

Talking fish



Making connections with the rivers
of the Murray-Darling Basin

Authors

Jodi Frawley, Scott Nichols, Heather Goodall and Liz Baker.

Queensland content in association with Zafar Sarac and Greg Ringwood.

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Project steering committee

Terry Korodaj (MDBA), Cameron Lay (NSW DPI), Zafer Sarac (Qld DEEDI), Adrian Wells (MDBA Community Stakeholder Taskforce), Peter Jackson (MDBA Native Fish Strategy advisor), Fern Hames (Vic DSE) and Jonathan McPhail (PIRSA).

Project Team

Scott Nichols, Cameron Lay, Craig Copeland, Liz Baker (NSW DPI); Jodi Frawley, Heather Goodall (UTS); Zafer Sarac, Greg Ringwood (Qld DEEDI); Hamish Sewell (The Story Project); Phil Duncan (Ngnulu Consulting); Terry Korodaj (MDBA); Fern Hames, Pam Clunie, Steve Saddlier (Vic DSE); Jonathan McPhail, Virginia Simpson (PIRSA); Will Trueman (researcher).

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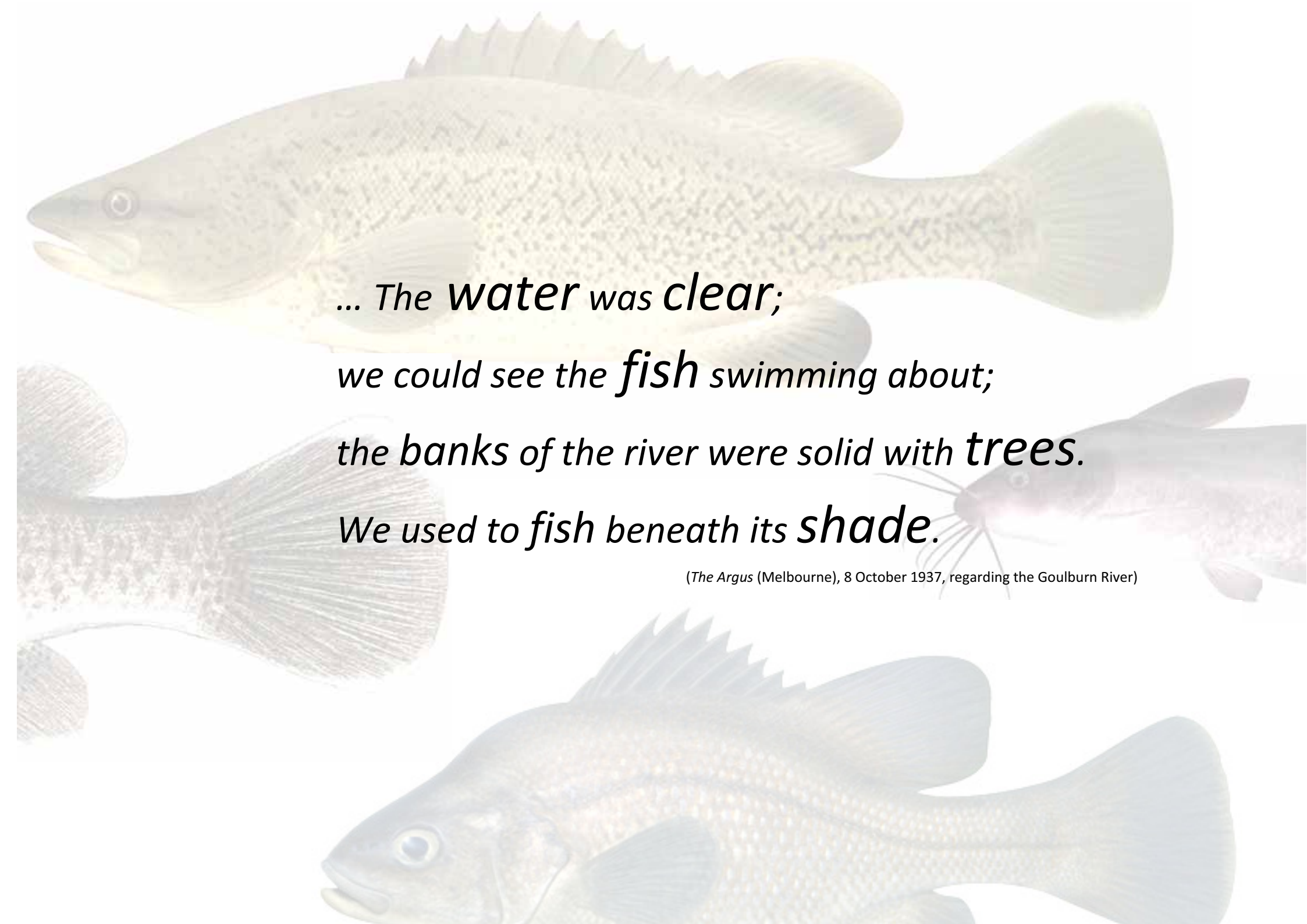
Note: The term *Talking Fish* is also being used by the Australian River Restoration Centre as a way of sharing knowledge about people's connection to fish and waterways.

Readers are warned that this publication may contain the names and images of Aboriginal people who have since passed away.

Photo credits (L-R): Wentworth Historical Society (at 'Kalcurreha', donor: Patsy Crozier; 2007-29-1-8), Scott Nichols, Jodi Frawley, Trish Johnson, Scott Nichols. Fish images: NSW DPI.

Abbreviations

DPI	Department of Primary Industries
PIRSA	Primary Industries and Resources SA
DENR	Department for Environment and Natural Resources (SA)
SARDI	SA Research and Development Institute
LAP	Local Action Planning Association
MDBA	Murray-Darling Basin Authority
DSE	Department of Sustainability and Environment (VIC)



*... The **water** was **clear**;
we could see the **fish** swimming about;
the banks of the river were solid with **trees**.
We used to fish beneath its **shade**.*

(The Argus (Melbourne), 8 October 1937, regarding the Goulburn River)

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Coorong and Lower Lakes

Participants: Brian Schulz, Terry Sim, John Yelland, Tracy and Glenn Hill, Garry Hera-Singh, Henry Jones, Sally Grundy and Dean Tugwell.

Advice and field support: Virginia Simpson, Phil Duncan (Ngnulu Consulting), Jonathan McPhail.

Katarapko

Participants: Howard Hendrick, Barry Porter, Tracy Bye, Kingsley Abdulla, Todd Goodman, Malcolm Wilksch, Gilli and Gladys Stoneham and Peter Teakle.

Advice and field support: Virginia Simpson (Rural Solutions SA), Phil Duncan (Ngnulu Consulting), Jonathan McPhail (PIRSA).

Lower Darling and the Great Anabranch

Participants: William Riley, Bill Lever, Rod Stone, Jenny Whyman, Dr Clayton Sharpe, Carmel Chapman, Bill and Elaine Grace, and Trish Johnson and her family.

Advice and field support: Phil Duncan (Ngnulu Consulting).

Murray

Participants: Dr Wayne Atkinson, Gavin Vale, Dennis Lean, Wally Cooper, Marg Crago, David Green, Colin Green, Hayden Green, John Douglas, Richard Kennedy, Ken Strachan, Kelli Cunningham, Merilyn Strachan, Peter Tidd, Graham Ellis, Jody and Harry Liversidge and J.O. Langtry.

Advice and field support: Phil Duncan (Ngnulu Consulting), Dr Wayne Atkinson, Charlie Carruthers.

Goulburn

Participants: Dr Wayne Atkinson, Ken Gilmore, Mick Hall, Donny Richter, Kaye Gibb, Gary Gibb, Don Collihirole, Geoff Vernon, Ron Bain, Jim Hanley, Hayley Purbrick, Wally Cubbin, John Douglas, Daryl Sloane and Jody Liversidge. Thanks also to Hartley and Noel Briggs, Doug and Laelia Rogers, Jenny Sheilds, John Koehn, David Chalmers, Rolf Weber, Roy Patterson, Ern Holloway, Keith Jones, John Mackenzie and Ray Donald.

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Ovens

Participants: Tom Cameron, Lyell Hogg, Ollie Evans, Gary Daws, Keith Snowden, Greg Sharpe, Adam Pascoe, Pat Larkin and Ron Dawson.

Advice and field support: Phil Duncan (Ngnulu Consulting), Fern Hames.

Upper Murrumbidgee

Participants: Dick and Gay Lawler, Bryan Pratt, Adrian Brown, Darren Roso and Sue and Vern Drew.

Advice and field support: Luke Johnston (ACT), Phil Duncan (Ngnulu Consulting), Charlie Carruthers (NSW DPI).

Namoi

Participants: Joe and Pearl Trindall, Eric and Carol Hannan, Spider Cunningham, Jason Simpson, Robert Horne, Tim and Mandy Gavin, Doug and Jacqui Jamieson and Darcy Harris. Thanks also to Helen and Gordon Cain.

Advice and field support: Phil Duncan (Ngnulu Consulting), Milly Hobson (NSW DPI), Anthony Townsend (NSW DPI).

Upper Darling: Brewarrina to Bourke

Participants: Gordon Brown, Phil Sullivan, Phillip Parnaby, Dwayne Willoughby, Feli McHughes, Mick and Barb Davis, Alma-Jean Sullivan, Cathy Simpson, Keith Coleman, Max Jeffrey, Brad Steadman and Joe Flick.

Advice and field support: Phil Duncan (Ngnulu Consulting), David Cordina, (NSW DPI), Anthony Townsend (NSW DPI).

Paroo

Participants: Colin and Beryl Leigo, Douglas MacGregor, Ron Heinemann, Ron Gardiner, Colin (Tud) Murphy, Fay and Donald Cooney, Gordon Warner, Kevin Eastburn, Lorna McNiven, and Paul Wheeler.

Advice and field support: Hamish Sewell (The Story Project), Greg Ringwood (Fisheries Queensland).

Culgoa - Balonne

Participants: Ned and Lynette Underwood, Roy and June Barker, Keith Codrington, George Thomas, Robert (Bob) Worboys, Rory Treweek, Margaret and Peter Peterson, Robert Lacey, Michael Anderson, Pat Stephens and Pat Cross.

Advice and field support: Hamish Sewell (The Story Project), Greg Ringwood (Fisheries Queensland).

Upper Condamine

Participants: Sam Bonner, Noal Kuhl, Brian Kuhn, Dessie Obst, Geoff Reilly and Olive and Ray Shooter.

Advice and field support: Hamish Sewell (The Story Project), Greg Ringwood (Fisheries Queensland).

The rivers of the Murray-Darling Basin

The rivers and creeks of the Murray-Darling Basin flow through Queensland, New South Wales, the Australian Capital Territory, Victoria and South Australia. The 77 000km of waterways that make up the Basin link 23 catchments over an area of 1 million km².

Each river has its own character yet these waters, the fish, the plants and the people that rely on them are all different.

The chapters in this book are about how the rivers, fish and fishing have changed. The main stories are written from oral history interviews conducted with local fishers in 2010-11, and relate individuals' memories of how their local places have changed. They showcase three ways of knowing a river: personal experience, scientific research and historical research.

Just as individual fishers do not always agree with one another, so their understanding might not necessarily agree with current scientific information or historical records. Similarly, specific items and events might be remembered differently by different people. These varied perspectives show the range in views about fishing and the rivers, each important in its own way.

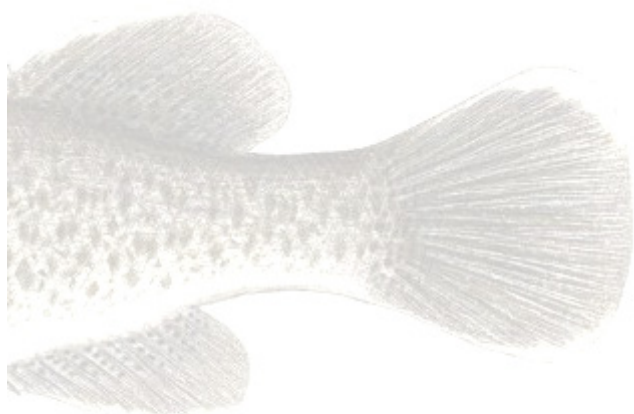
There are many other great stories out there about fishing in the Murray-Darling Basin. These are just the beginning.



Figure 1: The catchments of the Murray-Darling Basin.

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1. Introduction

Annie and Jack Koolmatrie learnt to fish in the Coorong and Lower Lakes of the Murray River where they were born in the 1910s.¹ They travelled up and down the Murray River, picking fruit, working on farms and camping with other Ngarrindjeri families beside one of the many creeks or wetlands.

As they fished around the river, lakes, wetlands and creeks they observed the habits of fish and the places that they lived, learning from their parents and grandparents as they went. By watching the movement of the reeds and water plants, they learnt to spot the giant Murray cod whose tail would break the surface of the water as it was feeding. Jack ran nets for mullet and congolli with his grandfather in the Coorong and at the end of a day's fishing they would sing songs for the Ngarrindjeri Sea-Country. Together they fished for food, fun and recreation.

Another life lived on the river is Jack Ryan's, who learnt to fish in Victoria in the 1880s.² He trekked around the streams and rivers in his spare time, experimenting and observing the habits of fish and the places they lived.

He had what he called 'blank days' when he caught no fish and others when he brought home loads of fish to share with his family and friends. By the time he mastered the art of angling he knew that to catch the illusive Blackfish, the now rare Macquarie Perch, he needed to use the common earthworm or the little green mud-eyes to tempt this shy fish out of hiding.

By fishing in all seasons, he learnt about the thunderstorms and floods and how there was a distinct window that would mean he could bring home a sugar bag full. If the water was a little churned up one of Jack's favourite fish would come out in shoals. But the conditions had to be exactly right - when a fresh came and the waters muddied - not when the flood was raging, nor when it was receding.

Having spent years fishing alone and learning to read the river Jack joined the local Angling club. By 1909 he had won ten gold medals and fifteen first prizes. As an older man, he took the time to teach young fishers what he knew about fishing and fish, and the rivers they depended on.



Fishing a river – it's about family and cultural traditions, catching food, relaxation and sport. This photo shows Alma-Jean Sullivan fishing near Bourke, NSW. Photo: Photo: Philip Sullivan.



Many people have fond memories of fishing as children. Photo source: John Douglass.

This book is about people, like Jack and Annie Koolmatrie and Jack Ryan, who live alongside and fish the rivers of the Murray-Darling Basin. It tells part of the story about the people, fish and rivers of the Basin and how they interact and influence each other. It's about how rivers, fish and fishing have changed and about how people are working to bring the rivers back to life.

Each chapter in this book captures some of the observations and the memories of fishers across the Murray-Darling Basin. It also draws on other types of records, including historical accounts and scientific studies to provide both context and insights into the changing health of the rivers and their fish.



Catch and release fishing is one of the changes to fishing that people talked about. Photo source: Jason Simpson.

The Basin

The Murray-Darling Basin is an iconic feature of the Australian landscape. It covers an eighth of the continent, crossing the borders of five states or territories. It is made up of twenty-three river valleys, each with tributaries, billabongs, backwaters, creeks and wetlands. There are Alpine streams that freeze solid every year, ephemeral desert rivers that might not flow at all for years at a time as well as rivers with deep and wide channels carrying thousands of megalitres of water a day.

This complexity of shape and flow provides many different habitats. Our native fish evolved to use these habitats and flourish with the natural extremes of drought and flood.

Despite all its diversity, the Murray-Darling Basin is a connected whole where events and changes in one area can have devastating consequences on rivers, fish and people downstream.

Past stories tell of clear water and vast shoals of fish, such as recorded in Thomas Mitchell's diary in 1835 while on the Darling River:³

The water being beautifully transparent, the bottom was visible at great depths, showing large fishes in shoals, floating like birds in mid-air.

We don't see this now.

Many things, from the over-allocation of water resources, poor land management planning and the expansion of primary production, have contributed to a decline in river health.

What we see now is a Basin that has only one-tenth of the fish that it once had.

One fish that people have noticed decline across the Basin is the eel-tailed catfish. This is one of the many fish that fishers remembered as being more plentiful before dams were built, widespread intensive agriculture or the arrival of carp. They also remember freshwater mussels, water snails and other small creatures that they don't see anymore.



Silver perch were once common across the Basin. Photo: Fisheries Victoria.

Stories relating to twelve rivers across the Basin are profiled in this book. The chapter number is shown in brackets. Moving upstream, the stories start in South Australia: the Coorong and Lower Lakes (2), where it all meets the Southern Ocean, and Katarapko Creek in the Riverland (3).

Crossing the border into New South Wales: the Lower Darling and the Great Anabranch (4) and the mainstem of the Murray River between Corowa and Echuca (5), part of the border between Victoria and New South Wales. Into Victoria: the Goulburn (6) and the Ovens (7). Then back into NSW: Upper Murrumbidgee (8), Namoi (9) and the Upper Darling between Brewarrina and Bourke (10).

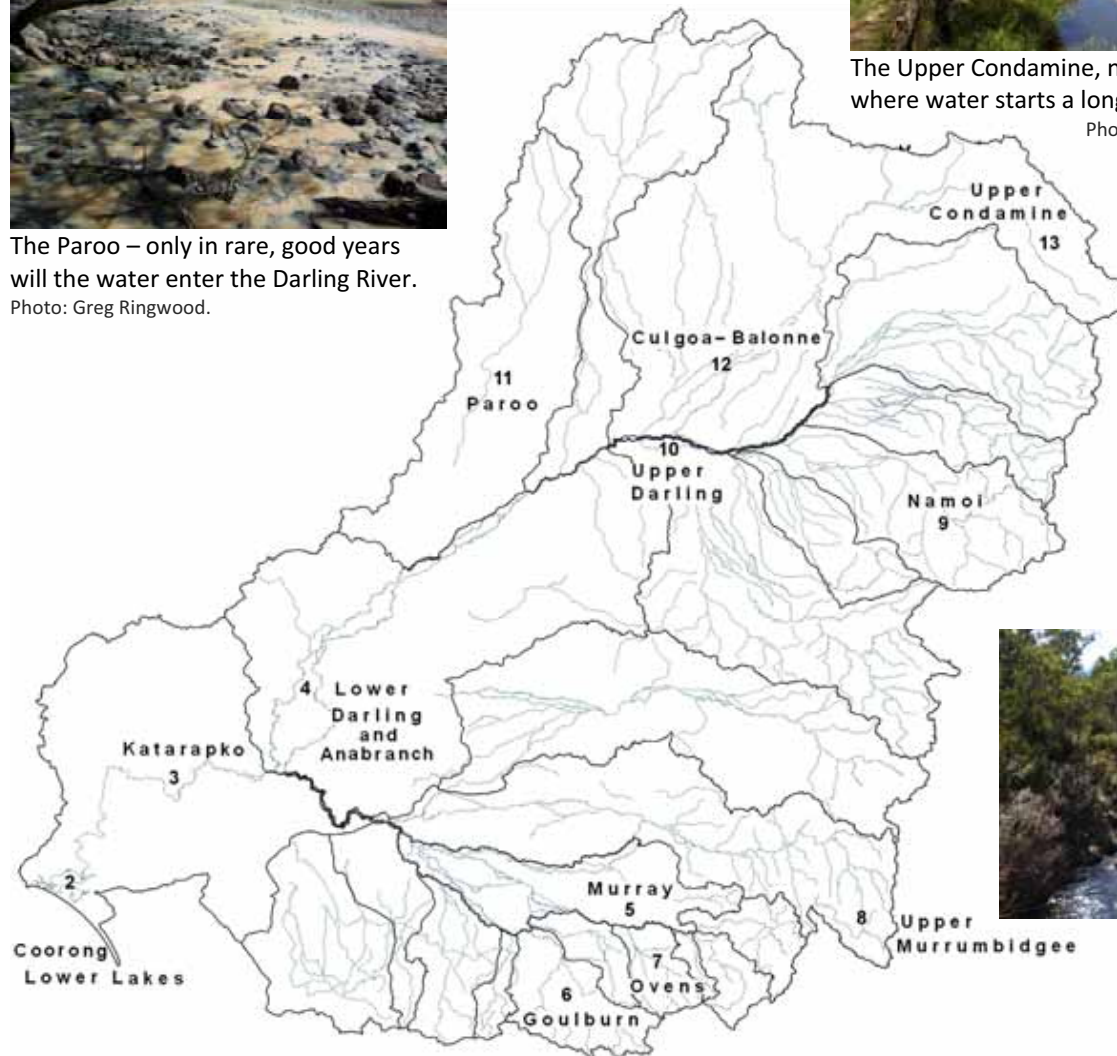
North west to the Paroo (11) in Queensland, then east to the Culgoa-Balonne (12) and the Upper Condamine (13).



