Tri-State Murray NRM
Regional Alliance

Murray Corridor Fish Connections

Native fish in the Murray-Darling Basin have drastically declined in the past 50 years and it's estimated that native fish populations are now at 10% of pre-European levels. More than half of the Basin's fish species are now listed as threatened under state or federal legislation. Without coordinated and large-scale action, we can expect further declines in fish populations and species extinctions.

Murray Corridor fish species most at risk fall into three groups:

RIVERINE SPECIALISTS

Need flowing water for spawning and recruitment (survival of young) and a mix of fast and slow flowing areas, eddies and backwaters for shelter, foraging and habitat at a moderate scale (kms to 10s km). Species include Murray cod and trout cod. Altered flow conditions (e.g. weir pools), habitat loss and overfishing have contributed to the decline in these species.

FLOW PULSE SPECIALISTS

Use habitat over a large scale (hundreds kms) and have spawning and recruitment linked to flow. These species, including golden and silver perch, need to move throughout the stream network for breeding and access to new food resources and habitats, and have been severely affected by instream barriers and altered flow regimes.

FLOODPLAIN SPECIALISTS

Need permanent still or slow water habitats with abundant aquatic plants for cover and breeding. Many of these habitats have been lost with river regulation and the few remaining habitats are subjected to land use pressures and alien fish like carp and redfin perch.

Habitats for these three groups still exist across the Murray River corridor. Some of these habitats are in good condition and have been recognised as 'fish hotspots' e.g. the Menindee lakes and the flowing section of Murray River between Torrumbarry and Euston. These areas require protection, enhancement and connection to new habitats.

Others are 'second tier habitats' that are nearly up to the standard of the 'fish hotspots'. Some of these areas have been previously overlooked for fish recovery. These include parts of the stream that are currently inaccessible for migrating fish, and novel habitats like anabranches and streams used for irrigation water delivery, weir pools that could be operated differently, and farm dams with water security and high-quality habitat. With habitat and flow enhancement, infrastructure such as fishways and species translocations, these habitats could reach their potential.

Finally, there are fish population sinks, such as irrigation channels that are never going to be suitable long-term habitats for native fish.

What is needed?

We want fish numbers to grow and species to extend their range and be resilient to disturbance events. We need to strategically protect and connect the existing high-quality habitats by securing agreement to the management and use of these habitats across the Murray River corridor.



We need to lift second tier habitats with complementary works that build food supplies and shelter, provide linkages and hydraulic diversity, and create options for species resilience in the face of events such as droughts, bushfires and blackwater.

We need to support coordinated environmental flows throughout the southern connected basin and between years to create spawning and recruitment events and then to move the young fish to productive habitats throughout the river network, so they can grow and mature.

We need to prevent fish from ending up in population sinks by screening irrigation channels and pumps.

Why the Alliance?

- Proven track record in delivering large infrastructure and habitat projects for native fish.
- Proven track record of connecting with regional communities and Traditional Owner groups.
- The Alliance operates at the scale relevant to the fish needing recovery and works are prioritised so that projects will deliver the best 'bang for buck'.
- Environmental flow outcomes can be demonstrated at a whole of Murray scale, rather than jurisdictions operating in isolation.
- Rapid knowledge sharing and adaptive management, capitalising on skills, resources and research between Tri-State and partner organisations.

Why now?

- The science behind native fish recovery has come a long way over the past decade. We now know what needs to be done and the scale that is needed to make a real difference.
- We need to take advantage of years of investment into floodplain habitats and water recovery though The Living Murray projects and upcoming Sustainable Diversion Limits offset projects.
- Some species are facing imminent extinction without a swift and coordinated recovery effort.
- Recent fish deaths in the Darling River have highlighted the need for large scale on-ground action and strong partnerships with the community.

