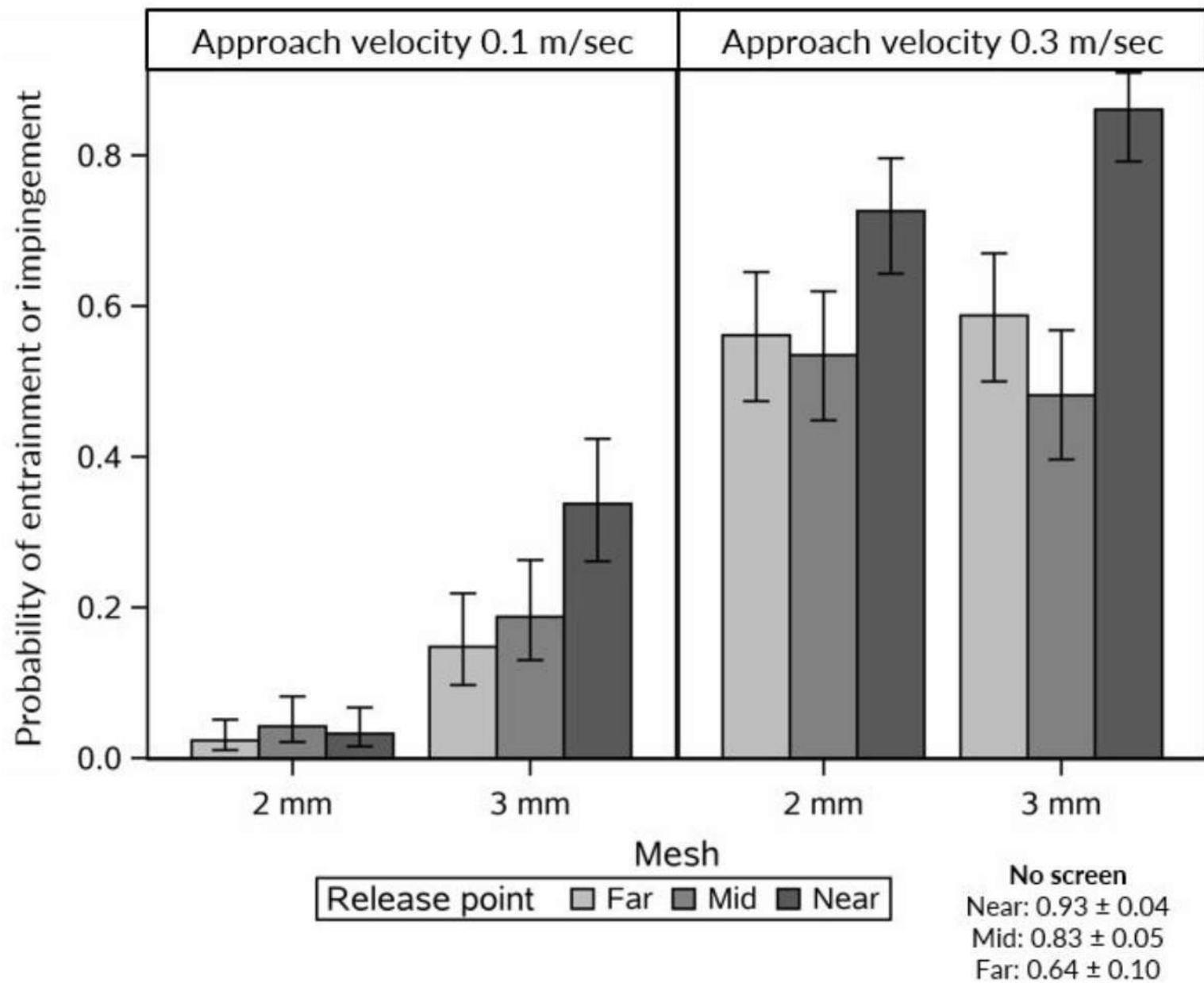


# FlowLab





# 25 day old Murray cod







Department of  
Primary Industries

# Design specifications for fish-protection screens in Australia

Edition 1



Department of  
Primary Industries

# The practical guide to modern fish-protection screening in Australia





doi: 10.1111/j.1442-8903.2012.00655.x

COMMENT

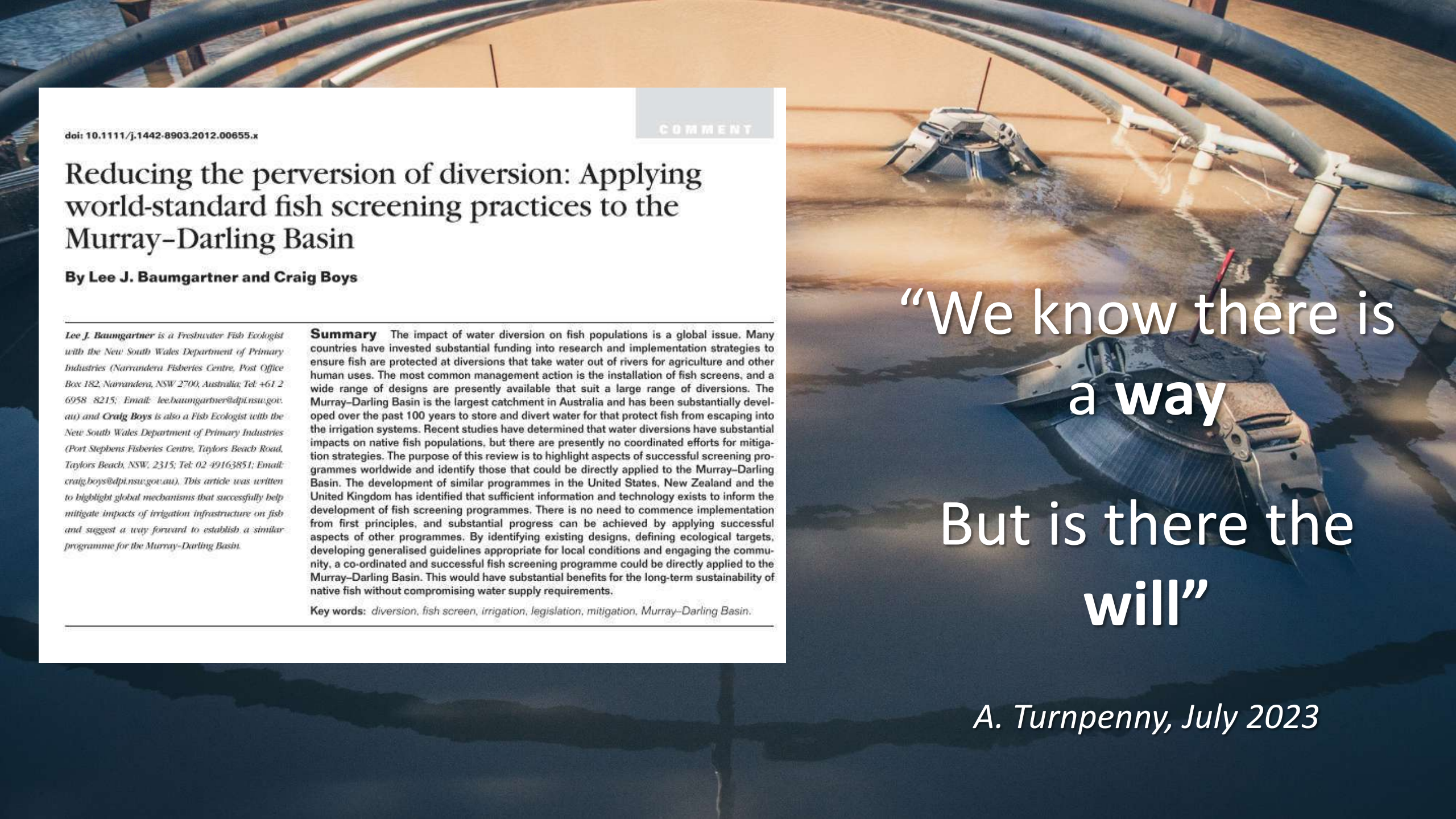
## Reducing the perversion of diversion: Applying world-standard fish screening practices to the Murray–Darling Basin

By Lee J. Baumgartner and Craig Boys

*Lee J. Baumgartner is a Freshwater Fish Ecologist with the New South Wales Department of Primary Industries (Narrandera Fisheries Centre, Post Office Box 182, Narrandera, NSW 2700, Australia; Tel: +61 2 6958 8215; Email: lee.baumgartner@dpi.nsw.gov.au) and Craig Boys is also a Fish Ecologist with the New South Wales Department of Primary Industries (Port Stephens Fisheries Centre, Taylors Beach Road, Taylors Beach, NSW, 2315; Tel: 02 49163851; Email: craig.boys@dpi.nsw.gov.au). This article was written to highlight global mechanisms that successfully help mitigate impacts of irrigation infrastructure on fish and suggest a way forward to establish a similar programme for the Murray–Darling Basin.*

**Summary** The impact of water diversion on fish populations is a global issue. Many countries have invested substantial funding into research and implementation strategies to ensure fish are protected at diversions that take water out of rivers for agriculture and other human uses. The most common management action is the installation of fish screens, and a wide range of designs are presently available that suit a large range of diversions. The Murray–Darling Basin is the largest catchment in Australia and has been substantially developed over the past 100 years to store and divert water for that protect fish from escaping into the irrigation systems. Recent studies have determined that water diversions have substantial impacts on native fish populations, but there are presently no coordinated efforts for mitigation strategies. The purpose of this review is to highlight aspects of successful screening programmes worldwide and identify those that could be directly applied to