Where the waters of the Murray-Darling meet the sea: the Coorong, where the stories in this book start. Photo: Jodi Frawley.



The Paroo – only in rare, good years will the water enter the Darling River. Photo: Greg Ringwood.



The Upper Condamine, near Warwick, Queensland, where water starts a long journey to the sea. Photo: Greg Ringwood.



Alpine streams add snow melt to the waters of the Murrumbidgee. Photo: Charlie Carruthers.

Fishing

Fishing has always been a common activity for people who live in the Murray-Darling Basin. In some families there are generations who have spent time next to a river, watching it, fishing and enjoying being outside, in nature. Hours spent comfortably alone or with family and friends, being taught to fish, fishing and teaching in turn. For the Aboriginal peoples of the Basin, the rivers, fish and fishing are an integral part of who they are and their culture.

Whether fishing for relaxation, for food or as a social activity, fishers have experienced change in their rivers and the fish they catch. Some know what they catch is different from what their grandparents caught. People new to the Basin or to fishing might not realize that what they see now is not what the rivers were, nor what they could be.

People featured in this book are among those who want to see the rivers healthy and the fish flourishing once more. Their visions of what the rivers could be and their descriptions of the sorts of things they are doing are part of the rich story of fishing throughout the Basin.



Pearl and Joe Trindall, with their nephew Phil (centre). Photo: Jodi Frawley



Donny Richter. Photo: Jodi Frawley



John Aston. Photo source: John Aston

The fishers you will meet in this book come from all walks of life. They share their memories of fishing and of the changes they have seen in the many and varied parts of the Murray-Darling Basin.

These fishers are among the 430,000 who fish the waters of the Basin.⁴ Some fish for relaxation and some for food. Others fish or fished commercially. For some, fishing is part of who they are. Over their lives, the reasons for fishing might have changed, and what was once a food-on-the-table necessity has become a recreation. This book includes people who fish for many different reasons and covers a range of perspectives.

For Aboriginal peoples throughout the Basin, fishing has remained a central part of community life.^{5,6} The location of many of the missions and reserves on or near rivers enabled Aboriginal people to supplement the meagre diets and rations of the postcolonial era. Fishing is also part of continuing traditional interactions with country and riverbanks remain important places for gathering and storytelling.

Growing up fishing

Growing up fishing is an important part of many fishers' stories. In Aboriginal communities, this has largely been because of the enduring role of women as fishers for food, accompanied by children and teaching them Country in the process.^{7,8,9}

In non-Aboriginal communities, women often had the strongest memories of fishing during the years when their children were young. The river was a cool and enjoyable place to take children to play in the heat of summer, to learn to swim and to fish. During this time in women's lives, their relationship with the river and fishing was intense, but as their children grew then their relationship to fishing also changed.¹⁰

Growing up fishing led some of these children to take up careers that kept them close to the rivers, either as commercial fishers in the Coorong and other areas, or as scientists studying fish or ecology or conservation.

Work and the rivers

Working on or near rivers contributed a lot to people's knowledge of rivers and of their fish ... as well as providing many different opportunities to go fishing!



Working with stock around the Paroo River meant sometimes meant 'droving' by boat! During the floods in 1935 and 1936 drovers had to use boats hauled by hand across the river to get stock to safety. Knowing when and how the rivers flooded was an integral part of living and working around these rivers. Photo source: Colin Leigo.

For some like Joe and Pearl Trindall, droving stock for months at a time meant getting to know the rivers and the floodplains so they could keep the stock healthy and have fish for dinner. As a young married couple in the 1940s they learnt how, where and when water flowed, during drought and flood.

The Trindall's main observation now, comparing the Namoi river system today with the experiences they had as young drovers, is that there is far less water available.

The Namoi is also one of the many rivers that have had snags removed – to improve navigation and as a misguided attempt to improve water flow. Previously this was accepted practice and resnagging was considered heresy. But many fishers, like Bryan Pratt whose story is in the Murrumbidgee, know that snags are a good place to catch fish - he says:

we knew snags were important because when you go fishing for Murray cod ... you home in on the snags. That's where the fish are.



A Murray cod at home amongst the snags. The majority of Murray cod are found within one metre of a snag. Photo: Craig Copeland.

J.O Langtry was both a fisher and a scientist. He says that over the two years working as a biologist in 1948-49 he learnt a lot as he talked to anyone who fished – whether they did it as a hobby, for a living or as a poacher.

They were all for him a source of knowledge about the river and how it was changing. In particular, he stressed that as a scientist, he learned most about fish because he DID the fishing. As he explained, emphasising some things very strongly:¹¹

So, the thing about it is not just to go and LOOK at the river, it's to go and WORK it. To handle it, to DO it! It's the only way.

How people fished has changed over the decades. Many of the fishers profiled here talked about how they, and others, have changed the gear they use, the techniques and their overall approach.

Handing down the stories

Although the collective memory of the people interviewed did not reach further back than the 1930s, in some instances people told stories handed down from generation to generation.

In more recent times, one of the key changes identified by fishers is that there has been a shift in attitudes from 'taking it all' to 'catch and release'. Where once it was common and unremarkable to catch huge hauls of fish, this practice is now frowned upon by most fishers, whether they fish the Upper Condamine at the top of the system or Lake Alexandrina, right down near the mouth.



Tethering (top) was once commonplace and common sense in an age when many fished for food and before refrigeration. Catch and release (below) has become much more the usual since the late twentieth century and tethering is frowned upon. Photo, top: NSW DPI. Photo source, below: Barry Porter.



While the techniques have changed, fishing remains an important aspect of family and community life. Most people we spoke to learnt to fish as part of the life of the family.

What was surprising was that mostly it was not their mothers or fathers who taught them to fish. Instead, they learnt alongside cousins and siblings from other members of their extended families: uncles and aunts and grandparents. For some fishers, grandparents now themselves, the opportunity to teach their grandchildren to be responsible fishers is both welcome and taken seriously.



Colin Green and his grandson, Blake. Fishing is a part of family life. Photo source: Colin Green.

Part of who we are

Aboriginal communities in the Murray-Darling Basin have related but slightly different experiences of familial relations and extended family. Fishing and trips to the river are interwoven with storytelling and learning their culture and interactions between elders and youngsters. Riverbanks are places where creation stories were retold and children are introduced into Aboriginal ways and responsibilities for Place.

This idea of being responsible for the river and its fish is an important one for many Aboriginal people. Feli McHughes, one of our interviewees, has said about the Brewarrina Ngemba Billabong, on the Upper Darling River:¹²

Our billabong is significant to our culture, our well-being, our value, Baiame's healing, Australia's reconciliation healing, Australia's environment, Australia's conservation and restoration.

The rehabilitation of a place like the Brewarrina Billabong will benefit the community and the fish, plants and other living things that live in the billabong itself and all the waterways it's connected to.



Top: Fish traps, Brewarrina. Photo: Philip Sullivan.

Middle: Alma Jean Sullivan, a renowned local fisher. Photo: Philip Sullivan.

Bottom: Ngemba Billabong. Photo: Feli McHughes.

Carp

One of the stories that will be handed down to generations to come is the arrival of carp.

Some of the fishers interviewed could remember rivers before carp and have vivid memories of their arrival. Others have never known a river without them. Several fishers observed that the carp do well because the river system has changed with the building of dams and weirs, increased siltation and less variable cycles of dry and flood. They also see how carp contribute to these changes, through their feeding habits and competition with native fish.

Most lament the introduction of carp, and some like Dougie McGregor from the Paroo would be happy to see those responsible 'shot'. Others have learnt to use them in various ways. Baarkantji woman Jenny Whyman recalls how she was taught a recipe for pickled carp from her Yugoslav uncle.



Large congregations of carp can be common after floods. Nathan Reynoldson.

The feelings about other introduced fish are more ambiguous. Trout fishing has a long history in Europe and North America. These fish were introduced into Australia to provide a familiar sport fishing experience for European migrants. In particular, fly-fishing for trout was enjoyed by middle and upper class and were the focus for the first fishing clubs and tournaments in Australia. It was believed that native fish were decidedly not sporting fish. This started to change in the mid-twentieth century and now lure and fly-fishers will regularly target native species.



Bill Austin giving would-be fly fishers a distance casting demonstration at Eildon in 1945. He is handling 30 yards of line with an Australian-made cane rod. Photo source: Mick Hall.

Trout and other species like redfin, roach and tench have always been seen as good eating fish and there are many people who lament the decline of redfin from the 1980s onwards.

New stories

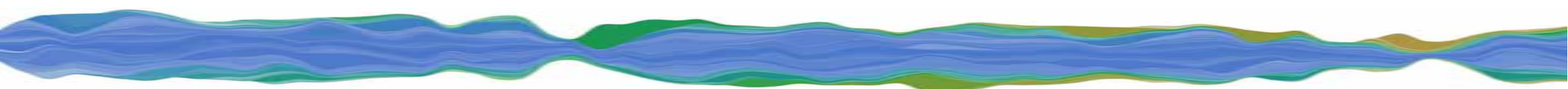
Whether it's catfish or carp, catch-and-release or set lines, the regulation of flows or not, the people we spoke to told stories of changes to rivers and to the type and numbers of fish. If we reflect on 150 years of change, can we imagine a Darling River clear to a depth of 30 feet? A Murray River with tens of thousands more snags, each with a Murray cod or a trout cod nearby? A Coorong teeming with mulloway, flounder and congolli?

There are fishers who remember the rivers differently than they are today. These are their stories.

Top: Allowidgee, pictured fishing using a bark canoe and reed spear in a way common to Yorta Yorta men, Photo source: State Library of South Australia, SLSA: PRG 422/3/704.

Middle: Fly fishing. Photo source: Jim Hanley.

Bottom: the next generation. Photo: NSW DPI.



The Talking Fish project

The *Talking Fish* project arose from an increasing realisation that many different groups of people, including fishers, Indigenous communities, tourists and landholders have developed unique relationships with the rivers of the Murray-Darling Basin. There is also the growing recognition that the health of the Murray-Darling Basin is at risk.

By accessing and recording different people's stories about their experiences of a river, its fish and how both have changed will contribute to our collective knowledge and help shape future management decisions. These stories also have the potential to give people a sense of just what these magnificent rivers and their fish were once like - and could be again with ongoing rehabilitation efforts.

The *Talking Fish* project focussed on 12 reaches within the following rivers: Namoi (NSW), Upper Condamine River (Qld), Katarapko Creek (SA), Upper Murrumbidgee River (NSW / ACT), Culgoa - Balonne Rivers (Qld / NSW), Paroo River (Qld), Goulburn River (Vic), Lower Darling River and the Great Anabranch (NSW), Ovens River (Vic), Mainstem Murray River (NSW / Victoria), Upper Darling River (NSW) and The Coorong and Lower Lakes (SA).

The *Talking Fish* project is a starting point to share local knowledge and learned experience with others to improve the health of the Murray-Darling Basin. Project information is available at: www.mdba.gov.au and www.dpi.nsw.gov.au/fisheries/habitat.

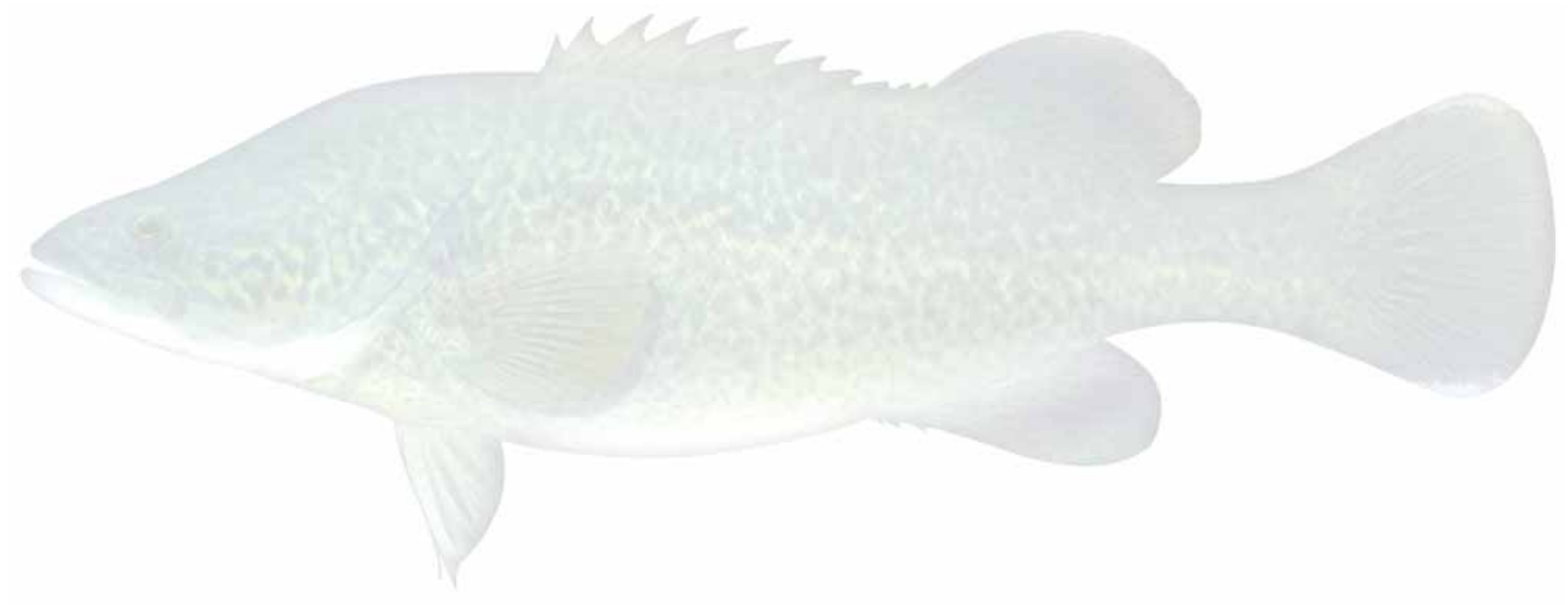
Aboriginal names usage note

The attempts of early European settlers to translate the names of Aboriginal nations and language groups into English led to variations in how these names were spelt. Local Aboriginal people often prefer particular spellings. Where an interviewee has a preference, this is used in their profile.



Many special people contributed to the stories in this book and are listed in the Acknowledgements. Some were profiled and others were not, but all contributed stories and photographs. Some of the people who weren't profiled are shown here.

From left to right, starting at the top row: Ken Strachan, Graham Ellis, Peter Stid (Murray); Robert Horne (Namoi); Robert Lacey (Culgoa-Balonne); Tim Gavin (Namoi); Bill Grace (Lower Darling); Pat Larkin (Ovens); Geoff Reilly (Condamine); Trish Johnson (Lower Darling); Gill Stoneham (Katarapko); Doug and Jacqui Jamieson (Namoi); Unc and Max Jeffrey (Upper Darling); Gary Sharpe (Ovens); Jim Hanley, Don Collihole, Jeff Vernon, Keith Jones (Goulburn); Mick and Barb Davis (Upper Darling).



Coorong & Lower Lakes

11



Source: Garry Hera-Singh.



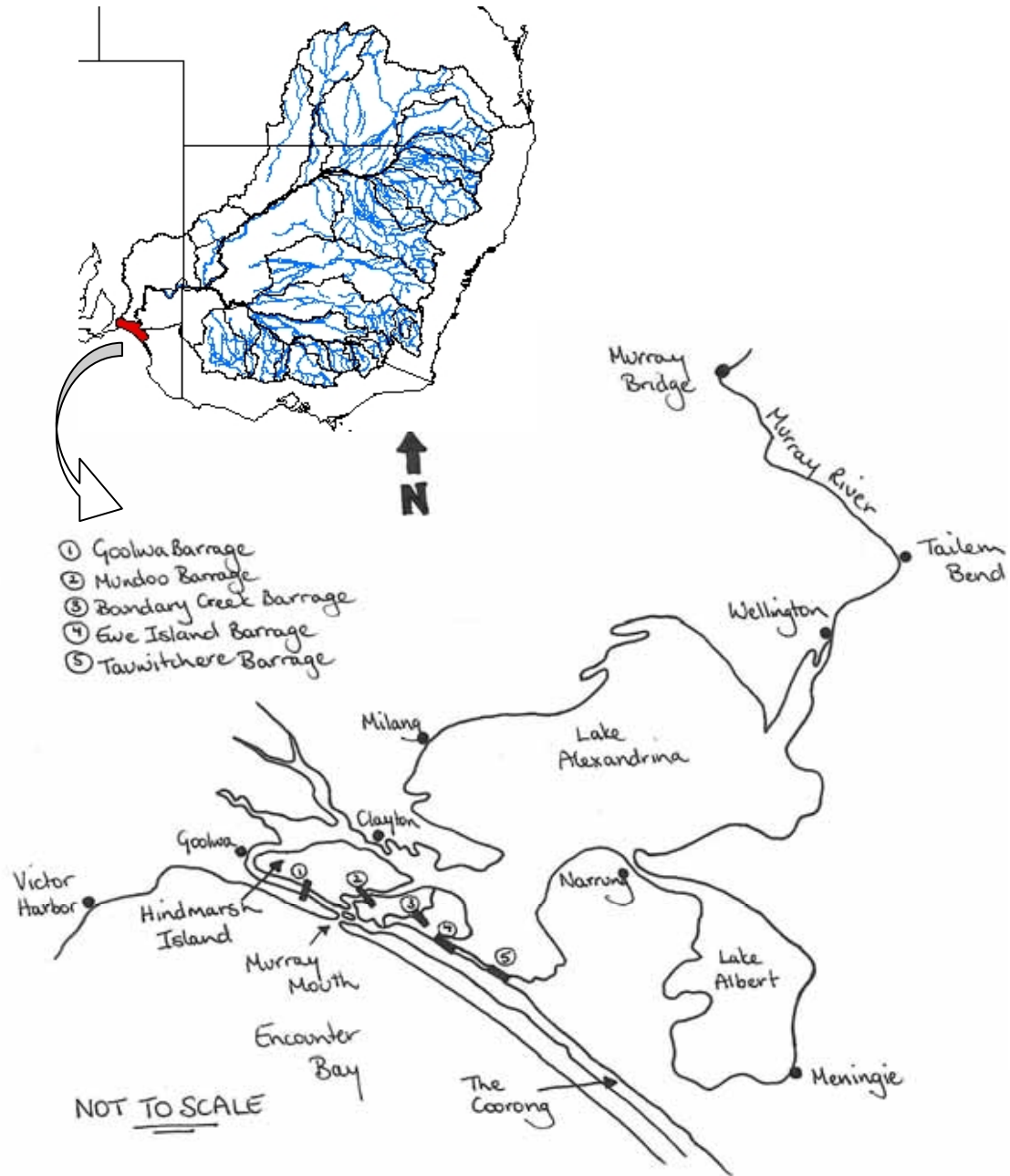
Source: Jodi Frawley.



Source: Garry Hera-Singh.



Source: Jodi Frawley.



Brian Schulz came to love the River Murray and its fishing from family holidays when he was a child. So, he moved to Murray Bridge! Photo source: Brian Schulz.



Terry Sim (left) and **John Yelland** (right) were born within three days of one another. As youngsters, they explored the banks of Lake Alexandrina and have continued this love of the wild as adults. Photo sources: Terry Sim and John Yelland.



Tracy Hill is an active member of the Southern Fishers Association. She is proud that the commercial fishery operating in the Coorong and Lower Lakes is recognized as a sustainable fishery. Photo: Jodi Frawley.