With your investment we can achieve:

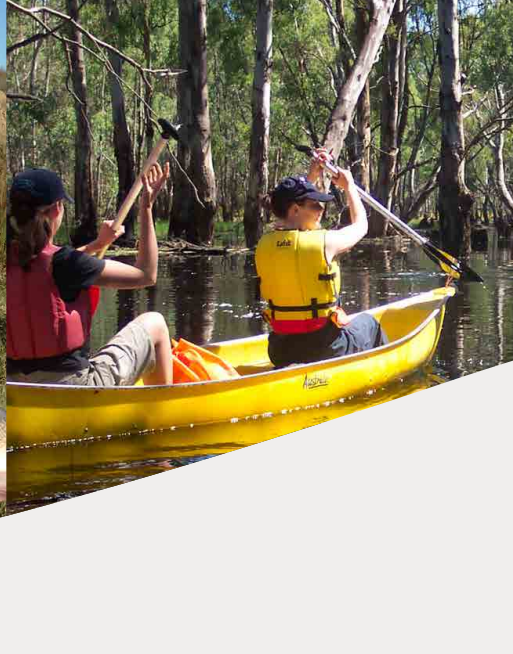
- Recovery of some of Australia's most threatened and iconic fish species.
- Increased recreational fishing opportunities with flow on effects to the regional economy.
- Regional communities and Traditional Owner participation in decision making and employment though the planning and delivery of on-ground works.
- Jobs in rural and regional towns through large infrastructure projects.
- Improved river health and flow on effects to nature-based tourism.
- Benefits to irrigators through fish screens on pumps and channels reducing debris loads and pump blockages and allowing more efficient irrigation practices.