the Murray–Darling Basin. The development of similar programmes in the United States, New Zealand and the United Kingdom has identified that sufficient information and technology exists to inform the development of fish screening programmes. There is no need to commence implementation from first principles, and substantial progress can be achieved by applying successful aspects of other programmes. By identifying existing designs, defining ecological targets, developing generalised guidelines appropriate for local conditions and engaging the community, a co-ordinated and successful fish screening programme could be directly applied to the Murray–Darling Basin. This would have substantial benefits for the long-term sustainability of native fish without compromising water supply requirements.

**Key words:** diversion, fish screen, irrigation, legislation, mitigation, Murray–Darling Basin.



“We know there is  
a way  
But is there the  
will”

*A. Turnpenny, July 2023*





# FISH SCREENS

AUSTRALIA



Department of  
Primary Industries



New South Wales  
Recreational  
Fishing Trusts



The Ian Potter  
Foundation



Charles Sturt  
University











REVIEW ARTICLE

## Native fish losses due to water extraction Australian rivers: Evidence, impacts and in modern fish- and farm-friendly screen

By Craig A. Boys, Thomas S. Rayner, Lee J. Baumgartner and Kat

Craig A. Boys and Thomas S. Rayner are Senior Freshwater Fish Ecologists with the New South Wales Department of Primary Industries (Port Stephens Fisheries Institute, Private Bag 1, Nelson Bay, NSW 2315, Australia; Tel: +61 2 49163851; Email: craig.boys@dpi.nsw.gov.au and tom.rayner@dpi.nsw.gov.au). Lee J. Baumgartner is a Professor of Fisheries and Management and Katherine E. Doyle is a Fisheries and Hydropower Researcher (both at Institute for Land, Water and Society, Charles Sturt University, PO Box 789, Albury, NSW 2640, Australia; Tel: +61 2 60519271; Email: lbaumgartner@csu.edu.au and kdoyle@csu.edu.au). This review consolidates all the historic and contemporary evidence on fish losses at Australian river diversions and outlines how a new Australian best-practice in diversion screening can be a big win for the environment and the prosperity of regional towns.