*And my grandfather used to tell me about the **weeds** growing in the river, and they'd watch that. And a **big fish** would come in there and of course you could see the movement. When he's feeding, the **Murray cod**'s tail would always come to the top. I've seen it myself – the tail, **the big tail**.*

Ngarrindjeri woman Annie Koolmatrie, born 1917, recorded in 1979 by Bonita Ely¹



Introducing the river and its people

After gathering water from 23 river valleys, the Murray empties into Lakes Alexandrina and Albert before making its way to the Coorong and out the Murray Mouth to Encounter Bay in South Australia. The entire Murray-Darling Basin is upstream. Everything that happens there affects what goes on here.

Wind is almost a constant here. Nothing separates this unique piece of Australia from Antarctica and the full brunt of the Southern Ocean.

Yarluwar-Ruwe: Sea Country

The River, Lakes and Coorong are part of the traditional lands of the Ngarrindjeri people. These waters provided food and featured in their stories.

The *Ngarrindjeri Nation Yarluwar-Ruwe Plan* retells how the Lower Lakes and Coorong were created by Ngurunderi and Pondi, who came from the upper reaches of the Murray River.



The Murray Mouth – where the Murray-Darling Basin meets the sea. Photo: Jodi Frawley.

A long, long time ago Ngurunderi our Spiritual Ancestor chased Pondi, the giant Murray cod, from the junction where the Darling and Murrundi (River Murray) meet. Back then the River Murray was just a small stream and Pondi had nowhere to go. As Ngurunderi chased him in his bark canoe he went ploughing and crashing through the land and his huge body and tail created the mighty River Murray. When Ngurunderi and his brother-in-law Nepele caught Pondi at the place where the fresh and salt water meet they cut him up into many pieces, which became the fresh and salt-water fish for the Ngarrindjeri people. To the last piece Ngurunderi said 'you keep being Pondi' (Murray cod).²

The coming of the Europeans

As well as being uniquely affected by changes upstream, the Lower Lakes, Coorong and their fish have been shaped by the people who came to live here and of the industries that developed. Sheep and cattle grazing, commercial fishing and tourism have all brought new people into the area, with new needs and new ways to catch its fish.

The Lower Lakes and Coorong that Charles Sturt found when he completed his journey down the Murray River to the mouth in 1830 was a tidal place, one big estuary where both salt and fresh water fish could be found. The Lakes only became salty during droughts. The shores provided good watering points for the sheep and cattle that followed in the 1840s.

Ngarrindjeri people worked in these pastoral activities, sharing their intimate knowledge of the Lower Lakes and Coorong with the newcomers. Fishing in the salt, estuarine and fresh water yielded a range of different fish for all to enjoy.

In 1853 the *SS Mary Ann* and *SS Lady Augusta* kicked off steam and paddle boat travel on the Murray and Darling Rivers, making Goolwa a key inland rivers port.

Professional fishermen worked the Lower Lakes and Coorong, moving between campsites dotted around the shores and the satellite towns of Milang and Goolwa. Professional fishing numbers swelled when other work in the area dropped, especially during the depression years of the 1890s and 1930s.³



A commercial fisher on the Coorong. Photo source: Garry Hera-Singh (Photo notes Courtesy of Tony Gardner).



James Carruthers, with his grandson Des, netting congolli in Narrung Narrows in 1940. Photo source: Garry Hera-Singh (Photo notes Courtesy of D and J Ayres).

Clayton

In 1910 the Surveyor General of South Australia laid out the township which was to be gazetted as Clayton. It was hoped that it would become another thriving foreshore community like Milang, 30kms around on Lake Alexandrina.

That didn't happen until professional fishers Henry and Gloria Jones arrived in the 1960s, joining the only other resident – a man living in a cave with 20 cats.

Henry and Gloria built a house and then a little shop where they sold fresh fish caught out on the Lakes. In 1974, they opened a restaurant and deli that they called 'Yabby City', selling their fishing hauls direct to the public.

The little town grew around them, becoming a drawcard for tourists. Henry remembers: It was a really busy little restaurant for 25 years.

We had coaches, boats and helicopters bringing people in: the whole works!

River regulation in Victoria and New South Wales meant that by the early twentieth century the Lower Lakes were saltier than they had been in the past. Five barrages were built at Goolwa, Mundoo, Boundary Creek, Ewe Island and Tauwitchere by 1940, changing the Lower Lakes again. The Lakes were now permanent fresh water.⁴

Now, the barrages separate the freshwater from the salt and the Lakes from the Coorong. Flows from upstream have declined so much that in recent years a dredge has been used to keep the Murray Mouth open to the sea.

Today the pulsing of the fresh and salt water has ended. Continued low flows from upstream have meant the southern end of the Coorong has become up to five times saltier than the sea and is at risk of ecological collapse. Once a place where both salt and fresh water fish moved with the different waters as they flowed backwards and forwards through the system, the fish are now struggling to cope.

Brian Schulz – The original ‘Fantastic Fisherama’



Brian Schulz was born 74 years ago and grew up in the Barossa Valley. His family ventured across to the Swan Reach on the Murray River where they holidayed in a shack near Lang’s Landing.

Fantastic fisherama

Brian so loved his fishing that he moved to Murray Bridge to be closer to all the best spots in the river. He was enthusiastic about getting people together and spreading the word about recreational fishing.

I used to run a fishing competition called Fantastic Fisherama and that was a very, very popular fishing competition. We had up to 790 contestants at Walker’s Flat one year back in the ‘70s. We went up to Big Bend in later years, and that’s a lovely place up there. Always good fishing.

All sorts of fish

Brian has caught all sorts of fish from the river over his life time: callop, silver perch, catfish and carp. But he has seen some fish disappear from the angler’s repertoire – for

better and for worse. Tench, another fish introduced from Europe, is one example.

We used to have tench years ago. Sometimes they would be up to three or four pound. We didn’t eat them though, they were too bony. But they have died out since the carp came in and took over.

Cod story

Brian’s all-time favourite fish is the Murray cod.

They’re so beautiful, they’re so docile, they’re such a marvellous species of fish. I don’t believe in slaughtering them or killing them. We had commercial fishing in South Australia until a few years ago. We had a big petition drawn up and collected something like 28 000 signatures and we took them to parliament through Mr Peter Lewis and eventually the commercial sector in the Murray River was closed. I think recreational fishers also need to stop catching cod. I’m against lure fishing for Murray cod. I feel, don’t target ‘em, leave ‘em alone.

Recently the South Australian government has moved to a catch and release policy for Murray cod, where they must be returned to the water.

Murray cod

(*Maccullochella peelii* – Cod, Codfish, Pondi)



Photo: Gunther Schmida.

- Largest Australian native freshwater fish, growing to 1.8m and 113kg (average 40cm)
- Found around deep holes, woody debris (‘snags’) and overhanging vegetation or rocks
- Ambush predator eating other fish, crustaceans, molluscs and frogs
- Migrate in Spring – often migrate hundreds of kilometres upstream with water level rises
- Males guard the eggs which are laid on logs or rocks
- Listed as ‘Vulnerable’ in Victoria and by the Commonwealth, catch and release only in SA



Photo: Luke Pearce.

Across the Murray-Darling Basin, fishers talk of a story about the map of the cod's birthplace imprinted on their stomach lining. Brian heard this story from an Aboriginal man he knew, Mr Hunter.

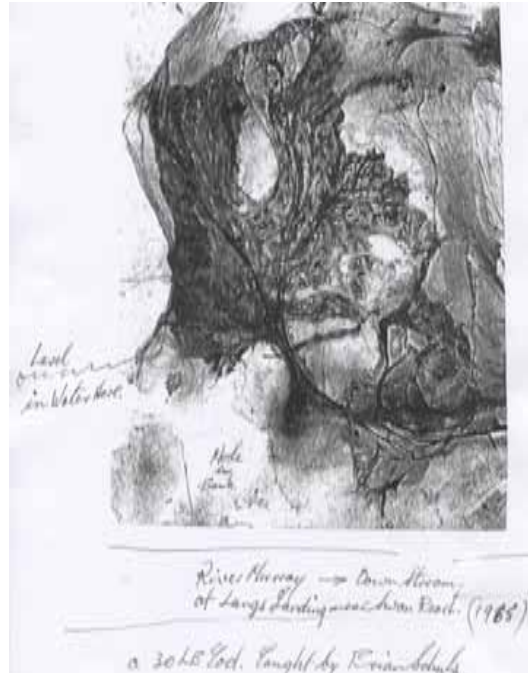
Like most fishers, he was skeptical. So he set out to find some proof, one way or the other.

I caught a cod, gutted it and cut open the stomach. When I saw the lining of the stomach, I held it up to the light and there was the tree in front of me. There are hundreds of trees in the Murray but this particular tree has got a particular lean on it, so I recognised it. A lot of people today don't believe me. But that doesn't bother me. I know the truth, I've got it there in writing. You can't do any more than that.

Tall tales and true

They catch some big fish at the bottom of the Murray system, Brian explains.

I was fishing and I had this huge bite and I started to reel it in and another fish came along and took the fish that I was reeling in. And then I started to reel that other fish in and he's hangin' on to the first fish and another fish came along and took the back fish, so I had three fish on the one hook. And just got them all to the boat and the cord broke and I lost the lot!



The stomach lining of a Murray cod showing Brian where the fish he caught was born. Source: Brian Schulz.

Salt in the fresh

Brian lives approximately 60 kilometres from Lake Alexandrina and has witnessed the problems of the Lower Lakes and the Coorong since the mouth of the River first closed in 1981. While he acknowledges that there are problems with hypersalinity in the Coorong, he also thinks fishers need to know about the salt in the River itself and how it affects what is happening downstream.

There is a lot of salt on the cliffs in this part of the Murray. The river gets salty because of the irrigation that's coming from the cliffs. Over time the water seeps back down into the river. It becomes very saline downstream. They've opened up the Barrages at Goolwa at the moment and a lot of that salt's gone out of the mouth. It's good it's washed out.

John Yelland also worries about the accumulation of salt from upstream water use and farming practices.

Salt interception schemes

Rising salinity is an issue throughout the Basin.

One option being used to address increases in salinity is Salt Interception Schemes (SIS). SIS use bores to capture saline groundwater and pump it to disposal basins before it reaches the river channel. Disposal basins are a large distance from the river and minimise the potential for salts to re-enter the surface waters.

The first SIS was built at Curlwaa in NSW in 1973. Sites in SA include Waikerie, Woolpunda and Loxton, Bookpurnong, Pike River, Murtho, and Chowilla.

At Morgan, the level of salinity is now about 25% less than it would have been without the schemes.¹²

For more information on this and other options being used to control the Basin's salinity see www.mdba.gov.au.

One of the things you certainly can't argue against in the Guide to the Proposed Basin Plan is the estimated two million tonnes of salt per year washing into the river. Where is it going? It has to go out to sea otherwise it's just going to fill the river up. I think everybody understands we need to deal with the salt.

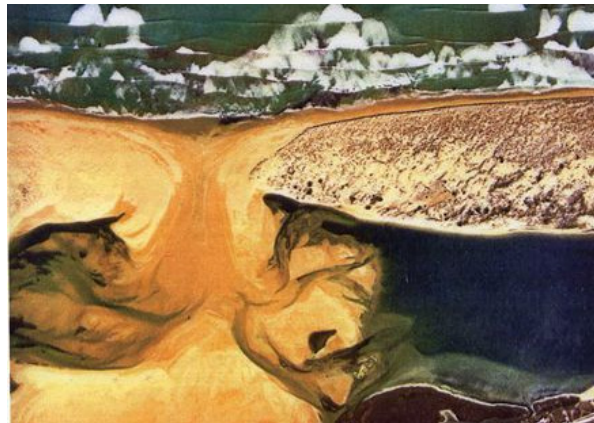
One of the paradoxes of the Lakes, says John, is that they are freshwater with saline swamps all around them, fed partly from the salt deposited by past flooding.



Big fish and lots of fish. Top: a catch that included a large mullaway. Photo source: Garry Hera-Singh (Photo notes Courtesy of Tony Gardner).

Henry Jones is a professional fisher who lives at Clayton on Lake Alexandrina. He thinks that the lack of flows are related not just to the drought, but also to the lack of freshes that would have helped to clear the salt in the past.

The big floods rarely happen now. I think '92 was the last one around this way, but we never get those intermediate ones anymore. Those little floods. They're pumped into dams and used for irrigation or critical human needs. Unless we can get those medium flows to flush the salt out through the sea, then this area will continue to die. I mean we can see it dying.



The Murray Mouth in April 1981. It was completely silted up, effectively separating the immense Murray-Darling River system from the ocean. Image source: Garry Hera-Singh.

The barrages

European settlement of the Murray-Darling Basin has altered the Coorong and Lower Lakes. Before settlement the Lakes were predominantly fresh, but during periods of low flow they are believed to have become brackish for short periods as seawater intruded into the Lakes.

As settlement expanded locally and across the Basin, land use changed and extractions increased. The intrusion of seawater became a greater issue such that by the early 1900s the increasingly salinity made it more difficult for locals to utilise the lake water.

By 1940 five barrages were built: Goolwa, Mundoo, Boundary Creek, Ewe Island and Tauwitchere - forever changing the connectivity, hydrology and ecology of the area.



The construction of the barrages in the 1930s was welcome work for many men. Fishing was important both to supply food and to take back to Adelaide and sell on their work breaks. Photo source: Garry Hera-Singh (Photo notes Courtesy of Leta Packman).

Terry Sim & John Yelland – Mates on the Lakes



Terry Sim (left) and John Yelland (right) were born within three days of one another in 1952. They were destined to be mates, although Terry grew up in Milang and John on Point Sturt. John's family owned a mixed farm that included a small dairy, and Terry's father did the milk can run every morning from the local farms to the butter factory at Milang.

As youngsters, they both explored the banks of Lake Alexandrina, fishing, picnicking, and searching for wildlife along the wind swept shores. Nowadays they continue to explore the area as members of the community group, the Lakes Hub.

Although there was plenty of water, John explains fishing was a challenge when he was a young boy.

Our part of the lake, the corner down at Point Sturt is very shallow. When the water

was out recently, it was nearly two kilometres out and it shows it is a lot of flats. So fishing there wasn't very good. Uncle Graham next door, he and his brother were keen fishermen. John particularly was keen. They had a decent sort of boat and outboard motor there for a while.

Yabbies and magic

Terry's family loved to yabby. And when they did, more than the family tucked in at the end of the day.

Everyone yabbied. If you wanted a feed of yabbies you went out and got your own. And you'd get enough yabbies to do a couple of copper-fulls. Coppers were used for boiling water that clothes were washed in. And at home we had a pergola that was covered in grape vine. The table would come out under the grapevine and the copper would start up for the yabbies. As a six or seven year old kid it was almost like magic because people just used to turn up. You didn't know how they got there but the gate would open and a couple of cousins and an aunt would come in. By the end of the day there'd be 15 or 20 people sitting around the table all eating yabbies.

Yabby fishery

(*Cherax destructor*)



Photo: Charlie Carruthers.

- A commercial yabby fishery operated in Lake Alexandrina from 1970-75
- In 1972 and 1973, in excess of 100 000kg per year of yabbies were removed – this equates to about 2 million yabbies per year
- The yabby population in the Lake has not returned to the high levels of the 1970s¹⁰



Today's good haul of yabbies does not come close to what was once available in the Lakes. Photo source: Brian Schulz.

Acid sulfate soils

Over the millenia, the sediments of the Lower Lakes have developed iron sulfide minerals from natural organic carbon and sulfate in an oxygen-free environment. With a decline in water levels, these materials are exposed to air, oxidise and form sulfates. When re-wetted, sulfuric acid is produced and toxic metals such as aluminium may be released.

In March 2009, when the water levels were very low (-1.4m AHD (mean sea level) or more than 2m below normal lake level) some 20 000ha of these sediments were exposed around the lakes. Potential acidification of the whole Lakes system was feared.

Most aquatic life needs a minimum pH of 6 to survive, but acidified water can be as low as pH 2, although it is often around pH 4. Fish and other creatures will try to avoid acid water, but if they can't, fish kills may occur. Acid water can have other negative effects to fish like damaging their skin, reducing their growth and reducing the ability of fish eggs to hatch. Acid water is also high in aluminium which is toxic to most fish, damaging their gills and leading to suffocation.⁸

Luckily, only small areas of shoreline showed serious acidification. Some aerial spreading of fine limestone was used to assist with neutralising these areas. Other areas were deliberately kept inundated with water following the construction of earth 'regulators' at Clayton and Narrung. As a result the waters remained greater than pH 7 and no fish kills were observed.

With much interest focused on the area, a Milang community initiative, the Lakes Hub, was formed to connect Government with enthusiastic and committed local groups. Community and agency monitoring and bio-remediation programs are ongoing.¹³

Acres of ducks

Terry knows that the wildlife in the Lakes was once measured differently than it is now.

I've talked to the grandson of one of the families who were professional duck shooters. And the ducks were on the lake in huge rafts. They didn't count the ducks in 200 or 300, they said, there's four or five acres of duck. That's how big the mobs were.

Terry and John explained how the abundance of birdlife also tells a story of Lakes thriving with the sort of feed that was also great for the fish.

Originally the Lakes were fresh, and in some places the ribbon weed, Triglochin, was two miles into the water. Then on the shore there were reeds, and then there were swamps and lignums behind them on the plains. And that water reed was where the invertebrates lived. The old fishermen and duck shooters say that there was a tiny little snail that lived in the water weed. I think they're more like a cockle or mussel than a snail. When the water weed was killed off by the sea water intrusions, that little snail died and then the ducks disappeared.

Little things lost

Henry Jones came to Clayton on Lake Alexandrina in the 1960s. He agrees with Terry and John that the devastation of the small animals in the system has effects for all the animals.

Little things like spiral snails. The swans used to live on them, and the musk ducks and the blue billed ducks, and the widgeon, the grebes. All those diving ducks. I used to throw an anchor in the water for ten minutes and pull it up and it was just covered in these snails. They're not there anymore.

Historically, about 18 species of snails lived in the River Murray in South Australia but natural populations of nearly all of these have declined.



Source NSW DPI.

Notopala sublineata hanleyi, was thought to be extinct in South Australia until it was discovered in irrigation pipelines in the Riverland region.

Notopala spp. produce 'miniature adult' babies and so require high protein, low carbon diets. River regulation is thought to have encouraged carbon rich algae in stable weir pools, meaning these snails don't get enough of the right food.¹¹

Terry thinks that the changes to the Lakes reach back into the nineteenth century – when non-Aboriginal people first settled in South Australia.

There was an inspector of fisheries in the late 1800s who wrote a report to say that the Coorong was going saltier than it was before. He also detailed how black bream, which were a major fish in the past, had almost disappeared and the mullet were taking over. So, even as early as 50 years after settlement things had seemed to change down the Coorong. With the salt water coming into the Lakes more and more, the cod and the callop disappeared back up stream and the mullet and the mulloway came in from the sea.

Prior to their construction the barrages were seen as the solution to the problem of increasing salinity. A Letter to the Editor of *The Advertiser* (Adelaide, 31 May 1915) states:

What is the position to-day? The lakes have been lower throughout the year than at any period known to white men ... [T]he encroachment of the sea water has gradually increased. It culminated in the storm ... [which] drove the water back, and allowed the inrush of sea water ... One of its effects was to destroy in Lake Albert one of the finest spawning grounds for cod in this State. ... A barrage would have prevented this ...

Mulloway for isinglass

Mulloway, a saltwater fish, has always been a popular fish for both professional and recreational fishers. It is also a favourite of the Ngarrindjeri people. Terry points out that in the early days not all fish were caught because they were good to eat. The dried swim bladders of some fish were used as isinglass, a type of gelatine and clarifying agent used in beer and winemaking.

Originally the mulloway industry wasn't for flesh at all. It was for isinglass. They took what they needed and chucked the rest of the fish away. I've met many local people who say that there's no wonder there's no mulloway down there now because we used to see great heaps of them on the shore rotting because they just caught them and threw them away.



Fish piled up after a big catch. Photo source: Garry Hera-Singh.