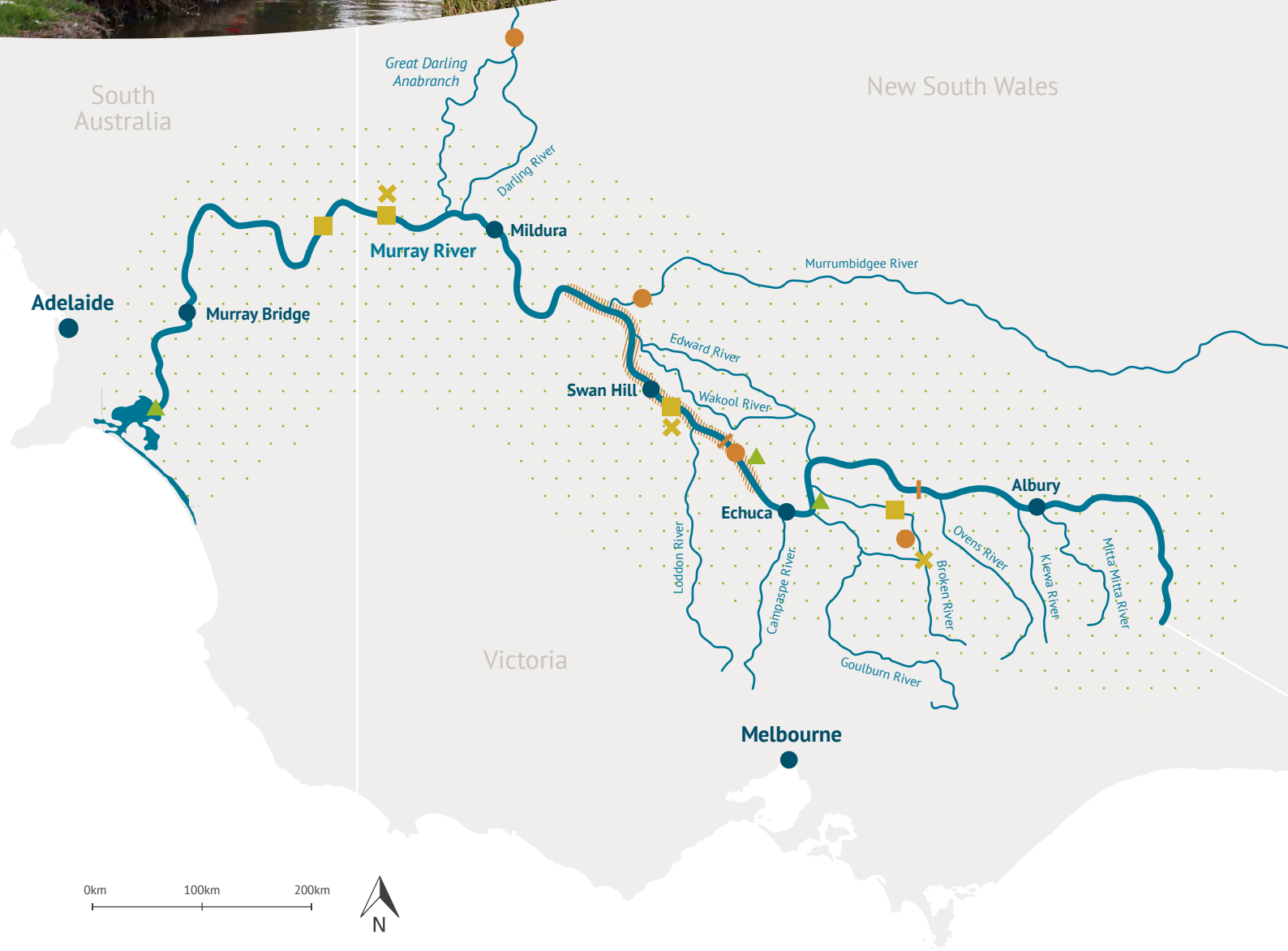
Invitation to partner

The three proposed projects will involve partnerships with local industries, Traditional Owners, and volunteer groups to guide and help deliver the on-ground works. You are invited to strengthen these partnerships and create large scale and enduring changes for native fish in the Murray Corridor.

If your organisation shares the same vision for native fish that we do, then:

- Read the three project briefs.
- Consider the value of the project for your organisation, and the contributions that you could offer.
- Contact the Tri-State Alliance Executive Officer on 0419 130 719 to discuss the possibilities. There may be opportunities to partially or co-fund projects and leverage investment from other sources.





Indicative on-ground works locations for the three fish projects

FLOW PULSE SPECIALISTS PROJECT

- Fishways
- Irrigation screens
- Re-snagging

RIVERINE SPECIALISTS PROJECT

- Re-snagging, rock habitat and re-stocking native fish
- Removal or lowering of redundant weirs

FLOODPLAIN SPECIALISTS PROJECT

- Restored wetlands and re-stocking native fish
- Surrogate habitats
  (Farm dams scattered throughout the Murray Corridor)

Recovery of imperilled wetland specialist fish species in the Murray Corridor

BACKGROUND

Small bodied native fish species that inhabit wetlands were once widespread and common throughout the Murray corridor. Many have suffered extensive declines in range and abundance through habitat loss, altered flow regimes, poor water quality and impacts of alien species such as mosquitofish, carp and redfin perch. All remaining wild populations of Murray hardyhead, olive perchlet, flat-headed galaxias, Yarra pygmy perch, purple spotted gudgeon; and southern pygmy perch face extinction without a timely and coordinated recovery effort from government, industry and the community.

To date, efforts have been restricted to small, discrete projects with limited resources. Resilient, self-sustaining populations are yet to be established at the scale needed for these species to persist in the longer term.

There are two major opportunities for small bodied fish recovery on the horizon: creation of floodplain wetland habitat through Sustainable Diversion Limit projects and the potential release of the carp herpes virus.

WHAT IS NEEDED?

The Tri-State Murray Regional Alliance proposes to recover populations and prevent the extinction of these unique, threatened and often overlooked native fish species in the southern Murray Darling Basin. This is only possible by breaking down jurisdictional barriers, sharing knowledge and coordinating recovery efforts, and sharing fish!

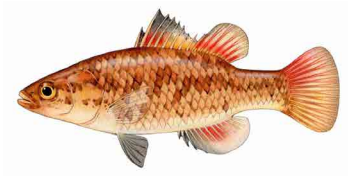
The project will:

1. Develop a southern connected Basin recovery plan for floodplain native fish species.
2. Secure wild and captive populations of six native floodplain specialist fish species across southern connected Basin.
3. Develop protocols for reintroduction, translocation and captive breeding.
4. Assess translocation sites for the target native fish species across southern connected Basin.
5. Protect and enhance habitat at translocation sites.
6. Initiate translocation trials of target native fish species undertaken across southern connected Basin.
7. Produce an online document, collaboration portal and a handbook on how to protect and manage the target native fish species.
8. Foster political and community project champions.
9. Involve communities and Traditional Owners in the conservation of the target native fish species.