**Summary** The diversion of water from rivers removes m waterways each year. Modern diversion screens are available by 90% and stop debris entering irrigation systems. Uptake of States has protected fish and infrastructure. However, applicat and both the problem and its solution continue to be overlook marise multiple lines of evidence of fish losses in Australia Large losses of fish at diversions have been reported for close pelling evidence of population-scale impacts on native fish. W ing the progress being made to bring modern screening techni social learning framework to improve how water is diverted at between the fisheries, agriculture and engineering sectors. i We conclude that uptake of modern screens will rely on dial problem or solution exists, to the following: how screening t water and environmental management; where investment sh screening could be funded. If Australia gets this right, substai saving millions of native fish every year, bolstering native fish: ing ongoing costs for water users and enhancing the economi areas by boosting manufacturing, service industries, tourism.

**Key words:** fish losses, fish screen, irrigation diversions, Murr recovery.

**This pump site is fish friendly.**

- Protects fish. Protecting farms.** Angle: Inverted Irrigation Scheme site is fitted with modern fish screens. Keep fish and debris in the river and outstation infrastructure.
- Same volume. Lower velocity.** Four core screens protect the main pumps. Their large surface area allows the same volume of water to be pumped, but at a lower intake velocity. This means fish can swim freely.
- Out with the old, in with the new.** Design: conventional steel installation needed 50 tonnes and placed inoperable.

Other benefits listed include: reduces debris intake at the pumps, reduces power consumption, pumps deliver cleaner water to 33 farms, protects vulnerable and threatened native fish, and native fish in the river - better fishing.

Additional text: 'Each one can take up to 250 mega litres per day.' 'Automated shutters ease the screen clean.' 'Scaleless steel 5-metre screens for long life and low maintenance.'

Logos for SW (South West) and TransNewLife are visible at the bottom.

## Funding available to install modern fish screens.

Progressive water users on the Barwon-Darling and Lower Mehi rivers can apply for assistance to upgrade their diversion with a modern fish-protection screen.



The Native Fish Recovery Strategy

## The Native Fish Recovery Strategy

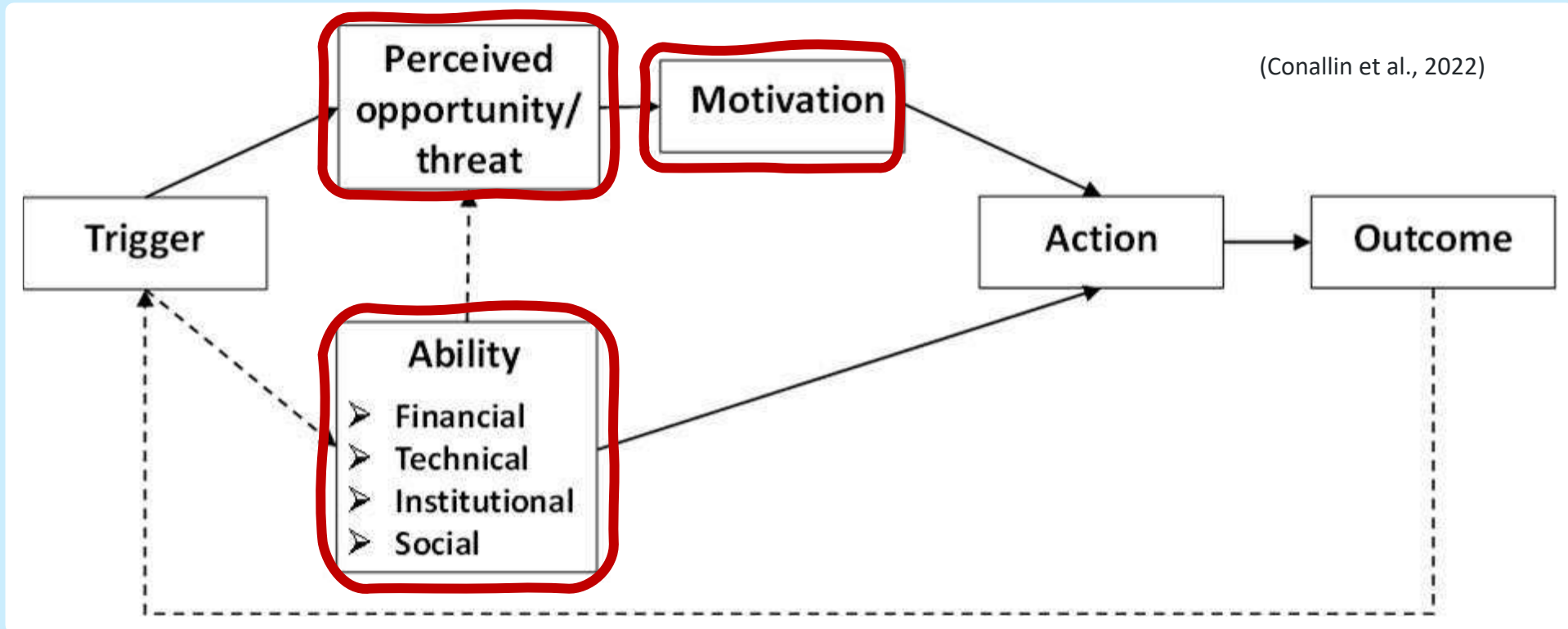
Basin governments, community, First Nations, recreational fishers and scientists have developed a Native Fish Recovery Strategy. The Strategy provides a high-level framework to guide future investment. It emphasises community engagement and ownership, focusing on recovering rivers of Basin-scale significance in a way that complements existing initiatives.