Mulloway

(*Argyrosomus hololepidotus*, jewel fish, jewie, butterfish)



Image: NSW DPI.

- Found in Africa, Madagascar and along the southern coastline of Australia from Shark Bay in WA to north of Brisbane in Qld
- Opportunistic predators, feeding on a variety of fish, molluscs and crustaceans
- Generally spawn in marine waters just outside of the surf zone. Egg and larval development occurs at sea
- Juveniles settle in estuarine nursery areas for three to four years
- Thought to live for a maximum of around 30 years
- Popular recreational species
- Some captured from freshwater of Lower Lakes
- Large mulloway fishery existed in the Lakes prior to barrage construction in 1940s
- Still the basis of a small commercial fishery in the Coorong Lagoon, but impacted by the presence of the barrages

Tracy Hill – A low-tech, low-impact fishery



Tracy was born in 1962, and initially worked in Meningie at the 'Bank of South Australia'. There she met Glenn, who had grown up in Melbourne. In the mid '80s he was working his way around

Australia, doing whatever work he could pick up. He came to Meningie and befriended a professional fisherman. After going out one night as his deckhand he was hooked.

Instinct for fishing

Tracy and Glenn have since married and she is now his business partner.

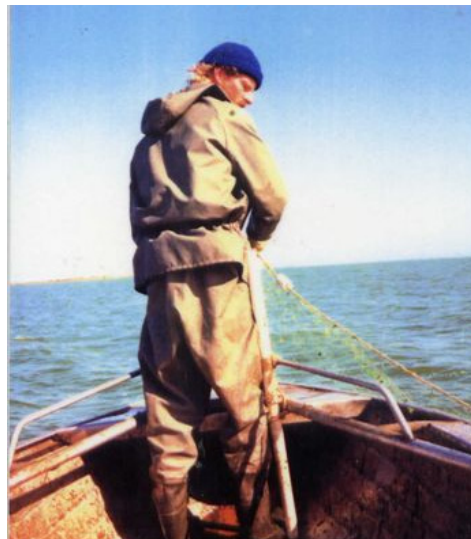
He bought his licence in 1990. As far as older pro- fishermen are concerned, he's a new kid on the block.

Glenn fishes at night, setting his fifty metre nets according to conditions at the time. He has learnt to understand the wind and waves, the weather, and how to find the right nook or cranny in the many places in watery areas around Meningie. He says.

You really need to think: cave man. You're really acting with nature, and there are no

human rules if you're working with nature, and remember, this isn't like a farmer who's got a fence around a paddock, and he's cleared the land, and he's planted this and done that. We have absolutely nothing but nature to work with. And that process is a much more base instinct than anything else.

Since starting, Tracy and Glenn have built the business up and now employ a fulltime deckhand for the boat and six people in their Coorong mullet processing rooms behind the house.



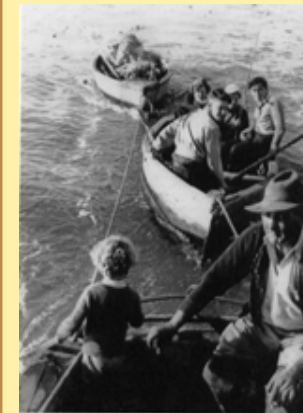
Glenn Hill running big mesh nets in the Coorong. Photo source: Garry Hera-Singh (Photo notes Courtesy of Glenn and Tracy Hill).

Boats for fish and fishing

The Lower Lakes, with their highly variable and unpredictable conditions, present a challenge for fishers using boats. The centre of Lake Alexandrina is classified as open-ocean, where howling winds from the Southern Ocean can whip up monster waves.

In the early 1900s Lakes fishers usually had one larger 18ft sail boat - one fourth or one-third decked forward. This boat carried them from home base in Milang or Goolwa, across the Lakes to mid-week camps. In 1907 one observer noted: *The men who go hooking are nearly all family men – good fearless boatmen.*⁶

Ngarrindjeri people often worked with the fishers at campsites. Smaller boats, dinghies or flatties were used to manoeuvre around the shores and swamps setting seine, gill and drum nets.



Boats made the run home on Saturday to meet the rail for market, and fishers spent Sundays with their families.

Sailing boats were eventually fitted with motors from the 1950s.⁷

Photo source: Garry Hera-Singh

Hard times for flounder

Tracy laments the changes in the southern lagoon of the Coorong, which is now hypersaline (up to five times saltier than the sea) and at risk of ecological collapse.

They used to get two hundred tonne of flounder out of the southern lagoon. And hundreds of tonnes of bream. Back in the seventies, early eighties, there's guys who've paid for their whole freezers and processing plants with the money from the flounder in the southern lagoon.

Garry Hera-Singh's maternal ancestors started whaling in Victor Harbour 1854-60, while his paternal forebears fished the Lower Lakes from 1900. Garry continues the family tradition as a commercial fisher but worries about the changes.

It's different for the species that are marine dominant, in other words, they live in the ocean, they grow and reproduce in the ocean and don't rely on the Coorong particularly. If the Coorong were to disappear tomorrow then those species will still continue. But the estuarine dependent species, the black bream and the green back flounder, the congolli, they're all doomed. They're in very, very low numbers.

Tracy explains how the changes in the flow from water use, sometimes thousands of kilometres away, show up in the numbers of fish at the end of the system.

Because of the lack of flows there's been no real breeding events, except in some isolated little areas where there is fresh water coming out of the sand hills. We'd get to a spot with our mullet net and we'd get all these little fifty cent size flounders. And you know they've bred, but trouble is, they're not reaching maturity. We also notice that when the water from the southern lagoon comes up into the northern lagoon you'll get dead flounder. They can't swim very fast so the hypersaline water can overtake them – if it's deoxygenated water, they'll just turn their toes up and die.

A sustainable professional fishery

Tracy has become an active member of the Southern Fishermen's Association. She is very proud that this Fishery has undergone restructuring. The Hills hold one of only 36 remaining licenses. They have also participated in an audit carried out under the rules of the Marine Stewardship Council. As a result they are internationally recognised as a sustainable fishery.

Barrages and fish

For fish the construction and historical operation of the barrages has created a series of problems:

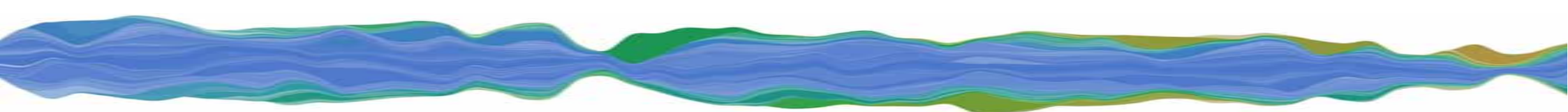
- the change from fresh to saltwater is abrupt
- fish can't move around the system at will to find food, refuge, migrate or spawn
- water levels have been more highly regulated

The barrages prevent sea water entering the Lakes and River. During times of flow, the barrages are opened to pass inflows, allowing fish and freshwater to reach the Coorong and sea. Stable water levels have created conditions suitable for introduced species like carp and redfin.

Under drought conditions water regulation and extraction for human use upstream mean the barrages are kept closed, preventing the movement of fish, nutrients and food materials to the Coorong. This is thought to be one of the major factors that has degraded habitats and caused declines in fish populations of the region.

To overcome some negative impacts of the barrages Lake water levels are now operated with greater variability and allocations of environmental water are improving the Lakes Coorong connection. Fishways have also been installed in the Goolwa and Tauwichee barrages and more are proposed.

Studies at Tauwichee have indicated more than 30 fish species will use the fishways and millions of fish are likely to use them in a single year!⁵



Marine Stewardship Council endorsement is the highest environmental standard for fisheries in the world, and we've got it. We were the third fishery in Australia after the Western Australia rock lobster and the Macquarie Island ice fishery, which operates down in the Antarctic. The MSC certification as a sustainable fishery is for our four main species: golden perch, mulloway, pippies and mullet.



Mullet, one of the fish that the Hills are certified for as a sustainable fishery. Photo: Jodi Frawley.

One of the first

One of Tracy's professional colleagues, Garry Hera-Singh, thinks this certification partly comes down to the practices that have been in place for generations of fishers in the Coorong and Lower Lakes.

In my grandfather's day, all those guys recognised that what we did was sustainable. This fishery was the first to put out an environmental management plan for a commercial fishery in the world. We completed that in 1998. And then the conservation groups got interested in what we were doing and World Wide Fund for Nature, which has a sustainable fishery section in it, were interested in what we were doing and they co-sponsored us in to getting a certification process. So it was just another way of telling the rest of the world that hey, it's not over-fished and rundown because of the pro-fishers.

Another professional fisherman, Henry Jones, explains why it is so important to balance caring for the environment with best practices in business.

I realised many years ago that if we weren't sustainable then the public wouldn't put up with us. They'd get rid of us, so I think that is probably why we're the last commercial fishermen on the river, because we've done all this work.

Wind brings food for fish

'Wind seiching' is the movement of water by wind energy. Wind is a major driver of water movement in the Coorong and Lower Lakes. Water levels between Lock and Weir 1 near Blanchetown and Wellington vary by up to 50cm daily due to this effect.

Wind sieching is important for keeping the Coorong, Lower Lakes and Murray Mouth healthy. This effect is believed to increase oxygen levels in the water and distributes nutrients used by plants and animals, in particular fish, for food.

Wind seiching also plays a part in flood irrigating the foreshore of the Lower Lakes, encouraging plant growth through late summer.



The Lake foreshore, such as seen here near Milang, benefits from wind generated watering in hot weather. Photo: Jodi Frawley.

Making connections

Different communities - different connections

Ngarrindjeri man, Jack Koolmatrie was born in the 1910s on the Coorong. In 1980, he told Bonita Ely about the ways he had got about the Coorong:

We used to ramble all over the Coorong and down the Coorong on foot, right from the Murray mouth down to Kingston. And then I done it with the boat; then I travelled down on the push bike, and horse. And then I got a bit well off; I travelled down there from Kingston and back to Rabbit Island in a Ford T across the Coorong.¹

Being part of a fishing community is also important to Tracy Hill. She sits on the Southern Fisher's Association, and has worked with other fishing businesses and families to raise the profile of their fishery. She is also an advocate for the place of women in the fishing industry.

A group of women in the wild catch industry formed the Women's Industry Network. We were the ones that were under attack all the time from the public.

There were people from over the west coast, people from down the south east, people in the north of Adelaide and the blue crab people. We had quite a few groups and we mobilised the women in this area to raise the profile of fishing.

Women have been and still are important to the success of fishing activities in both Aboriginal and European traditions. Some travelled with their husbands, living in camps and caravans as they followed the fish. Ngarrindjeri women have a strong tradition of weaving fishing nets using local reeds.



Bethel Goldfinch, pictured here in the late 1940s, was one of the Coorong fishers who worked alongside her husband Reg, travelling in their caravan to wherever the fish were. Photo source: Gerry Hera-Singh (Photo notes Courtesy of D and J Ayres).



Reeds like these on the banks of the Murray further upstream, used to be a common sight on the edges of the Lower Lakes. Photo: Malcolm Wilksch.



Ngarrindjeri reed weavers Ellen Trevorrow and Noreen Kartinyeri at Bonny Reserve on the Coorong 2008. Annie and Jack Koolmatrie recalled:¹

They used to string their own nets with a type of rush. They used to get this long grass and they'd chew it to make it pliable, then they would lay it out in the sun to sort of cure it. Then they would make a net just the same as any nylon or cotton net.

Photo source: National Library Australia PIC/12975/5 LOC Cold Store PIC CHAP.

Local reeds for Ngarrindjeri weaving

Ngarrindjeri women and children have always harvested the reeds from the edges of Lake Alexandrina and Lake Albert.

The historical records show the same techniques which Ngarrindjeri women use today: a range of different types of weaving to create baskets, string bags and nets for fishing.

These are made by weft-twining, knotting and coiled baskets methods. Reeds are stripped and then dried, and could be softened by chewing or woven green as a communal activity on the shores of the Lakes. Like fishing, weaving has always been an opportunity to gather for storytelling.

Once complete, woven items trapped fish, acted as keeper nets and were used to store fish as they were carried from the water to the campsite.

Baskets and other hand woven artefacts became items for sale to curious immigrants and tourists – providing important income streams from a traditional and time-honoured practice.

Ngarrindjeri women are internationally recognized for their creativity in design and weaving skills. Women share their skills at weaving workshops that are regularly held at Camp Coorong.

Another group of people that are making connections with the Coorong and Lower Lakes are those interested in the environment, especially from a scientific perspective. John Yelland and Terry Sim have been involved with the Strathalbyn Naturalists' Club, the River, Lakes and Coorong Action Group Inc. and the Lakes Hub. John explains the importance of the way the group works with scientists from the South Australian Museum and other agencies and universities.

The Strath naturalist group was really incredibly valuable for the area because it brought people together who were interested in the environment from around the whole region. My mum was one of the early members. It also brought in experts and suddenly, you have a crossover of specialist and local knowledge, which is fantastic.



A productive day fishing at Point Sturt on Lake Alexandrina in about 1958. Photo: Graham Yelland (Source: John Yelland).

Congolli

(*Pseudaphritis urvillii* – tupong, sandy)



Photo: Gunther Schmida.

- Small to medium sized fish, maximum 35cm, that lives 3-5 years in the Murray-Darling Basin
- Found with logs, rocks or overhanging banks. Its eye placement on top of its head allows it to be partially buried in leaf litter or sand
- Moves between freshwater and sea water as part of their life cycle
- Known to migrate up to 215km in lower Murray (but uncommon upstream of Wellington)
- Spawn in winter and early spring. Females reside in freshwater and males in the estuary. Both appear to move to marine environments to spawn
- Large upstream migrations of juveniles from ocean / estuary to freshwater in summer
- Eats small fish, aquatic insect larvae, small crustaceans, snails and worms
- Threats include barriers to movement and declining river flows



A composite photo showing the expanse of water at Lake Alexandrina – the Murray mouth is out there somewhere. Photos: Jodi Frawley.

Ngarrindjeri flag

The Ngarrindjeri flag was first flown on 21st November 1999 at Kumarangk (Hindmarsh Island).



The dots represent the eighteen Lakkinyeris of the Nation who are all called to Tendi by the scared boomerang. The traditional spears used for fishing take pride of place in the design with the waters of the Coorong, Lower Lakes and Southern Ocean all represented in blue. The sun, central to all life in Ngarrindjeri Country, is a central motif of the design.

The flag flies permanently at Camp Coorong near Meningie.

Belonging

Jack Koolmatrie saw many changes in the Coorong and the Lower Lakes over his lifetime. When he talked to Leigh Hobba in 1980, he remembered the way that his great grandfather would travel up the Darling River as far as Wilcannia looking for work and meeting up with other Aboriginal people along the way. But the Coorong was always a special place.

That was the tradition – they weren't lazy like some people think they were. My great grandfather, he got out early in the morning, and he'd rejoice and he would sing his language and dance – a great dancer he was – just to bring the new day for him. He was happy all day.

He also remembered how his great grandfather, who was an excellent fisher, continued Ngarrindjeri traditions:¹

My great grandfather used to get out early in the morning, and he had his two corroboree sticks and he'd corroboree with them, early in the morning. That was their tradition. He'd go out and run his nets in the early hours of the morning when we were living on the Coorong. He'd have a real good corroboree when he got out, you know. That was like saying he was satisfied and pleased with what he got for the day.

Visions for the Coorong and Lower Lakes

The fishing people who contributed to this project have all talked about their hopes for the future of the river. Many felt they had seen some improvements but most don't feel the river is as healthy yet as they would like to see it. Each of these fishers suggested ways to help the river and in turn help provide healthy habitats for fish.

The little things ...

Henry Jones is a member of the Community Stakeholder Taskforce for the Murray-Darling Basin Native Fish Strategy. During the drought, Henry observed the way that scientists worked hard to ensure the protection of the smaller fish of the system.

I mean we had scientists going into little pools and taking out the Yarra pygmy perch and Murray hardyheads and putting them into aquariums and trying to keep them alive. When the water comes back they can put them back in and the species will not be lost forever. We've got a whole heap of species here that are unique to this area, and unless we can do things like that, or unless we can fix the Murray-Darling Basin and put some water back in the river and make it sustainable, then they will keep on dying unfortunately.

And the big picture

John Yelland and Terry Sim think that rather than everyone thinking about their own backyard, people should think about the Murray-Darling Basin as a whole. Terry says

We would like to see the river system looked after as a whole system and looked after from the mouth up rather than from upstream down. We can't understand why people upstream can't realise that what's happening here, if it's not fixed, it's a cancer that will move up through the system. There is a fair bit of pain, as far as humans go, especially for irrigation and orchards, but the environment's had the pain for the last 100 years. It's maintaining itself but it's nothing like it used to be. And we've got that little window of opportunity of repairing it. If you've got a healthy working river and it's flowing to the sea, everyone should be happy.



Yarra Pygmy Perch saved from Lake Alexandrina.
Photo: Michael Hammer.

Fish rescue!

During the recent drought, water levels below Lock and Weir 1 dropped to such an extent that wetland and refuge areas for a number of small native species dried up. Quick action by committed volunteers and government agencies ensured the last remaining populations of purple spotted gudgeon, southern pygmy perch, Yarra pygmy perch, Murray hardyhead and river blackfish didn't disappear for good.

Intensive sampling for these fish was carried out at locations where they had been known to occur. As many individuals as possible were collected and transported fish to aquaria where they would be safe.

Since being in captivity, some of these fish have done really well, not only surviving but breeding! Their genetics are being monitored carefully to make sure genetic diversity is maintained.

Now that water levels in the River Murray and Lower Lakes have improved, these fish are able to be released back into the wild.

Special congratulations and thanks should go to the volunteers including individuals, community groups and schools who have cared for these fish during their time in captivity.

For more information contact Native Fish Australia SA: www.nativefishsa.asn.au.

Tracy Hill is optimistic for the future – if we can get things right.

How about just fixing the environment up, and then it will be there for everybody. Mother Nature does all this stuff for nothing. It uses solar power and wind power and it does it for nothing. Our motto is 'look after the environment and the fish will look after themselves'. And it will respond before your eyes.



The Murray Mouth – the end of a very large river system which has diverse land uses, regulation and significant degradation.