OUTCOMES

- Protecting these important native fish species from extinction strongly aligns with government initiatives such as Australia's Biodiversity Conservation Strategy 2010-2030.
- Through recovery of these species, wetland ecosystem functioning, genetic diversity and cultural values will be improved.
- The project will increase government, Traditional Owner and community awareness of and support for conservation of these unique and important species.

Flat head galaxias



Southern pygmy perch

Purple spotted gudgeon

Olive perchlet



Recovery of Murray cod, trout cod and Murray crayfish by restoring flowing habitats

BACKGROUND

Native fish and other aquatic biota can be categorised into two fundamental habitat groups: flowing-water habitat and still-water habitat. One of the most significant impacts for native fish and aquatic biota in the Murray River corridor, particularly in South Australia, has been the loss of flowing-water habitats through the creation of weir pools. All of the biota that require flowing water in the Murray Valley have declined dramatically with some species now extinct in the lower Murray in South Australia.

Flowing-water species only spawn and recruit (survival of young) in flowing water habitats. These species fall into two groups and include some of the most important recreational fish species:

- species that use these habitats over a moderate scale (kms to 10s km), such as Murray cod, trout cod and Murray crayfish; and
- species that use these habitats over a large scale (hundreds kms), such as golden perch and silver perch.

Riverine flowing-water habitats cannot be created by managing environmental flows alone; for example, increasing flows in a weir pool may not change the habitat from still-water to flowing water, whereas lowering a weir pool can increase flowing-water habitat without any need for increased environmental flow. Present river rehabilitation programs such as The Living Murray, Constraints Management Strategy, Murray Darling Basin Plan, and Sustainable Diversion Limits are based on providing environmental flows and floodplain rehabilitation by expanding the area of inundation. These programs only indirectly impact on flowing-water habitats and without a planned strategy of permanently restoring flowing-water habitats and refugia, the future distribution and diversity of flowing-water specialists remains uncertain.

WHAT IS NEEDED?

To complement the Basin-scale rehabilitation programs there is a major opportunity for regional communities in the Murray River corridor to focus on restoring flowing water habitats with the specific objectives of improving biodiversity and aquatic food webs that are an essential part of a functioning river.

The Tri-State Murray Regional Alliance proposes to address this issue by showcasing and evaluating at least three flowing reach demonstration sites throughout the Murray corridor, including:

1. A Murray River weir drawdown site. For example, this might include sections of lock 7, 8 or 9 where background investigations to understand risks and benefits are underway.
2. An improved creek and anabranch system such as lower Broken Creek or Little Murray River.
3. A novel ecosystem such as Bookmark Creek.

The project is broken into two stages and would focus on providing the moderate scale habitats i.e. each reach would be a minimum 10km.

Stage 1

Stage 1 is a scoping study to confirm the three demonstration reaches and develop a project plan with detailed costings. This stage will include stakeholder and community engagement to garner support, contribution and confirm project viability, hydraulic modelling to show that the flow conditions can be achieved for each demonstration, risk assessments, detailed costings for habitat reinstatement works, translocation approvals, irrigation infrastructure works, and a detailed ecological monitoring program.

Stage 2

Stage 2 of the project will see flowing-water habitat restored through weir pool lowering or weir removal, pump infrastructure modification to function at lower water levels, large scale habitat enhancement including re-snagging and rock installation, and where required, translocation or stocking of key species: Murray cod, trout cod and Murray River crayfish. A comprehensive 3-year program of monitoring will be undertaken for all key components of the food web (biofilms through to native fish).

OUTCOMES

- A proven approach to habitat restoration for the iconic flowing-water species that will be used to determine the priority of future works across the Murray River corridor and that can be up-scaled and replicated at other sites throughout the Murray corridor.
- A healthy self-sustaining recreational fishery that supports the growth of national and international tourism, where fishers are attracted to a location for that almost-guaranteed photograph of a large fish. Fishers spend over $1.3 billion annually in the Basin and support around 10,950 jobs. (Ernst & Young, 2011)
- Regional communities and Traditional Owner participation in decision making and employment though the planning and delivery of the on-ground works program.