The Native Fish Recovery Strategy recognises that native fish move, breed and complete their life cycles over Basin-scales. This means that having healthy native fish populations in any given river is largely dependent on the health of native fish populations in connected catchments. The Strategy calls for investment in actions that complement state activities and maximise outcomes at local, regional and Basin-scales through coordinated efforts.



# Motivations & Abilities

MOTA Analysis - What do water users want & need?

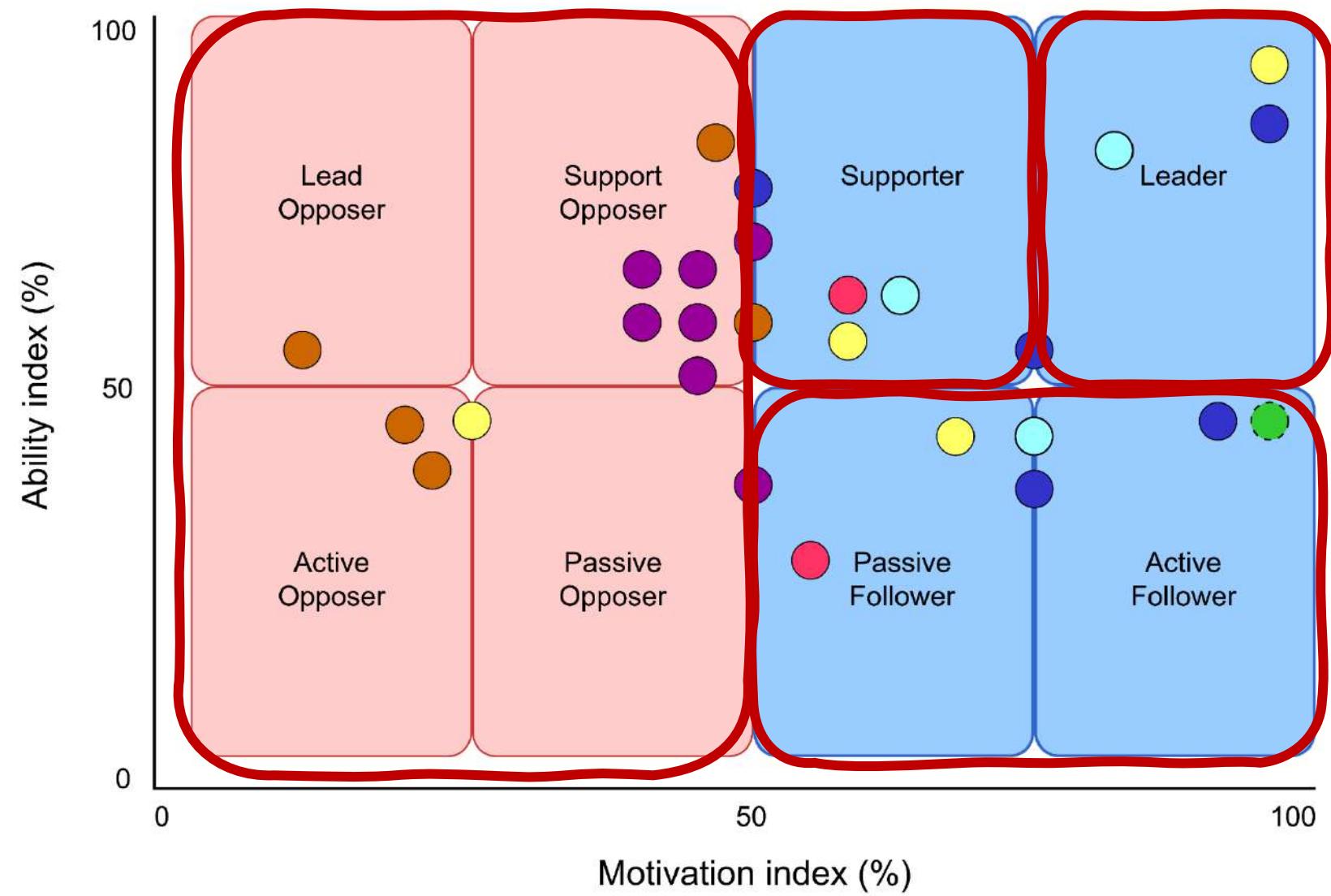








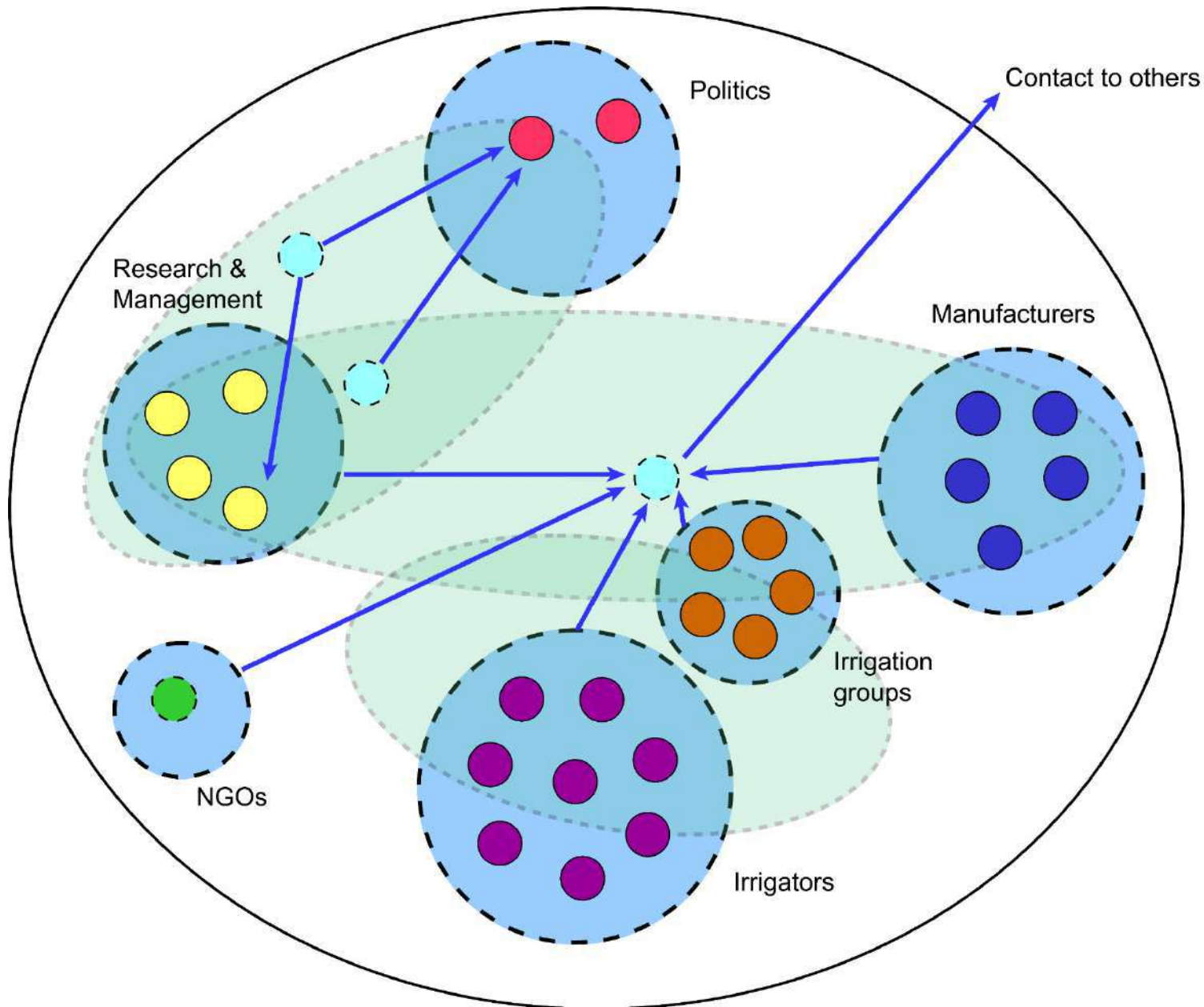
Build capacity



Build consent







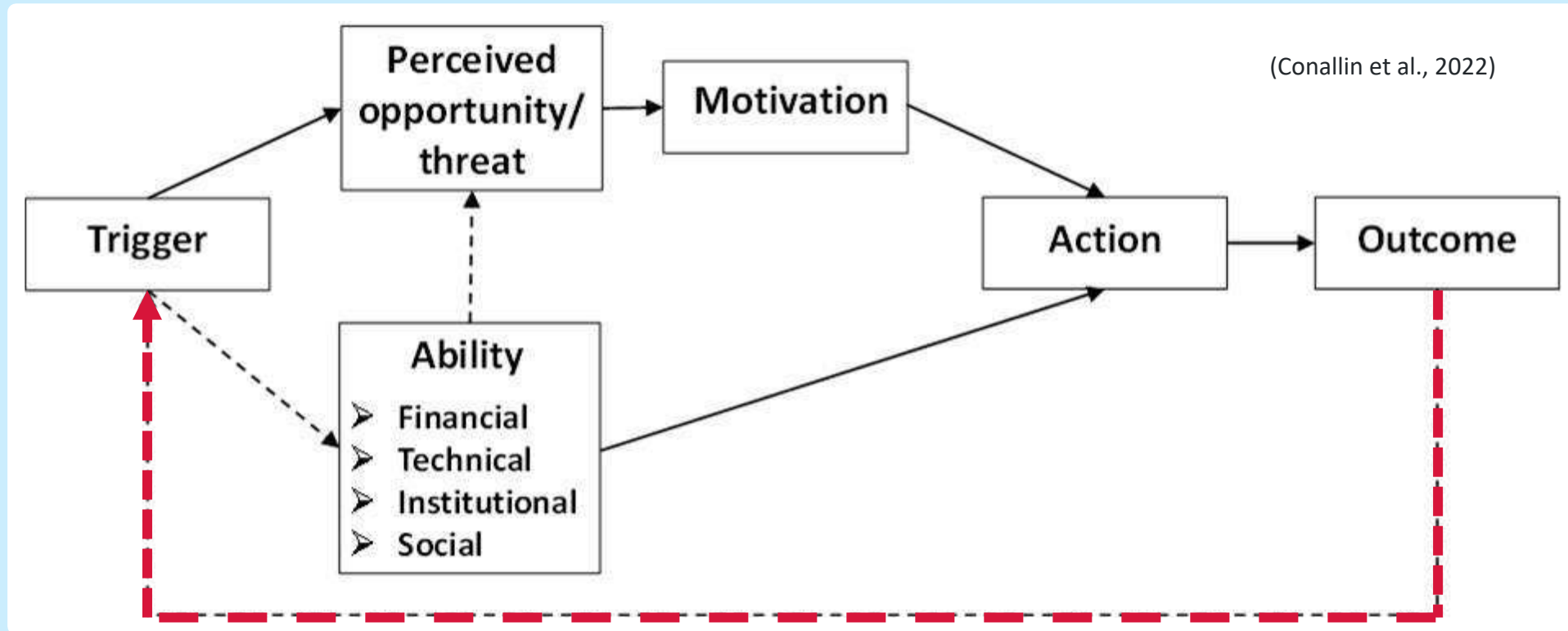
**KEY**

-  Project stakeholder boundary
-  Interest group (bonding)
-  Multi-stakeholder group (bridging)
-  Champion (linking)
-  Decision makers
-  Research & management groups
-  Irrigators
-  Irrigation groups
-  Screen manufacturers
-  Governance & advocacy groups
-  NGOs