Image source:
http://www.thelivingmurray.mdbc.gov.au/__data/page/1482/WALKER_report1.pdf

Fish communities of the area

Fish monitoring at the barrages and island overflow channels in 2007-08 identified up to 33 freshwater, estuarine and marine species.⁹

Monitoring of island channel and lake edge habitats recorded 26 freshwater and estuarine fish species in 2005-07.¹⁴

The estuarine small-mouthed hardyhead dominated the catch for both these studies, but other fish captured in large numbers included: bony bream, Australian smelt, flathead gudgeon, introduced Eastern gambusia and redfin perch (freshwater) and Tamar river goby, sandy sprat and yellow-eyed mullet (estuarine).^{14,9}

Species that move between fresh and saltwater to complete their life cycle (congolli and common galaxias) were also captured in large numbers.⁹

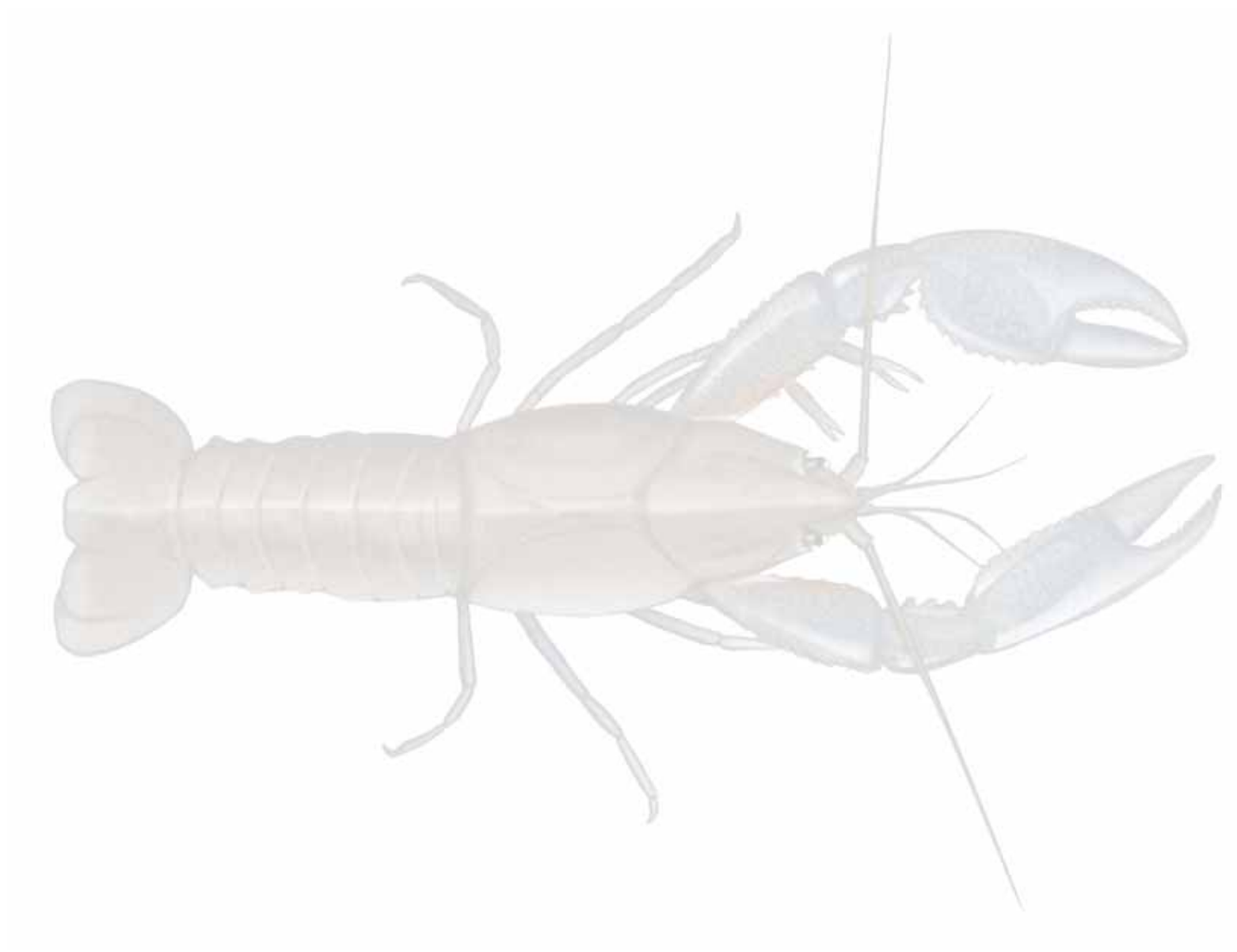
Over the last decade, the extensive drought has resulted in a significant reduction in freshwater flow to the Lower Lakes and Coorong.¹⁵ In the estuary and Coorong, monitoring of black bream and greenback flounder has seen a significant decline in abundance and recruitment.¹⁵

The lack of inflow also has serious implications for the Endangered Southern pygmy perch, Yarra pygmy perch and Murray hardyhead that rely on the specific habitats found in the island overflow channels and which could be lost if inflows continue to decline¹⁴ occur once again.



The Lower Lakes, Coorong and Murray Mouth are one of the *Icon Sites* of the Murray-Darling Basin. This designation recognises the unique cultural, social and environmental values of this place as well as the unique threats it is facing. The acknowledgement of and respect for cultural heritage values is an important aspect of the area's rehabilitation.

Photos: Jodi Frawley.



Katarapko



Source: Barry Porter.



Source: Scott Nichols.

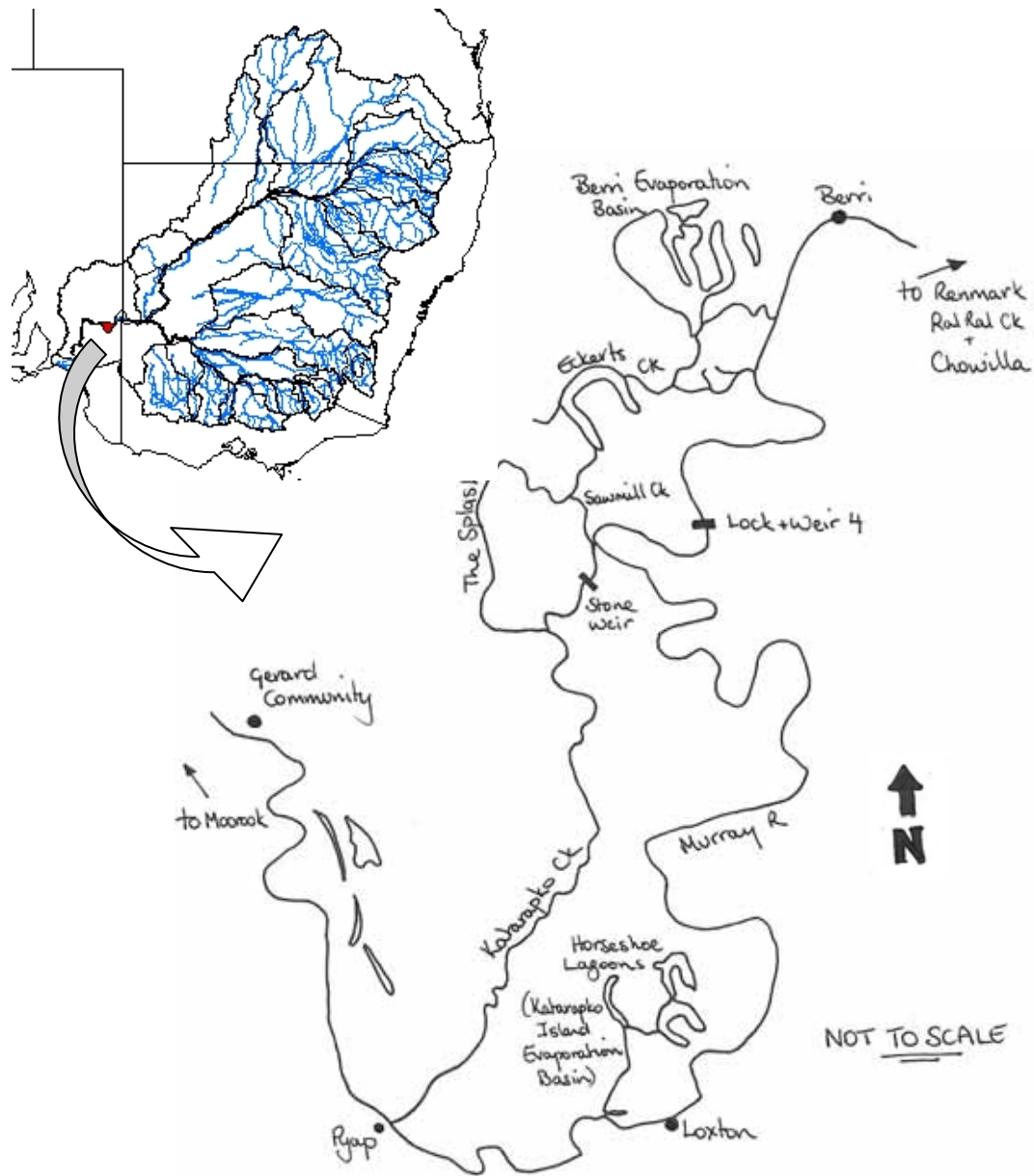


Source: Tracy Bye.



Source: John Aston.





Howard Hendrick has lived most of his life close to Katarapko Creek. He grew up a 'Blocker' and gained his own block as part of the Returned Soldiers Scheme after World War Two. Photo: Jodi Frawley.



Barry Porter grew up in Berri. He worked on the river barges in the 1970s, travelling from the Murray Mouth to Mildura. It also meant Barry explored, and fished, a lot of the river. Photo source: Barry Porter.



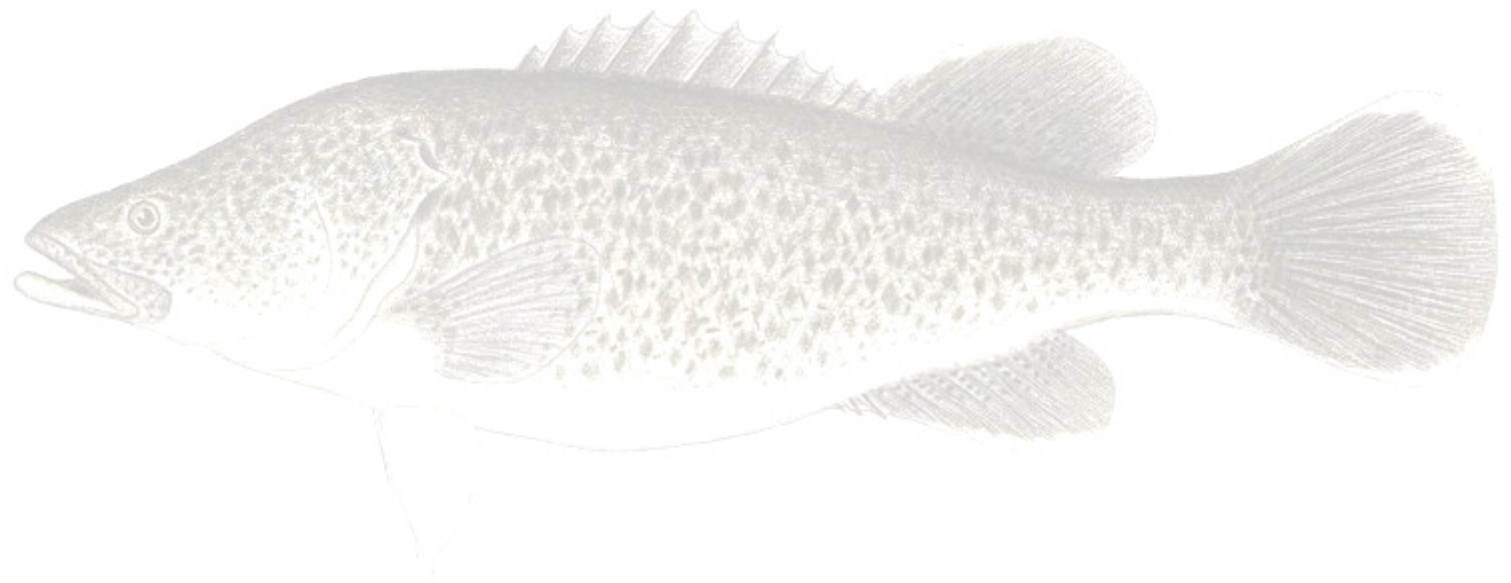
Tracy Bye, pictured with her son, Jack, has fond memories of being taught to fish by her father and long summer holidays camping and fishing by the river. Photo: Jodi Frawley.



Kingsley Abdulla grew up on the Gerard community. He believes in continuing and building on the relationships his people have had with the river for millennia. Photo: Jodi Frawley.

... Murray cod ... at Renmark and Loxton this fish was SO abundant last season that people used it to feed fowl and pigs!

The Advertiser, Wednesday 11 September 1912



Introducing the river and its people

Once known as Crabb's Creek, Katarapko Creek is a small anabranch of the Murray River, located between the towns of Berri and Loxton in the Riverland region of South Australia. Its 9 000 hectare grey clay floodplain is covered with blackbox, saltbush and lignum. The creek's horseshoe lagoons, marshes and islands are the traditional lands of the Meru peoples.

Chasing Pondi

This is Meru country, where the Eriwarung, Moorundi, Barmerara, Maru and Narwij-jerook groups all lived along what is now known as the Riverland. Large groups lived in semi-permanent camps, hunting fish and birds and collecting mussels from the food-rich wetlands and waterways of the Murray and Katarapko.¹

Today, the First Nations People (Riverland) are part of the Walkandi woni constellation that share creation stories with the Peramangk and Ngarrindjeri of the mid and lower Murray respectively.

Like other Murray groups along the River, the Old Peoples' stories tell of the chase for Pondi – the Murray cod ancestor – across the land. The thrashing of Pondi's tail created the wide channel of the Murray as well as the lagoons, billabongs and creeks like Katarapko.¹



A wetland area near Renmark that still has reed beds and riparian vegetation. Photo: Scott Nichols.

In these places, Aboriginal people see more than a unique waterway – they see the essence, excitement and power of the ancestors.

The Arrival of the Europeans

Many people have come to the Riverland as migrants, and fishing has been a way to explore a new place and to put down roots in a different environment to the one they had grown up in.

Since Europeans arrived the health of the river and its fish has been shaped by the people who came to live there and the industries that developed. Grazing, dryland farming, steamboat trade and irrigation all needed different types of workers, bringing new people with new needs to the river and new ways to catch fish.



Fishing and hunting have been important ways of supplementing diets for a long time.

Photo source: Berri Barmerara Local History Collection, Berri Library & Information Centre.

Commercial fishers were the first industry on the river, viable because of the abundance of native fish in the river.

Enormous grazing runs bordered lengths of the river and led to more permanent settlements.

The South Australian Government's Village Settlement Scheme in the 1890s saw up to 400 people arrive *en masse* and grow food crops.

Successive governments encouraged irrigation settlements by building locks, weirs, channels and pumping stations. Many people began by living along the river in tents made from tin and hessian bags. Fishing and hunting were important ways of supplementing their diets. Aboriginal people worked alongside the new immigrants, shifting from stock work to the seasonal fruit industry labour.



Labour intensive furrow irrigation in early Riverland orchards. Image source: Cobdogla Steam Museum.

By the time the Returned Soldier Settlement schemes started after the first and second World Wars, water certainty allowed the 'Blockers' to grow fruit and grapes. They fished for food and fun, just as Aboriginal people were continuing to do.

Today, Katarapko's red gum and river coobah-lined waters leave the Murray near Lock and Weir 4, rejoining the river 16km later.



Dead box trees and abundant pigface are the result of altered water regimes and increased salt. Photo: Scott Nichols.

Katarapko has seen many changes as its waters were blocked, floodplains grazed, and surrounding irrigation districts flourished. Berri Evaporation Basin and Katarapko Island Disposal Basin have both taken a toll as they collected salty irrigation drainage water.

Fishing for market

Professional fishermen have featured in the history of the river around Katarapko Creek. The fishing industry predated the grazing runs in the 1860s. The depression of the 1890s increased the number of professional fishermen, who regularly fought over fishing rights. Combined with the drought, they saw fish numbers decline drastically. Fish went to market on steamboats and later by rail and road.

In 1923, the government declared licenses for 'reaches' which only gave a right to fish, but no claim on the water, riverbanks or the fish themselves. By 1936 there were 195 reach holders in the Murray River above Lake Alexandrina.

Fishing supplemented incomes when it was combined with working on irrigation blocks. Businesses were family affairs. Some members set nets and hauled catch, while others tarred nets and repaired knots in the mesh.

Professional river fishers today can catch only yabbies and non-native species, such as carp.⁷

Men like Gilli Stoneham, John Aston and Malcolm Wilksch have fished the river most of their lives. Their stories, too, are woven into the history presented here.

Howard Hendrick – Growing up as a Blocker



Howard's parents came to Renmark after the First World War to settle an irrigation block at Renmark. He was born in 1923 and grew up near Ral Ral Creek.

A favourite stretch of the river

Howard now lives at Pyap, near the mouth of Katarapko Creek. In his youth, his family favoured one stretch of the river, near the house, for swimming, fishing and relaxation. Howard remembers:

Most of the blockers were fairly poor on the whole. We were fairly self-sufficient. We had our own eggs, we had our own milk, we made butter, and we had our own vegetables. That was another good reason that we went fishing, it was a good supplement for us. We went fishing often because we never had any fridges and you couldn't keep the fish very long.

A welcome diversion

Howard's family mainly grew fruit for the dried fruit market – sultanas, raisins and currants.

Howard and his brother had to feed the chooks, pigs and cows before breakfast. And after school they would cut lucerne and collect vegetable scraps for the animals as well as chop wood for the stove. During harvest the boys would take three weeks off school to help out. Fishing and the river were a welcome diversion from life on the block.

And I look at the Ral Ral Creek it looks like a river, so vast and big. There were lots of logs in the river, lots of fallen gum trees over the years and it was a mecca for fish. In those days, cod was equally as plentiful as callop and bream. They were the three main fish. There was a sprinkling of catfish, but I don't remember seeing perch or carp in those early days.

A lovely place to cool off

Howard's father was a very keen fisherman. Fishing, he says, enhanced their social life, because on Sundays they would join the other fruit blockers at the river. Sometimes at the widest stretch of the Ral Ral, dozens of families would gather for picnics and swimming on hot summer days.

Coming to the Riverland

In 1887, the Chaffey brothers came to Renmark hoping to transform the desert into an irrigation settlement.³ The government also encouraged immigration with communal Village Settlements across the Riverland, including at New Residence, Pyap and Loxton's Hut. Although early irrigation schemes failed,² governments continued to believe in engineering solutions for securing water for agriculture and to support the irrigation industry.



Image source: Cobdogla Steam Museum.

Pumping stations initially stored water off-river and gravity fed it through hand-built channels to crops. Large gangs of men were recruited from the city to build the channels. Later, water was pumped directly from the river.

Returned Solider Settlement schemes were introduced after both World Wars, and the smaller blocks associated with these schemes brought more people to the area.⁴ The schemes required land clearing, which increased the areas available for planting crops but also changed the water tables around Katarapko Creek. This contributed to developing salt problems.

As young children we'd go down to the river and it was lovely place to cool off. In fact the place had lovely shady trees, had nice green grass on the bank and it was a nice place to put a rug out and sit and have a picnic. Meantime I had three or four lines in. In those days, I don't remember anybody having a boat like today, everybody's got a tinny boat, including me. So you never went up and down the river. You just went to one place and there you stayed.

'Lock the river, unlock the land'

After the final year of the Federation drought in 1902, dreams of drought proofing the land saw calls to 'lock the rivers and unlock the land'. The River Murray Waters Agreement was approved in 1915, with an initial proposal for 26 weirs from Blanchetown to Echuca.

In 1929 Lock and Weir 4 was completed. It spanned the Murray between where Katarapko Creek left the river and where it rejoined. The new weir meant that water was continually pushed down the creek from the higher upstream pool. The weir also changed conditions for fish breeding, limiting migration. Stable water levels replaced small-medium rises that fish used as breeding cues.

As early as 1934, SA Fisheries blamed the locks for fish decline. Fish passage is being improved on locks and weirs in South Australia and upstream to Hume Dam as fishways are now being built – over 90 years after they were recommended.

The Depression years

The Depression years meant that the Hendricks became more reliant on the resources available in the river. A day on the river also meant catching and collecting baits from the local area.

So actually fishing was a very cheap way of entertaining for a family. Didn't cost us anything for bait, 'cos all the bait was available in the river. And what we'd do, first thing, my father would shoot a bird, and that would go in a shrimp tin – well really, dip tins. Dip tins were used on the block so we had a lot of them, it was like a more or less better than a net. So you tied the bird, cut it half and put it in the shrimp tin, so we got shrimps.



Amas Harvey (Jack) Heward watching his son Frank Heward fishing near Berri, 1950.

Photo source: Berri Barmera Local History Collection, Berri Library & Information Centre.

Perfect bait for cod

The smaller animals that lived in the river were so plentiful that there was always that perfect bait to catch cod.

We'd also dive in the river as boys, a little area we knew was safe and there was always mussels available in the bed in the river. So we'd get mussels for cod. We'd also catch little frogs and you'd get them in the bark of the gum trees, you'd pull off bark and there'd be a frog hibernating in there. Or we'd get little yabbies you'd also get in the shrimp tin. So that was the main bait for cod.

Using water for irrigation

During the years between WW1 and WW2, irrigation on Howard's family block was gravity fed. Water was pumped out of the river and held in storage, then released down miles and miles of man-made channels. Howard remembers:

In those days there was no sprinkler irrigation, no pumps, it was all gravity fed. So the water went down the vines and you had to direct it down with shovels and make furrows. And they had a bulkhead that held the water back 'cos it was a gravity channel, went for miles from the pumping station. And eventually ended up in Ral Ral Creek. The bulkheads held the water back so that many growers could water at one time.