Large scale recovery of golden and silver perch in the southern connected basin

BACKGROUND

Scientists and managers are increasingly recognising that flow management alone will not recover fish populations in the Murray corridor. Until recently, flow recommendations have been often developed and implemented at the single river, or sometimes river reach scale. Managing flow at these scales is unlikely to address the needs of large-scale channel specialist fish, golden and silver perch, which use habitat over landscape scales of 500-1000km and have spawning, recruitment and dispersal requirements that are linked to flow.

Flows need to be coordinated for spawning and dispersal across systems and into tributaries. Fish need to be able to move past instream barriers into tributary systems to take advantage of food and habitat resources for growth and survival. Creating strong populations throughout areas of the stream network in the southern basin will increase the longer-term resilience of these important species. Stronger and more widely distributed populations would also increase population resistance to or recovery from disturbances such as blackwater.

WHAT IS NEEDED?

This project targets golden and silver perch to increase their distribution and abundance throughout the southern connected Basin by focusing on key life history processes: spawning and recruitment, dispersal to new habitats and growth to maturity in enhanced habitats.

The project builds on the success of recent coordinated 'attractant flow' trials throughout the Murray and major tributaries to disperse juvenile golden and silver perch. For example, through this work, silver perch have returned to parts of the Campaspe River where they were previously rarely encountered. A large program of on-ground works is required to match the landscape scale that these fish operate at, and includes construction and optimisation of fishways, reinstating woody habitat, and screening major irrigation channels where both adult fish and large numbers of eggs and larvae are removed from the potential breeding population each year.

Specific project objectives are to:

- Identify, enhance and protect key spawning sites and protect drifting eggs and larvae of golden and silver perch from irrigation diversions.
- Capitalise on successful spawning and recruitment events with coordinated attraction flows. Review and improve communications and approach for multi-year planning of coordinated flows and expand the approach to other systems (e.g. lower Lachlan, Murrumbidgee, lower Loddon).
- Promote the coordination of environmental water and system scale benefits to golden and silver perch through community events such as the "Mighty Murray Migration" and ongoing media.
- Implement a large scale works program that enhances current strongholds of these species (Murray River from Torrumbarry to Euston) and improves connectivity for dispersal into new habitats for growth and maturation.

The works include:

1. Fishway construction or upgrade at key locations including Koondrook (Gunbower Creek); Balranald (Murrumbidgee River); Menindee storage (Darling River) and Gowangardie Weir (Broken River).
2. Habitat reinstatement including re-snagging at key sites in the Murray River (e.g. downstream of Torrumbarry) and in major connecting tributaries and anabranches including Lower Darling River, Gunbower Creek, Loddon River, Goulburn River, Broken Creek, lower Murrumbidgee River.
3. Prioritising and installing irrigation screens at major gravity fed diversions.
4. Auditing of the performance and operation of existing fishways throughout the southern connected basin and subsequent modification, again with a system scale coordinated approach.
5. Implementing a large-scale science informed adaptive management program for golden and silver perch.

OUTCOMES

- Building on new knowledge and successful coordinated flow events to create resilient populations of golden and silver perch inhabiting more of their former range.
- Delivery of Basin Plan outcomes by maximising the benefits of environmental water through collaboration and system scale coordination. Building community support for environmental water through community and media events.
- Increased recreational fishing opportunities with flow on effects to broader tourism.
- Regional communities and Traditional Owner participation in decision making and employment though the planning and delivery of the on-ground works program.
- Jobs in rural and regional towns such as through irrigation screen design and manufacture, and flow on benefits to irrigators through reduced debris loads and reduced pump blockages, allowing more efficient irrigation practices.

NSW GOVERNMENT Local Land Services

mallee catchment management authority

NORTH EAST CATCHMENT MANAGEMENT AUTHORITY

NORTH CENTRAL Catchment Management Authority
Connecting Rivers, Landscapes, People

GOULBURN BROKEN CATCHMENT MANAGEMENT AUTHORITY

Government of South Australia
South Australian Murray-Darling Basin Natural Resources Management Board