# Motivations & Abilities

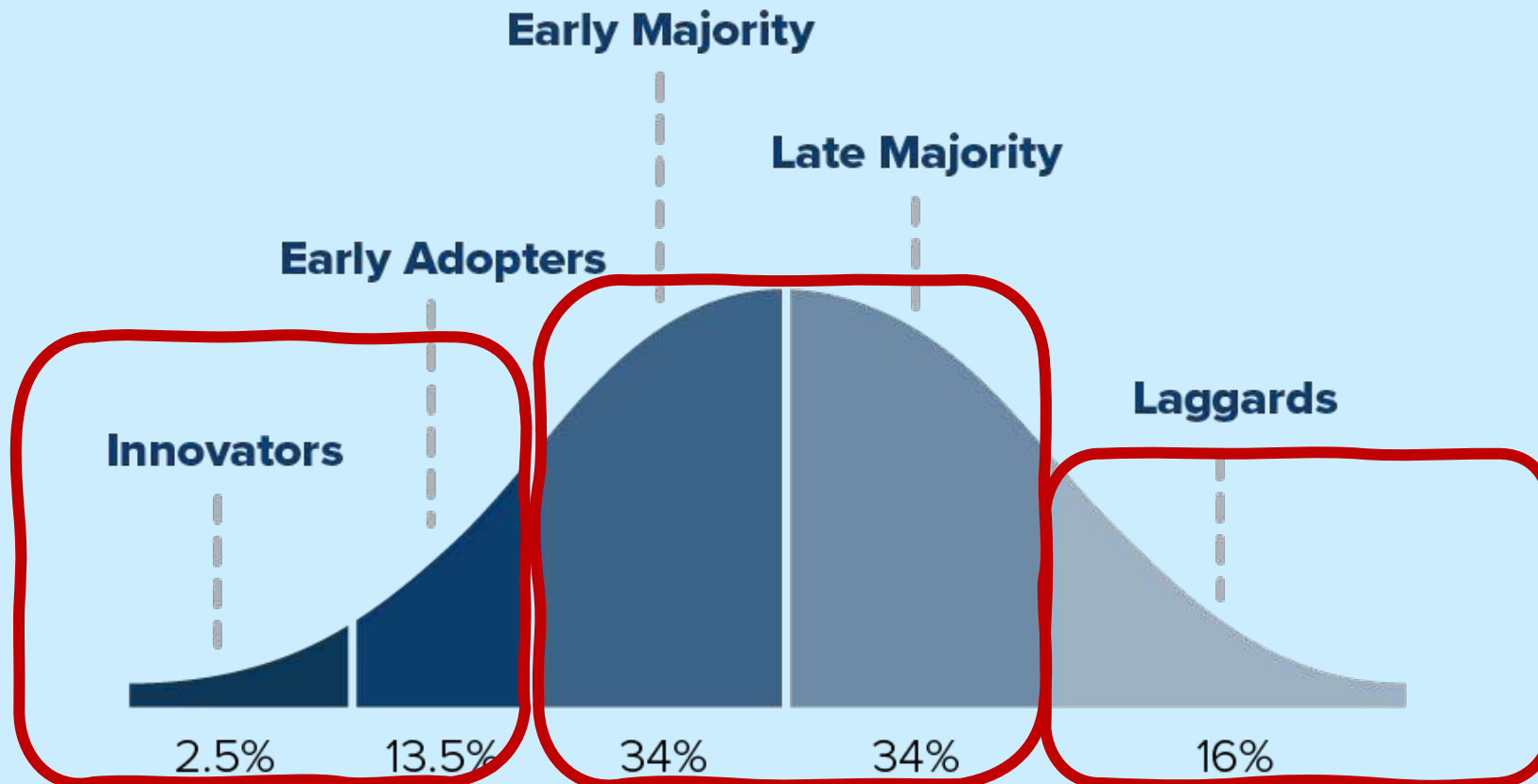
MOTA Analysis - What do water users want & need?





# Diffusion of Innovations

How do people adopt a new technology or behaviour?



(Rogers, 1962)