By the 1950s sprinkler irrigation was being developed. By the 1970s many converted to 'under-tree' systems to avoid salt damage to foliage. Image source: Cobdogla Steam Museum.

Over the twentieth century, more blockers came to the Riverland, more irrigation was built and more water was pumped from the river. Howard and his brother both got blocks at Loxton as WW2 veterans.

Salt

Salinity became a new problem for the local communities to manage. One of the changes to Howard's block was the introduction of overhead sprinklers, but these were then changed again to the more efficient drip irrigation used today in the Riverland.

Also of course the salt content increases as the river goes down, and that may have a bit of effect on the native fish, because they're used to the fresher water from years ago. It went very salty, oh I don't know, 20 years ago. I remember we converted all our overhead sprinklers above trees to under-tree, because the salt in the water is so high it was burning the leaves on the tree. So all the irrigation practices on the Riverland changed, to watering under the trees and under the vines rather than over the top. I think because when the rivers were high it would flush all the backwaters out where the salt had accumulated in the river.



The Berri Evaporation Basin (pictured) drainage scheme started in 1942, although salt and drainage issues were noted at Berri Experimental Orchard as early as 1923. Photo: Scott Nichols.

The rise of salt

Native fish in the Murray-Darling evolved to tolerate salt levels that fluctuated with the natural cycles of drought and flood.

Due to underlying geology, the lower reaches of the Murray have always functioned as a natural pathway for removal of salty groundwater. During floods or high rivers, these waters are diluted, but during times of low flow, water tables would be exposed and the salinity of the river would increase.

Native vegetation was the key to keeping a balance between the water tables and salinity. The system changed when there was widespread clearing for grazing and cropping. Early grazing runs and the Overland Stock Route hugged the river, as livestock needed access to water. However, the stock damaged the river banks by eating and trampling the vegetation. In 1917, 800 bullocks were pastured at Katarapko Creek.⁵

Cropping and an internment 'wood camp' at Katarapko during WW2, meant trees were removed to fuel pumping stations, produce fence posts, and make way for irrigated crops.⁶ Loss of trees and addition of irrigation water raised the water table and brought salt closer to the surface as waters evaporated. Attempts were made to flush salts away by adding more water to crops.

The rising water table has been a serious problem from the 1940s, necessitating evaporation basins to dispose of saline drainage water. Today at many priority sites, 'salt interceptions schemes' act to collect some of the salty groundwater before it reaches the river and redirect it to evaporation basins away from the floodplain.

Barry Porter – Spending time on the water



Barry was born in 1949. As a youngster growing up in Berri he loved nothing more than to grab his pushbike with his brother and head off to the River with their cord-lines attached to bamboo rods.

Families out fishing

The professional fishers locked up the reaches around Berri, so the family would often travel out of town to throw a line in.

In the '50s we'd travel a couple of miles outside of Berri, because you knew you could catch fish. Dad and Mum's brother would go out in the old boat, rowing and fishing while Mum looked after the two kids on the riverbank. Plenty of other families did the same thing. We used to fish fairly regularly. Probably a couple of times a week in the summer. The family would be out probably at least once a fortnight because it was a cheap addition to the family food.

Floods mean yabbies

In Barry's family the floods meant yabbies. As the flood waters in the Murray or the Darling made their way downstream to the Riverland the Porters were preparing for floodplain adventure.

Yabbing, an historic institution. 1956 we had a huge flood here, 1957 we had the biggest yabby run I've ever seen. It was what you did after a flood. While the floods were up you get the yabby nets out.

Barry describes their yabby nets as two wire hoops, with the bottom one covered in bird mesh and the sides made from an old wheat bag. He remembers:

When they got wet they were very heavy.



Barry's father with a catch. Photo source: Barry Porter.

The regular flood water of the 1960s and 1970s filled the myriad of wetlands, lagoons and backwaters of the local Katarapko floodplains. As the waters peaked and started to recede, the signal was up for the boys to head out yabbing.

We preferred very shallow water, no more than about two feet of water, you actually had to row around in the flood plain before the flood's gone right down. Yabbies came out of the mud to breed.

Yabby

(*Cherax destructor*)



Photo: Charlie Carruthers.

- Seldom over 250g
- Widely distributed in SE Australia
- Found in ponds, billabongs and slow flowing streams
- More active in the warmer months, less active when water temperatures are below 14°C
- Breed from September to March
- Fast growing: can reach 50g in first year
- Grow for 6-7 years
- Reduction of backwaters, floodplains and billabongs biggest threat, overfishing leading to localised losses

On a barge on the river

As a young man Barry gained his crane driver's license and in the 1970s he secured a job on a pile-driving barge. His first job was to help install all the effluent disposal stations for the houseboats that were becoming so popular with tourists.

The barge travelled up and down 1 400 kilometres of river between the Murray mouth and Mildura. As well as driving piles, the crew maintained and rebuilt locks and helped out with odd jobs at the pumping stations along the way. They also helped to remove snags that were a navigation hazard from the main river channel.

Howard Hendrick recalls how there were more fish in the creeks, where they didn't remove the snags:

Years ago there was another very famous fishing spot, the Katarapko. The fish seemed to like creeks where all the logs had fallen over the years. Whereas in the main river they used to clear it for the paddle steamers, clear the logs out and make it a safe passage. Where no one worried about the creeks because there was no big ships, or boats rather, going up the creeks, so they were full of logs. And that was a marvellous breeding place for fish to feed and catch shrimps and all that sort of thing too.



The S.S. Ellen at Berri. In the 1840s, locals dreamed of the river as a transport route to the goldfields. A decade later shallow-draft steamboats moved produce, including fish, to market. Barges removed snags with steam-driven winches to make clear passages for larger boats. The water then moved along the channel faster, scouring the riverbed as it went. By the time the locks and weirs were built rail and later road transport had replaced river trade.

Photo source: Berri Barmera Local History Collection, Berri Library & Information Centre.

I've seen islands grow

Working on the barge was a golden opportunity to explore the river by fishing and to see the changes to the river environment.

I've seen islands grow where they weren't before. Especially over the last 20 years when we were out in small boats a heck of a lot more. We've noticed through the '70s that the big floods shifted a huge amount of sand around. This formed the shape of the river

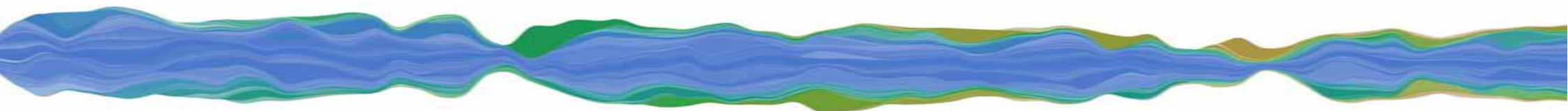
that we've got at the moment – cut new passages through the flats in a few places.

Upstream of Katarapko Creek, irrigation schemes have been developed for many industries. Barry says upstream irrigation means they don't see the small floods they used to. The loss of small flows and the fewer, smaller floods of the 1990s have changed the river in ways that people might not see. Barry explains:

We used to drive straight down the middle of the river, now we're weaving around looking for a spot through. People look at the river and, oh there's plenty of water there and it's 150 metres wide, but what they don't know is that most of it's less than a metre deep.

Working on the salt problem

Since the 1980s Barry has worked for South Australian Water and the Department of Water, monitoring salinity and developing programs that measure and identify salt plumes in the river.



Fishing remains Barry's favourite recreational activity and he spends as much time on the water as he can. Fish are no longer as plentiful as they used to be. He doesn't see the periodic movement of the channel in the river as a problem for the fish. He says:

I don't think that that sort of change affects the fish as much as the changes in flow. It's just another symptom of the lack of flows, the gradual drying of the bottom half of Australia.



These river red gums are dying due to increased salinity and changed cycles of flood and dry. Photo: Scott Nichols.



Barry working on the salinity issues affecting the Murray River. Photo: Jodi Frawley.



Barry at play . Photo source: Barry Porter.

Snags, crays & cod

Until relatively recently there was large scale removal of snags in the River Murray to improve navigation as this story from Adelaide's *The Register News* shows:

'The S.S Industry has been between Lock 4 and Loxton for some time ... About 50 large snags have been removed. Some were 50 feet long and yards round. Tackling broke like pieces of string when these huge logs were being lifted clear of the river. Cod and large crayfish dropped out of holes in the logs - which Captain Harry Brand considered had been on the river's bottom for half a century or more.'

(The Register News (Adelaide), 26 February 1930)

- Snags were also removed because it was thought they caused erosion of river banks, however it is now recognised that in many cases the presence of snags can actually reduce erosion by protecting the river banks
- There was also the misconception that snags increased flooding by reducing the amount of water that the river channel could hold. Under normal circumstances this is not the case
- The maintenance, protection and restoration of habitat including snags are objectives of the SA River Murray Act 2003

Tracy Bye - For her father, a fisherman



Tracy was born in 1964 and came to live in the Riverland in the mid 1970s. Her father, Colin Schultz, purchased the Shell depot in Loxton. With her brother and sister, Tracy learnt

to fish from her Dad. Fishing was a way to explore and put down roots in their new home.

Tracy sees telling her story as a way of paying homage to her father's love of fishing and to talk about how important the river is in all their lives.

Dad loved Katarapko Creek

Dad was born down the south-east, so from all accounts he was probably more of a sea fisherman. But he just fell in love with the river. I mean it's such a beautiful stretch here. He loved going up Katarapko Creek, getting away from some of the speedboats and other people. He had his special secret spots that he'd come home with all of his fish and not tell us where he caught them. He was a bit tight lipped some times.



Colin Schultz out on the river. Photo source: Tracy Bye.

Colin patiently taught his children to bait their lines, where to cast and how to get a fish into the boat. Tracy even learnt how to fillet the fish. But being on the river was also an opportunity to take in the river.

He really enjoyed it and I think that's why we enjoy it down there so much as well, because we were brought up to really appreciate the colours and the water and the trees. I can remember sitting with him for ages. We'd be looking at the trees and discussing, you know, what was wrong with them or which one looked like it probably had a bird in the hollow and all that sort of stuff. It was really interesting. He just loved it.

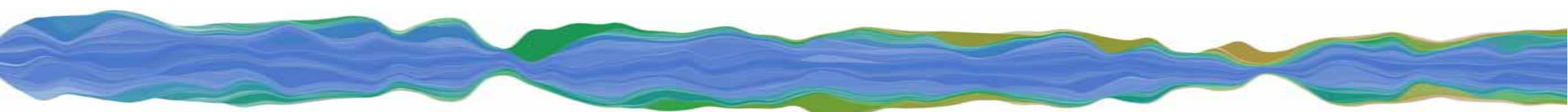
Always keep the callop

Unlike many fishers in the Riverland, Tracy and Colin didn't chase Murray cod as a favourite fish from the river. Tracy remembers that the three most common fish when she was growing up were catfish, redfin and callop.

I didn't like catfish when it was easy to catch them. They're just ugly things really. They were just slimy looking, horrible things. Dad used to keep them, of course, when we were able to, but in preference we'd always keep the callop. It's just such a beautiful meat.



Barry Porter with a callop. Photo source: Barry Porter.



All the comforts of home

Over the Christmas holidays, the Schultz family would camp for six to eight weeks by the river. Tracy's mum wasn't quite the passionate fisher as the rest of the family. So Colin would take a generator to the river and hook up all the comforts of home.

He used to take the generator for her so she could use her hair curler. She would put her hair in curlers and put a cap on and sit there with the hot air blowing. We thought it was quite funny. He did whatever it took to make sure Mum was happy down there so she'd stay for that little bit longer.

While the family stayed at the camp site, Colin would travel back and forward to work at Loxton. Often he'd give a feed of fish to people he knew would appreciate it:

People who perhaps weren't that well or had lost their husbands who had been fishermen.

Clear water and white sand

Things have changed in the river since Tracy first came to the area. One of the things that she's noticed is a difference in the colour of the water:

I think the colour of it. Like I said, it was quite clear. When we used to go yabbying as kids in the river you would see a foot out before it

became darker. Now it's quite murky. It just seems to be different. It almost has taken on quite a grey-green tinge. As a child I can remember it almost being blue.

Over Tracy's lifetime there have also been dramatic changes to the vegetation, both in the river and on the banks.

There's a lot more weed growing in the river as well as from the bottom. I can't remember having to walk through weed as a kid, or having weed tickling your legs as you're coming in from the boat. Whereas that's quite common now.

Occasionally you would see duck weed come through. We used to have fights with it, whereas now it's quite common to see large patches of it. There are now reeds growing in and on the side of the sandbars. Some sandbars we used to go to as kids were just pristine white sand right down to the water. Now they have reeds all over them growing right into the water.

Finding peace

In 2000 Colin was diagnosed with cancer, which had a devastating impact on the family. Fishing became a refuge from his illness. By Katarapko Creek Colin could find the peace and quiet to just do what he had

always done. Tracy is sure that it helped him to cope.

And I think he found that it was quite nice just to get away a little bit on his own and deal with things in his own way. He also used to have a favourite fishing spot down around the bottom of Katarapko Creek, and when he was diagnosed the second time, with cancer, he jokingly used to say to his friend that he used to go fishing with, that's where my ashes are going. So when he did pass away that's where his ashes went, up to Katarapko Creek. And that's just where he should be.



Tracy says: *This magnificent old river gum proudly marks the spot of Dad's ashes.* Photo source: Tracy Bye.

Kingsley Abdulla - Passing on what our grandparents taught us



Kingsley was born in 1976 and grew up at the Gerard Aboriginal Community next to Murray River National Park. As a spokesperson for this community, he sits on the Katarapko Creek Demonstration Reach

Steering Committee and he'd like to see more Aboriginal participation in the management of the National Park.

Learn to sit still and be quiet!

Whenever a big mob went fishing and camping, storytelling amongst the generations took on a different emphasis. One of the first lessons in fishing is to learn to sit still and be quiet – one that Kingsley says was not always easy to learn! But once kids get it, he says, listening brings much more than knowledge about baiting a hook.

That's when we'd take the time to educate all the younger ones about their history and how we used to do things. To pass on what our grandparents taught us.



Rainbow fish, a small, pretty native fish found in the Murray-Darling Basin. Photo: Gunther Schmida.

So if you get the young ones to do that then you can still be taught your traditional way and non-traditional way which is good. I've grown up with both so I can do a combination of both.

Callop, Pondi and Thukeri

When Aboriginal families go out fishing, Kingsley says they favour the big fish of the Murray to bring home for a feed:

You've got the yellowbelly. We call them callop up this way. You've got the Murray cod, which we call Pondi. And then you've got your silver bream, which we call Thukeri, that floats on the top of the water.

Murray hardyhead (*Craterocephalus fluviatilis*)



Photo: Gunther Schmida.

- Small fish up to 7.6cm, commonly 4 - 6.5cm
- Only found in the southern part of the Basin
- Found in lake edges and wetlands, prefers open, shallow, slow flowing or still water with a sandy or silt bottom; sometimes found in deeper water with dense aquatic vegetation
- Can survive in highly saline environments
- Spawn from September to April
- Short lived, only some adults survive to a 2nd year
- Eats microcrustaceans, aquatic insects and algae
- Formerly abundant, now very restricted

and other small fish

Other small species found in the Murray-Darling Basin include gudgeons, Australian smelt and rainbowfish. These small fish occupy various habitats: some prefer wetlands and off channel habitats, others prefer fast flowing mainstem waterways or heavily vegetated sites. Most have small home ranges but will move upstream if they drift or get washed downstream.

Catfish are no longer present in the numbers that they were in Kingsley's youth.

You get the odd one or two but the majority have all disappeared somehow. I don't know why. It's probably because of what's been happening with the salt and everything else. They're driven away or they've stopped breeding, because there's no water in the back waters where they can breed. So they haven't bred up for 10 or 15 years, maybe longer.

Katarapko and Chowilla

The Old People's stories talk about the connections between Katarapko Creek and Chowilla wetland, a couple of hundred kilometres upstream. The connections are important to the Aboriginal people of the Riverland. Kingsley explains how the two systems differ:

They are two different systems, but they are related. They're both related but they're different cousins. Like first and second cousins. Up at Chowilla it's more open and it's got a dry land. More like an arid type of wetland up that way compared to down this way, which is more widgee river clay. Up there it's more sandy and stuff like that, which is two different ecosystems. Totally.

Flow in complex systems

In the summer of 1829-1830 Charles Sturt travelled by boat from the Murrumbidgee River to the Murray River mouth. Sturt described a variety of habitats, from wide, slow-flowing pools to 'rapids' and noted on their return journey: 'Shoals frequently impeded us as we proceeded up the river, and we passed some rapids that called for our whole strength to stem'.

Today, the locks and weirs on the mainstem Murray River have made the river a series of connected weir pools, with uniform slow-flowing habitat at most flows except floods, and fast-flowing habitat mainly restricted to anabranch systems or tributaries.

These conditions have benefited some native species like bony bream (bony herring) and carp gudgeons, but also the introduced carp and redfin. Species like Murray cod and callop, that prefer fast flowing habitats, have been disadvantaged by the creation of weir pools.

In South Australia, the most complex anabranch system is Chowilla. It has streams with different hydrological characteristics, aquatic plants and woody debris and includes permanent creeks, ephemeral creeks and lakes that fill at different river levels. The Chowilla system therefore acts as a microcosm of what the lower Murray River once was. It supports a diverse, healthy native fish fauna including one of the most significant Murray cod populations in the lower Murray River.

Like Chowilla, Katarapko Creek and floodplain possess a variety of habitats and because the creek passes around Lock and Weir 4, its fast flowing habitats are preserved, benefiting species that prefer these conditions like Murray cod and callop.⁸

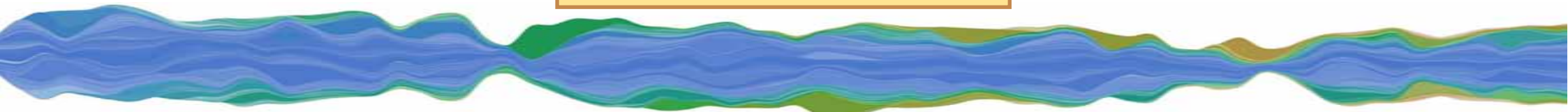


Bulyong Creek, Chowilla. Photo: Scott Nichols.

The back ponds

Fish benefit from regular water flowing into the wetlands around Katarapko Creek. Katarapko Creek is important for native fish to breed, says Kingsley:

It's good when the water comes up because it actually builds the back ponds up where they do all the breeding. As they grow they follow the water down and back into the main rivers. We used to do most of our fishing in the back creeks, where the water was a bit more stiller and it was a lot warmer than the river. The river's constantly moving and it just brings the cold water with it. And the back waters are nice and warm for the breeding and everything else.



But it is not just the fish that benefit. Kingsley points out that all the animals, trees and river vegetation need that water to survive.

Well if you don't get water into your back creeks, you don't build up what they call the nurseries, which is for all animals. If you haven't got those they can't go back into the main river system. And once they fill up the black swans and ducks will come back.

Wetlands

Prior to river regulation, all wetlands around Katarapko would have dried out periodically. Post regulation, several became permanent and were blocked to prevent water loss.

A wetland isn't necessarily always wet; however a wetland needs to be wet long enough to support the plants and animals that live in it for at least part of their life cycle, like most of the 46 fish species native to the Murray-Darling, which use them for feeding, spawning and nursery habitat.

Wetlands like Katarapko's Ngak Indau are now managed using flow control structures so that it can be watered or dried.



Photos: SA Department of Environment and Natural Resources.

Not enough water

The effects of the drought over the last fifteen years has taken its toll on the Murray-Darling Basin. This dry has been even more devastating on the Katarapko than earlier droughts because of the lower and lower flows coming down the river.

When there's not much water around, the vegetation decreases and then that opens up to the elements like the wind. And the wind is the biggest one. If you haven't got any windbreaks it will just score through anywhere. That's the biggest one we've got. And once you've got water and rain, if there isn't any ground cover, it destabilises everything, especially if the water had dropped back too far.