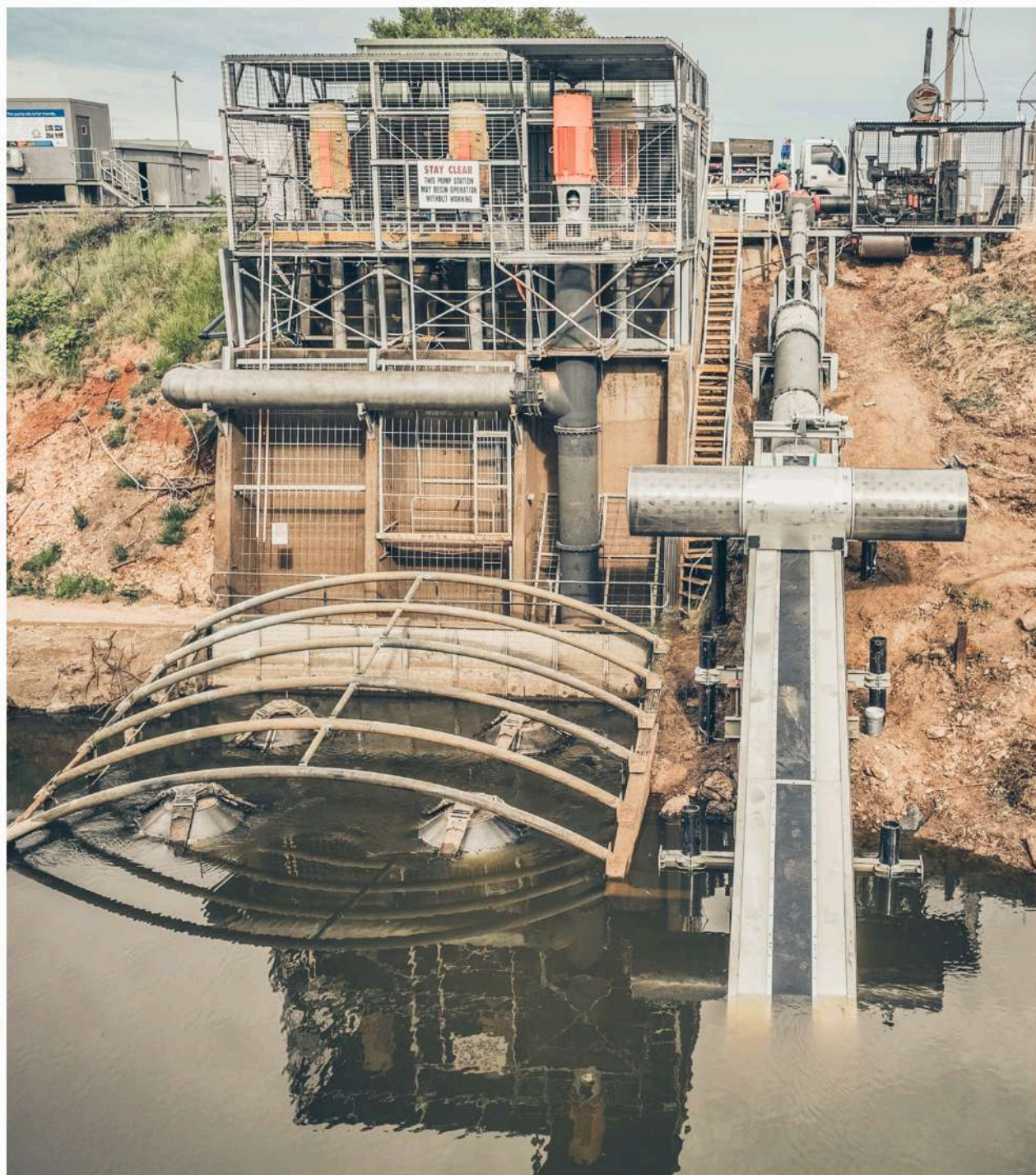




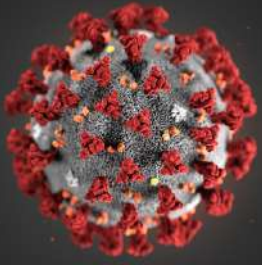








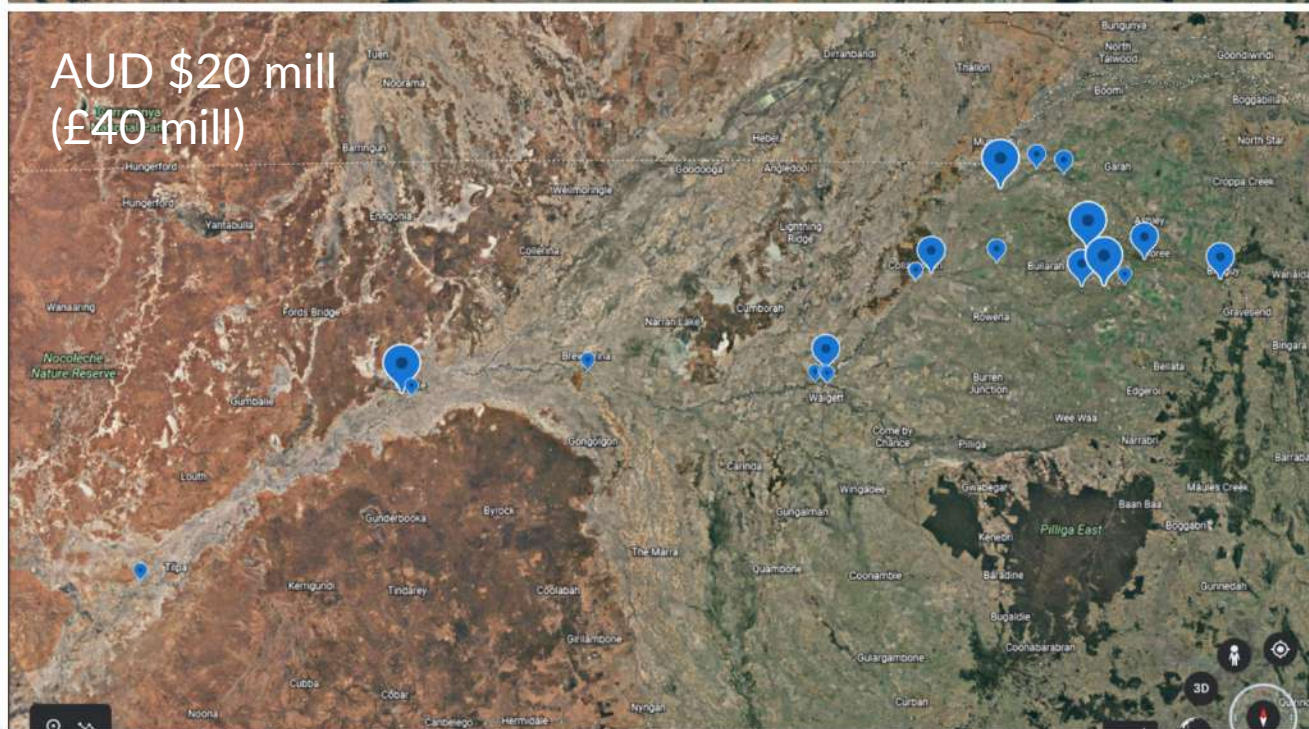




AUD \$13.5 mil  
(£27 mill)