There go the windbreaks

Since the 1980s, cropping and agriculture has increased across the Riverland and the Riverina. The salinity in the area has increased.

The salt levels come up and the acidity in the sand and that just kills all your native trees around the edges. And then there goes the windbreaks.

Managing salt

The salt interception basins are important features of salt management in the area. People see these salt inception basins differently. Barry Porter, for example, argues that these schemes have seen an improvement in the water quality.

Because we've taken the salt interception schemes and tackled the big salt ascensions, we're actually removing probably half of that salt before it gets into the river now.

Kingsley, on the other hand, sees the salinity problems of the area as interconnected with other pressures that have been building over the last three decades.

I've seen it go from lovely and lush to grey and dreary, which a lot of the trees are just getting killed off by salt because there's not enough water coming through. Plus you got the expansion of towns and cities which is even worse. Plus people doing cropping. So just their techniques, some will do cropping, some will do spraying. And the sprayings will get into native bushes and that actually kills a fair bit of it. Which they don't intentionally do but it's just with their drift some chemicals just wipe out all together.

Making connections

Belonging

Tracy Bye's family felt they had come to belong on the river after they moved from Adelaide and started fishing.

We didn't fish when we were in Adelaide, down at the beach. But as soon as we hit the Murray we were there all the time. It would have been when I was 11 or 12 that we first started fishing. I suppose it all boils back to Dad, and he had an absolute love of the river. I can remember going down with Dad in his boat. And he used to put up with so much from us kids but he always encouraged us to go down with him. He never got any fishing done himself, because he'd spend the whole time baiting us up, untangling us. He would just spend every waking moment down there if he could.

Throughout Kingsley Abdulla's life, fishing has been an important part of Aboriginal community life.

We were always camping and fishing especially during the holidays, especially in the warm weather. Always on the river. We'd go as a family. The close family as well as an extended family, plus community members. Sometimes 40 or 50 of us would go out camping at the one time.



Colin Schultz's love of fishing lives on. Tracy's son, Jack, and nephew, Will, are as keen to learn as Tracy and her siblings were. Photo: Tracy Bye.

A professional relationship

Gilli Stoneham and John Aston (senior) both fished the Murray around Renmark. A common problem was who could fish which parts of the river. Gilli and John squabbled with another pro-fisher over the boundaries of their reaches.

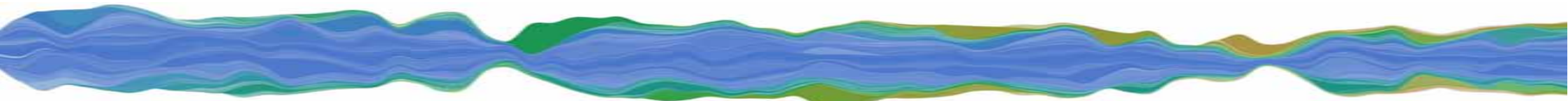
John's son, also called John, recalls how this was resolved and how a creek got named. John junior feels that his family's history is permanently part of the history of the river.

Dad went to the fisheries department to try and resolve this argument. And they said well, what is his area of it? Well, he said, Gilli Stoneham was working from this point to

that point. So the fisheries officer said, I think that's a pretty fair argument. And he said to my dad, 'And what do you think we should call this creek? It has no name.' And he said, 'What about Squabbly Creek,' and that's what it was named.



John Aston, a third generation professional fisher in the Murray River. Photo source: John Aston.



Knowing the fish

Malcolm Wilksch took up a professional fishing reach in 1957 and took the time to learn as much as he could about fish habits in his area.

We'd have to find the bait the fish were biting on that year, they never ate the same food all the time like you'd expect. Quite often we'd start off with mussels. And some years would be all yabbies. One year I found a spot where there was very large shrimp in the off season. I caught big cod on those as well.

Before Dartmouth Dam was finished in 1979, water was pulsed down the river from Lake Victoria and through the locks and weirs for irrigators. Judging the reaction of the fish to these rises and falls in water level meant Malcolm could adjust his weekly timetable:

After a while I realised that I really only had to fish three days a week, cos only three days of the week the fish would actually bite.

Big cod were also, naturally enough, a favourite for young boys. Norm Dixon was a young boy when he and his schoolteacher had this encounter in 1910:

I used to do a bit of fishing before school, and one morning I caught a big Murray cod

that weighed 68 pounds when cleaned. The teacher asked me why I was late for school. I told her and she said to show her the cod. I rowed the teacher down-river to where the cod was tethered and told her she could pull it up out of the water. Well the fish really let her have it and almost drowned her!⁵

Gilli Stoneham's wife, Gladys, recalled an old wives tale for using mussel shells that shows that a healthy river can also provide for the health of the people who live around it:

We used to bake them, grind them up and any sores – we used them as a powder. A wonderful healing power.

Part of life

A lifetime spent fishing in Katarapko Creek and around the Murray River near Loxton meant that the river has come to be an important place of renewal and contemplation for Tracy Bye.

I hadn't realised how often we radiate down towards the river for things that happen in our lives. My husband proposed to me down the river. When Dad passed away, without even realizing, we took the kids down the river to tell them. I tend to go down there if I need some time out. So it's just played such a vital role in different things that have happened over the years. I'd find it really hard not to live near the river.

State of the river – 'poor'

The Sustainable Rivers Audit (SRA) is an ongoing systematic assessment of river health of 23 major river valleys in the Murray-Darling Basin. Environmental indicators (themes) include hydrology, fish and macroinvertebrates, which are monitored and will highlight trends over time.⁶

The Lower Murray was surveyed in 2005. Both the Lower Murray Valley fish community and Ecosystem Health were considered to be in 'Poor Condition'.

Only 35% of predicted native fish species were caught from the 'upper zone' (near Lock 3). The ecological community was dominated by alien fish (64%).

Abundant un-specked hardyhead, bony herring, Australian smelt, Murray-Darling rainbowfish and Murray-Darling carp gudgeon dominated the native fish. Carp dominated the alien species captured. Eastern gambusia and goldfish were also found.



Lower River Murray Lobsters ready for market.

Photo source: State Library South Australia (SLSA: PRG1258/2/2495).

Visions for Katarapko

The fishing people who contributed to this project have all talked about their hopes for the future of the river. Many felt they had seen some improvements but most don't feel the river is as healthy yet as they would like to see it. Each of these fishers suggested ways to help the river and in turn help provide healthy habitats for fish.

This is all we've got

Todd Goodman is a recreational fisher on a mission. In 2007 Todd's family discovered a small population of 50 southern purple spotted gudgeons in a wetland adjacent his father's holiday shack.



Todd Goodman's aquariums where he is breeding southern purple spotted gudgeon. Photo: Jodi Frawley.

Since then, he has been breeding the fish in aquariums in his garage. The species was declared extinct in South Australia in 2000 and now Todd works with other breeders in Adelaide and a number of local schools to ensure their survival.

Well basically this is it. This is all we've got. These guys used to be so common. They used to be used as cod bait, as live bait. They're part of the food chain. They're genetically distinct from the other populations around the place. Everyone you talk to used to catch them as kids. They used to be all through the irrigation channels. But they're just one of those species that for some reason has just disappeared. And I suppose being on our property we felt that it was our obligation. Originally it was only going to be for 12 months, now we're four years on. They've domesticated really easy. Why wouldn't you want to keep them? They are a great little fish.



Southern purple spotted gudgeons (*Mogurnda adspersa*). Photo: Gunther Schmida.



A week's catch of Murray crayfish in 1955.
Photo: John Aston.

Future health

Retired professional fisher John Aston voluntarily gave his license up in 1996. The long years of drought from 1992 until 2000 were a time when the fish did not breed as regularly. John believes that reducing the professional fishers at that point was beneficial to the future health of the river.

So in my opinion if the fishermen had been left there long enough, the number of cod would have gone down. From 1992 to now, 2010, we haven't had any water. In that period if the fishermen had continued to be in there it would have made a dramatic difference on our native fish.

Howard Hendrick would like to see more water allowed to flow to help the wetlands maintain themselves for longer periods between high river cycles. He says:

But the last 12 - 14 fourteen years we've had no floods, no breeding up and these fish have gone out and there's very few are being hatched out and coming down this way. So it's fallen off with the fishing a lot.

Kingsley Abdulla sees pest management as one way to help the fish. He sees the removal of carp as being important for a healthy river.

The carp can be classed as a weed and pest, you can have your land-based weeds and pests and your water-based.

He also sees a special role for the Gerard Aboriginal community in rejuvenating Katarapko Creek for native fish.

I'd like to see co-management with the Gerard community on the National Park as well as other reserves around. Co-management would mean that we would be looking after the land and water. We could develop teams to do certain projects like weeds and pests and revegetation.



Carpark Lagoon during a wet phase.

Photo: SA Department of Environment and Natural Resources.

These two photos illustrate the difference in wet-phase and dry-phase vegetation at Carpark Lagoon. Reinstating natural cycles of wetting and drying can be an important way to help manage populations of pest fish like carp, which like permanent still water.



Carpark Lagoon after it has been dried, showing dry phase wetland plants. Photo: SA Department of Environment and Natural Resources.



The 'Tree of Knowledge' indicates the heights of floods, the highest being 1956. Photo: Jodi Frawley.

Lower Darling & the Great Anabranch



Source: William Riley.



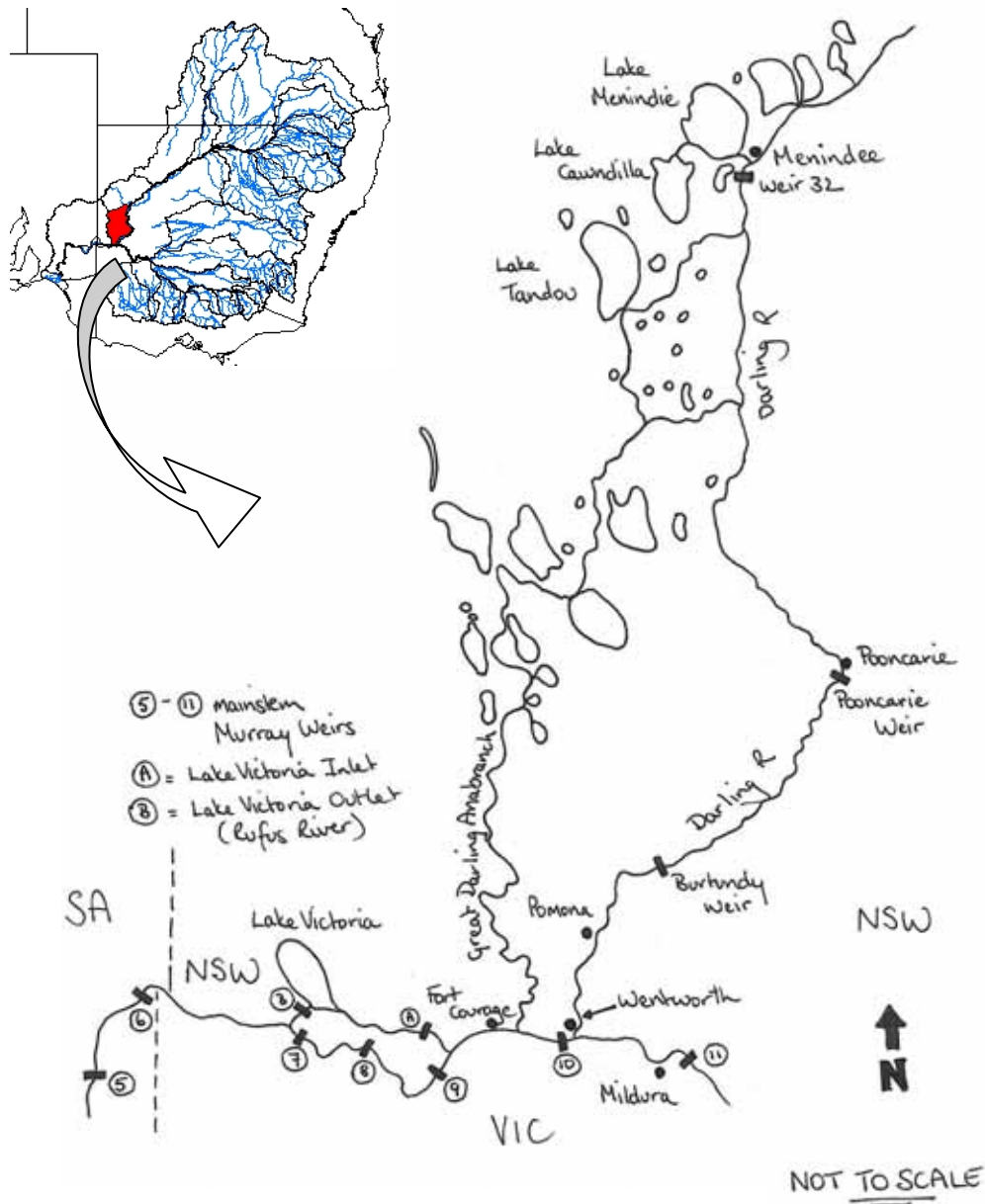
Source: Scott Nichols.



Source: Wentworth Historical Society (at 'Kalcurrha', donor: Patsy Crozier; 2007-29-1-8).



Source: Jodi Frawley.



William Riley is a Paakintji man who was taught to fish by his Granny Quayle and his aunts. He fondly remembers the family fishing gatherings.

Photo: Jodi Frawley.



Bill Lever lives at Wentworth and is a commercial fisher who has worked the Murray, Darling and Great Darling Anabranch since the 1960s. Photo: Jodi Frawley.



Rod Stone has been on the Wentworth Angling Club's committee for over twenty years and is currently serving as the president. Their home base is at Fort Courage where they have 100 acres right on the Murray River. They welcome travelling fishers to their camp and caravan park on the grounds. Photo source: Rod Stone.



Jenny Whyman is a Paakintji woman and representative on the Northern Basin Aboriginal Nations Committee (NBAN). Jenny believes the river needs to be looked after when its dry so that fish get the best chance to survive when there is plenty of water. Photo: Jodi Frawley.

We ... passed the bank of a *beautiful* piece of *water* This lake was *brimful*, a novel sight to us; the *shining waters* being spread into a horseshoe shape, and reflecting the images of enormous *gumtrees* on the *banks*. It seemed *full of fishes*, and it was probably of considerable depth, being free from weeds, and continuing so *full* and *clear* throughout summers which had drunk up all the minor streams.

The Journal of Thomas Mitchell (1839)¹



Introducing the river and its people

The Lower Darling River and Great Darling Anabranh are located in south-west New South Wales. Muddy waters meander over the grey soil floodplains past red dunes, spiky saltbush and gnarled red gums. 11 000 years ago, the Darling River changed its course just south of Menindee Lakes, leaving the Great Anabranh's 460km channel to dry and flow into the Murray only during big floods.

These are the traditional lands of the Paakintji people.



For 11 000 years, the Great Anabranh has been separated from Darling River, only flowing into the Murray River during big floods. Photo: William Riley.

The heritage of Paakintji fishing

Aboriginal heritage of the Great Anabranh and the Lower Darling dates back at least 36 000 years. Paakintji people have explained that the river system is important to them for its cultural and spiritual expression of their heritage, its many sacred sites and burial grounds and its continuing provision of medicines and foods.^{2,3}

This long heritage is visible on the banks of Lake Tandou, where wind formed dunes ('lunettes') of fine red sand line the edge of inland lakes. Within these lunettes, Archaeologist Jane Balme uncovered a campfire in the 1980s.

In it she found the bones of 357 yellowbelly from a single meal. Radiocarbon dating found they were 25 000 years old.⁴

To Paakintji people, there is still nothing better than a fish feast from a campfire with family and friends.

The arrival of the Europeans

The Darling River provided a pathway for explorers, overlanders, graziers and bushrangers from the 1830s. In 1853, the first river-boats moved up the Darling and ports were established at Wentworth and Pooncarie. Produce, including fish, was sent to market along this river 'highway'.



River transport was critical for the survival of early settlements along the Darling. Photo source: Wentworth Historical Society.

Pastoral stations were vast and homesteads and outbuildings were located close to the river to ensure watering points for livestock.

The introduction of sheep, cattle and horses gradually changed the river environment, degrading banks, reducing native grasses and saltbushes and adding nutrients to both land and water. These stations employed both Aboriginal and non-Aboriginal people, who all enjoyed fishing for fun and food.



The introduction of livestock had a profound impact on the riverbanks. Photo source: Wentworth Historical Society.



Properties like Dunlop Station on the Darling River, pictured in 1886, employed a variety of people to work the land and in the homestead. Photo source: National Library of Australia (PIC/9228/16 LOC PIC Album 76).

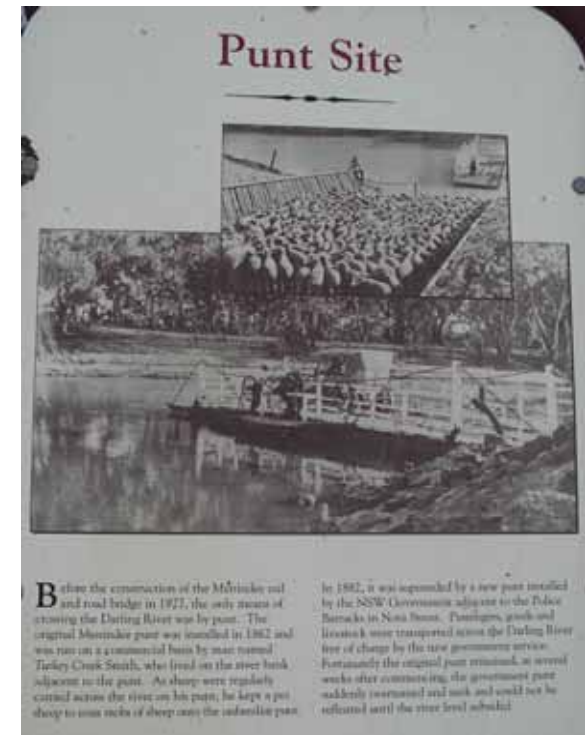
In 1886, George and William Chaffey secured 250 000 acres from the Victorian Government and began the development of irrigation schemes along the Murray and Darling Rivers. In this area, Wentworth, Pomona, Comealla and Dareton all started irrigating from the early 20th Century.

The arrival of soldier settlers after each world war meant smaller blocks and more permanent people in the area.



Surveyors, possibly looking at divisions for Soldier Settlement Schemes – one of the significant land development activities that affected the rivers of the Murray-Darling. Photo source: Wentworth Historical Society.

Vine and stone fruits were grown for the dried fruit market, and wineries eventually joined fruit and vegetable gardening. Irrigation kicked off the annual rhythm of seasonal workers who often lived along the river while they picked fruit and worked in the factories.



The plaque commemorating the original Menindee punt. The text reads: *Before the construction of the Menindee rail and road bridge in 1927, the only means of crossing the Darling River was by punt. The original Menindee punt was installed in 1862 and was run on a commercial basis by a man named Turkey Creek Smith, who lived on the river bank adjacent to the punt. As sheep were regularly carried across the river on his punt, he kept a pet sheep to coax mobs of sheep onto the unfamiliar punt. In 1882, it was superseded by a new punt installed by the NSW Government adjacent to the Police Barracks in Nora Street. Passengers, goods and livestock were transported across the Darling River free of charge by the new government service. Fortunately the original punt remained, as several weeks after commencing, the government punt suddenly overturned and sank and could not be refloated until the river level subsided.* Photo: Scott Nichols.

William Riley - *I'm trying to get our people to rally now*



In 1934, William Riley, a Paakintji man, was born in White Cliffs, a tiny opal mining town in the far west of New South Wales. His father worked as a drover, pushing sheep from station to market along the rivers.

The River!

William didn't see the river in the first few years of his life, but boy when he did!

Well, I was amazed when I saw the Darling River. I was about 6 year old when I first crossed the Darling River bridge in Wilcannia. My niece was a bit younger than me and she was frightened to cross the bridge – because the old bridge across the Darling had cracks in the boards - and she could have fallen through.



Darling River channel in flow. Photo: William Riley.