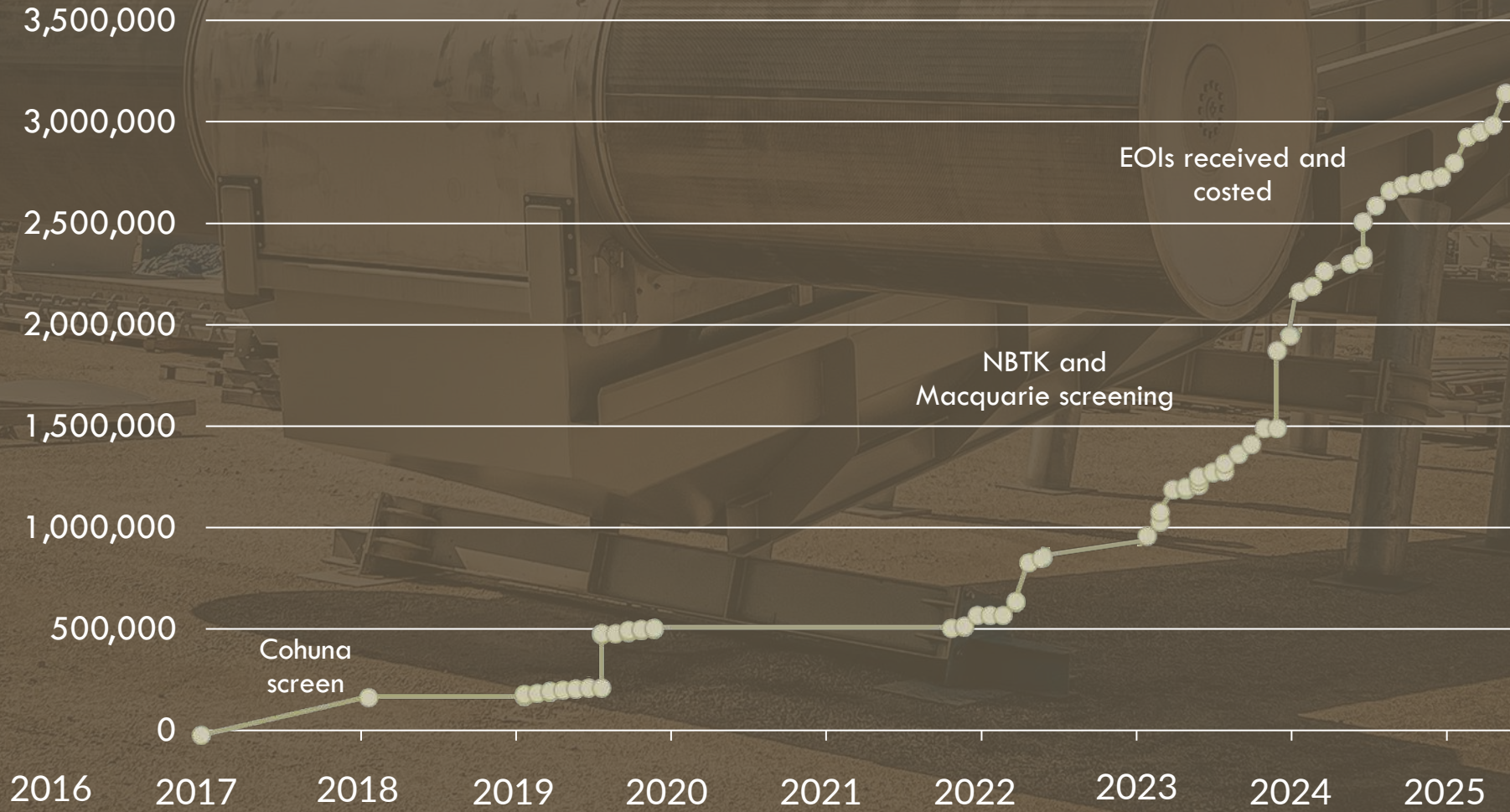


AUD \$20 mill  
(£40 mill)





# Native fish protected per year





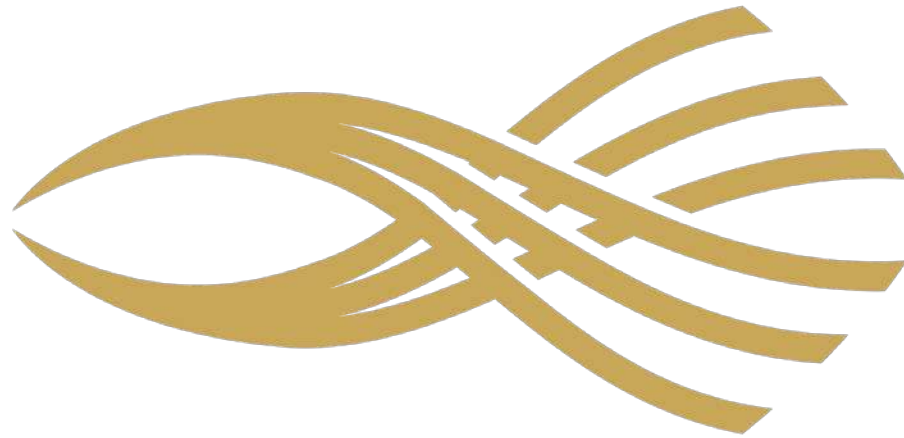




# Challenges ahead

- Who pays? Private versus public funding models
- Where do we prioritise investment?
- Incentivisation versus regulation (or mixed model)?
- How can we supply enough screens to meet demand?
- What do we do when screens reach end of life?
- Expanding into new frontiers – southern MDB, coastal catchments and Western Australia





**FISH SCREENS**

A U S T R A L I A

[www.fishscreens.org.au](http://www.fishscreens.org.au)





## Newcastle Australia

18-21 November  
2024

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