Fishing with Granny

When William was in his early teens, his father first sent him to an Afghan family in Broken Hill. From there he went to live with his Granny Quayle at Wilcannia. On the Darling River he learnt to fish with Granny and a couple of aunties.

I'd be running bait for them, keep an eye on the shrimp bucket, digging for worms. I was about eight years old before they let me touch a fishing line. They taught me to fish on a hand line. A lot of kids didn't know how to twirl a line and would get it hooked in their ear or in the back of their neck. Danger for a small kid, really.

In the right conditions, big groups would go down to the river in the evening for special night fishing.

When the river was really running low, it was clear as crystal and they used to get down there with hurricane lights. Sometimes we'd make fat lamps – 'slash lamp' we used to call them. We'd get hessian, roll it up and pour mutton fat around – melt it and fill it up with sand while the fat was still hot and you'd light the hessian and it would throw a good light. The light used to attract the fish, and that's how they'd catch them.

The ancient Darling

The main channel of the ancient Darling River once ran down the course of what we now call the Great Anabran. The threaded nature of this whole web of channels has always consisted of lakes, channels, anabranches and a river channel that interlace across the dry arid landscape. Sometimes it dries down to a series of pools and other times water flows across the plains, linking all the waterways together.

Fish evolved in this pulse and response environment – sedentary when it is dry, moving and breeding when it is wet. It is thought the main channel moved from the Great Anabran to its current position around 11 000 years ago.

At the time of European contact, when the Darling was in full flow, the Paakintji used cooperative fishing techniques such as nets to feed the large groups of people who had gathered to take advantage of this time of plenty. As the waters receded, weirs were constructed across channels and wetland inlets to contain and capture fish. As the waters slowly subsided the Paakintji would disperse, and smaller groups would work the smaller pools with spears and poison.⁸

The Darling is a dynamic river system that has always moved across the broader floodplain – and its people, the Paakintji and those of European descent, continue to learn how to respond to these changes.

The women fishers in his family were able to take fish home for people who didn't make it down to the river.

Yellowbelly, bream, there was never any carp in the river in those days. They'd feed their own families. And they shared them with the other families. It's a great sport and it kept everyone out of trouble. There wasn't any drugs around in those days and not much alcohol.



Trish Johnson, Paakintji woman, with two cod she caught from the Darling River near her home at Pooncarie. Photo source: Trish Johnson.

Lake fish

As William got older he would camp at Kinchega National Park with his family and friends. They would enjoy the Menindee Lakes, as time out from their day-to-day lives. They caught all sorts of fish in the lakes.

What they call the black bream has got a very small scale and more scales than the perch. And of course, they're harder to fillet too. They're very bony. A lot of thin bones.



The bony bream (*Nematolosa erebi*), also known as bony herring, pyberry, hairback herring, melon fish and thukari, is a hardy fish widespread throughout lowland rivers in the Basin. It's an important source of food for other fish and for birds. Photo: Gunther Schmida.

A young man's mistake

As a young man, William took on all sorts of work for the station owners in the western district. He worked with cattle, horses and sheep. As farming became mechanised, he got a license and tackled the modern equipment.

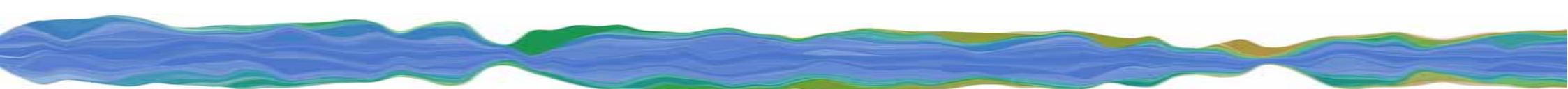
Planting crops on farms and big properties, erecting windmills, making corrugated iron tanks and troughs, setting up all watering

points and things like that. My dad was pretty proud of me taking on heavy machinery, until I woke up to myself.

William's attitudes to the farming that was going on along the river were changed one lonely nightshift out on the plains.

This Chinaman gave me a big area to myself to plant, to sow my crop and it had been worked before, and I didn't know. There was a nearby creek going past. I was on night shift, I thought the dust was changing colour; but then I realized, it was a burial site! And just on daybreak, I've unhooked the tractor off the combine, raced off the corner to prepare the machine for the next shift, and I came across a disturbed grave, where I'd been ploughing over these burials. I prepared the tractor, left a note and jumped in the ute, got outta there – I felt haunted, you know. The guilt I carry, and the damage that's been done to all of our rivers and our Country in general, that's why I'm trying to get our people to rally now.

Burials were once common along the river corridors, because of the softer soils. These same spots were favoured for ploughing and irrigation by the non-Aboriginal settlers.



I feel sorry for the old cod

Whether out camping, or travelling along the Darling for work, William and his family would see commercial and recreational fishers taking advantage of the wide open spaces – which also meant hardly any fishing inspectors.

I feel sorry for the old cod – everybody goes for the cod, and they're just about extinct. I was against the Victorians coming up to Menindee and they'd have camps set up all over the place. They were licensed fishermen, of course, but instead of Fisheries putting a quota on what they were allowed to take, they just let them go and they just hogged everything. Just too greedy. They used to come right up as far as Tilpa. Up the Darling. Set up big camps. Boats. Spinners and all their fancy lures. And some of them even carried gillnets with them, which are illegal. And they just got too greedy. And, even now, they still get away with a lot.



High river levels, such as seen here at Menindee, provide temporary habitat for native fish. They take advantage of the additional snags and the food that falls from overhanging trees. Photo source: Scott Nichols.



Inundated lakes and wetlands, such as Lake Menindee, provide critical habitat for many small native fish, yabbies and other invertebrates – important food for the larger fish. Photo source: Scott Nichols.

Cod & snags

- Snags are important habitat for both Murray cod (*Maccullochella peeli*), also known as Cod, Guduu, Pondee, Pondi, and trout cod (*Maccullochella macquariensis*), also known as blue nosed cod or blue cod.
- It's estimated that 80 per cent of Murray cod are found within 1 metre of a snag
- Trout cod move less than 500m from their home snag, with occasional explorations of 20-60km before returning home



Photo: Luke Pearce.

Bill Lever – Fishing for a living



Bill was born in 1926 in Albury where his Dad worked on the Hume Dam and his grandparents were the weir caretakers. During the depression, lack of local work

forced his parents into the drift to Melbourne. He served a plumber's apprenticeship but quit the day he finished because, as he said, he wanted to go back to the bush again.

Fishing for a living

He got a commercial fishing licence in 1953, just after he was married to Judy.

When I got my licence and we were living at Numurkah I used to fish the Murray around Cobram. I'd go up the Edwards around Denny and the Billabong Creek and used to drive over to Euston, Lake Benanee. Fished it all from Numurkah. I put in about five days and go home and pack the fish and send it down to Melbourne. Echuca can be pretty good for reddies. I'd sell them at Echuca on the way home. Shepparton was always good sale for cod. They didn't want reddies or yellowbelly, just cod.

In the 1960s Bill came to live at Wentworth and started heading north up the Anabranche and the Lower Darling to the Menindee lakes for his catch. Bill almost always fished on his own, working from his 18ft boat, setting nets to catch native fish for market.

But you know, the drum netting was the best living though, I liked drum netting. Plenty of exercise up and down the boat. It kept me pretty fit. If you've got 20 drum nets in - I'd shut the motor off, walk up the nose of the boat with the net, and jump back and set the net again. Get half way back pulling the oars, all depends on the current. I'd be walking over a mile a day just up and down the boat.



Drum nets like this one being set in Victoria were used throughout the Murray-Darling Basin.
Photo source: State Library Victoria (H84.488/135).

While mostly Bill fished on his own, sometimes he would meet up with other commercial fishers along the river.

I'd meet up with my mate Roy Wilson when the river was running. He'd be fishing upstream and I'd be fishing downstream. We'd camp nearby or together. Just sit there of a night-time, knitting up drum nets. We'd have our ice-boxes with us. There used to be a bloke who'd bring ice up for us from Wentworth once a week. And we'd have a tonne and a half of fish for him every week.

A seasonal catch

The bounty from commercial fishing in the Darling was seasonal – entirely dependent on the flow of water from upstream.

We'd be sweating on rain. Sometimes we used to get February rains then you'd get a bit of a flush for Easter. Then we used to start getting a good river, from the rains in March and April. She'd be rising around July. Every day from then on, the fish were getting up steam all the time. More and more every day. The last day in August that was always our best lift. That was also the day when you had to pull out.

The NSW regulations closed fishing in September to allow the fish to breed and for numbers to rebuild for the following season. But the water kept moving downstream, crossing over the state border, where the regulations were different.

Used to cry then, used to cry because bloody South Australian blokes, they could catch golden perch all the year around. We'd knock off and they're catching perch left, right and centre.

Rules and regulations

Fishing regulations currently vary between all Murray-Darling Basin states, something which has been a bone of contention for some time.

As early as 1928, during a visit to the River Murray in South Australia, the NSW Inland Fisheries Officer, Mr. H. K. Anderson, recommended a number of actions to the SA Minister for Agriculture, Hon J. Cowan, which would improve conditions for the Basin fishery.

Amongst these were a *schedule of lawful lengths* that would apply to both recreational and professional fishermen, and be in line with those in place in New South Wales and Victoria.

In addition, Mr Anderson recommended regular opening of Lake Victoria's gates to allow fish to move to the river, and fishways on Murray weirs⁹ – something that is only now being implemented.

Golden perch was the best

Cross-border fishing regulations regarding golden perch became more of an issue for Bill in the mid 1990s. In part, this was because one of the favoured fish for Indian, Chinese, Vietnamese and other Asian communities was golden perch. At this time, cooking fish using Asian methods started to become more popular among the broader community too. Bill says:

It really kicked on in the last 15 years when the Asians started getting used to our fish and they reckoned our golden perch was the best thing they'd ever had. They were our best buyers.

The coming of carp

Recreational fisher Rod Stone worries about the biggest change that he has seen to the rivers and to the fishing in the area: the carp.

When they first came here, probably late '70s, '80s, I reckon for the first four years after they hit here you could hardly ever catch a native fish. They just decimated the native fish population in my opinion. Then, after that, native fish started to pick up a bit. We used to catch native fish with carp inside them. You'd go down there and you'd catch

20 fish and 19 of them would be carp, and you might catch one little perch or something, that's about all.

Lagoons and backwaters are traps for the carp, who don't always move into the main channel as the water levels drop. Rod has seen this for himself:

We were driving through Boxer's Island trying to find whether there was any water in the billabong to get a tin of yabbies. We drove up and all you could hear was these fish. We walked back down over the bank and just saw these massive carp. I mean they were three and four foot long. Some of the biggest carp I've ever seen in my life. And they were just packed in this water hole. I reckon there must have been a million carp in there, at least.



Carp are often the last fish left in a drying wetland if it was possible for fish to escape. Photo: Scott Nichols.

Carp FAQs

Carp arrived in large numbers with the floods of the 1970s. These fish are now a major pest in the Basin.



Photo: Milly Hobson.

How many eggs do carp lay?

Carp can lay millions of eggs per year. Carp spawn on vegetation in warm, shallow waters such as found in wetlands and undergo population explosions following flood or high river events.

Can eggs be carried by birds' feet and survive in mud and in the water to be fertilised at any time?

No, carp eggs only survive out of water for a short time and are usually attached to plants. Unfertilised eggs soon die.

Can carp stay alive in mud?

No, carp cannot live in mud.

Do carp undermine river banks?

Carp feed by sifting through mud but there is no evidence that they undermine river banks.

Do carp spread diseases to native fish?

A large number of parasites, diseases and viruses have been associated with carp but there have been no specific reports of deaths of native fish caused by carp-borne diseases in Australia.¹⁰

Bill has also seen changes since the carp arrived:

Because carp were feeding on the bottom, they ate all the catfish eggs. They just go along sucking everything up. Catfish used to lay eggs in stony nests and you could see a hollow in the bottom of the creek when it went dry. Plus all the little water snails. In the summertime when we were drumming, they'd be just encrusted with snails, we had to run our hands down and knock them off otherwise you'd ruin the boat. I haven't seen a snail since the carp. They tell me there's a few down South Australia, in some of the pipes there. And that was the main food of the catties, plus all the mussel beds, they wiped them out too.



Natural populations of *Notopala* spp. are now thought to be extinct in the Murray-Darling Basin, however small populations are surviving in irrigation pipelines. Source: NSW DPI.

Little things lost?

Historically, the Murray-Darling Basin supported about 18 species of snails, but natural populations of nearly all of these have declined.

Some of these, like *Notopala* spp., were thought to be extinct until rediscovered in the mid 1990s in irrigation pipelines, where numbers are still limited.

Notopala spp. produce 'miniature adult' babies and so require high protein, low carbon diets. River regulation is thought to have encouraged carbon rich algae in stable weir pools, meaning these snails don't get enough of the right food.¹¹

Len Hippisley observed changes in the Darling River over a 42 year period. He noted the loss of a small aquatic insect.

A change I noticed [around 1953] concerns what I describe as a tiny microscopic water flea, they were always evident in the water especially when furrow irrigating. Water soaking into the earth would be laden with these tiny insects, hardly noticeable except by their absolute mass of numbers enabling them to congregate on the water in billions forming a level line up to an inch thick. They are not seen like this anymore. I believe that they must have been food for small, newly hatched fish and crustaceans, similar to tiny sea plankton of the oceans. I have not been able to identify this insect, and capture exercises carried out by various different bodies have been unsuccessful.¹²

Len accounted the decline in native fish catches at that time to the disappearance of the water flea.

Rod Stone – Drought rivers and flood rivers



Rod was born in 1955 in Mildura but for a number of years lived at no fixed address with his family. His dad was a rabbit trapper, so they travelled up and down the Darling and the Great Anabranch making a living

on the fringes of the pastoral industry. They lived in a shanty on the river, and Rod's childhood was rich with the experience of the great outdoors.

Oh, I was probably fishing by the time I was about three years old. We used to have a place on the river– they'd call it a shanty now I suppose, but it was probably a fairly good house back then. We used to have all kinds of animals; rabbits, goats, kangaroos as pets. We had a dog, but no cat. We just lived there up 'til I was about five and a half and then we moved into Pomona so that we could go to school.

Fishing – part of life

Fish were part of the staple diet of an early life lived on the riverbanks. And after they moved to town, Rod and his family continued going to the river as much as they

could, joining their Dad on weekends and during the school holidays.

It used to be mainly perch, the odd cod and catfish. We used to get silver perch in the Murray. There used to be a lot of other native fish that you used to see swimming around. At odd times, you'd get a little gudgeon type. Tiny little fish. We used to call them 'minnows'. We wouldn't know what they were. But the odd times, you'd get them.

Gudgeons

(*Hypseleotris* spp., *Philypnodon* spp.)



Western carp gudgeon. Photo: Gunther Schmida.

- Group of small native fish, usually 8cm or less
- Bottom or mid water dwellers that prefer wetlands, or slower waters with aquatic plants
- Food includes microcrustacea, aquatic insects
- Males guard and fan eggs while they develop

Over the long summer holidays it was hot and dry. Christmas Day was always a traditional day at home trimmed with a hot roast lunch. But on Boxing Day, the Stone family celebrated a different tradition.

Oh, they were fun days. Christmas night after tea, we'd start getting everything organised, have it all packed up, ready to go next morning. We'd leave at day break. We used to take all the cold meat and things left over from Christmas Day. And we'd go up the rivers fishing and swimming, play cricket and go out in the bush walking and just having fun. There was a couple of other families used to go with us. Just a fun day out, it happened every Boxing Day, it was just a ritual.



The notice board at Fort Courage, Wentworth Angling Club's home base, is covered in photos of successful fishing trips and get-togethers. Photo: Scott Nichols.

Dry, very dry and drought ...

The western district of New South Wales has a highly variable climate. You get dry, very dry and drought. Rod has seen the Darling River and Anabranch in all these stages – each one with its own special fishing conditions.

I've been up the Darling when it's only been holes; a little trickle between each hole. We used to use lures called 'floppies' back in those days. You'd cast your lure out and let it sink, and you'd actually see five or six feet down into the water 'cause they were all clear, pools. You could actually see the fish come up and strike the lure. That's a fantastic feeling when you see a big fish come up and grab the lure.

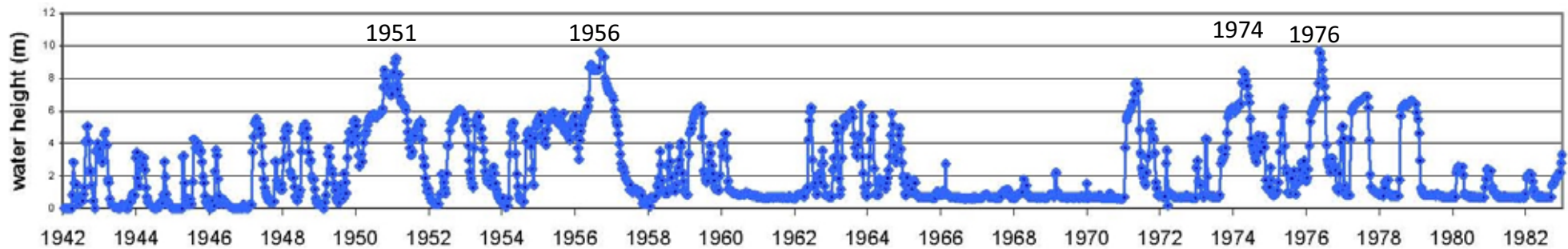
... then flood

But Rod has also seen plenty of the other extreme that people of the west experience – the floods that can take months to travel down from all the upstream tributaries. The dry beds and creeks of the Great Anabranch and its floodplain changed dramatically once the water arrived.

Some of the creeks were like channels and were probably about eight or ten feet deep, so they weren't shallow. There were five or six of them together in this little spot on the Anabranch. One of the main ones that used to run off the main channel and it would nearly do a loop, and then it went back into the delta. It used to roar down that one. You couldn't stand in it when it was running real hard. It used to knock you over. We used to get a few fish but it was good for yabbing!



The Darling River in 2007 during the recent drought (above), then in flow in 2010 (below). Photos: William Riley.



Len Hippisley meticulously measured and recorded water heights at Burtundy Weir on the Darling three times a month from 1942-1982. The graph shows just how variable the river height can be and reveals that the 1951 flood peak was almost as high as the memorable 1956 and 1976 floods and was higher than the flood of 1974. Data source: Len Hippisley.

1956 at the confluence

After WW2 the irrigation areas around Mildura were cut into smaller blocks for soldier settlers. Each pair of blocks was supplied with a Bedford truck and a TE20 Ferguson tractor.

In 1956, flood waters threatened Wentworth from both the Murray and the Darling systems. The 'little grey Fergies' were brought in to build levee banks while the water was still far away. A fleet of these light little tractors, with earth scoops on the front and trailers at the rear, successfully sandbagged Wentworth, which sits at the confluence of the two rivers.

Locals knew that the light red sand that filled the bags would not be enough. So they fortified levees with a layer of red river clay that baked solid in the sun. Levee banks protected the hospital, pump houses, power station and most of the main town.⁵ Mildura, just over the Murray River, was not so lucky, experiencing some of the most devastating flooding in 1956.



Fergies at work in the 1956 flood, Wentworth.
Photo source: Wentworth Historical Society.

Clayton Sharpe is a fish ecologist who works for the Murray-Darling Freshwater Research Centre in Mildura. He grew up in Mildura angling and yabbing in the irrigation channels, rivers, backwaters and the Great Anabranch. He too remembers arrival of flood water from rain events upstream and its effects on fishing:

They were slow in that it seemed slow, but really, in two days the river would change. It would go from a slow river to a really happening, fast flowing system and then the full front would hit, sometimes it seemed, in less than a week. It was slow in terms of how far it was inundating but it was just roaring. Even on the flood plain there were current lines and it was just beautiful to see.



The 1956 flood – well and truly covering the floodplain. Photo source: Wentworth Historical Society.

Floods, droughts... and fish

Flow in the Murray was, and still is, much less variable than in the Darling which is dependent on the less reliable rainfall brought by tropical monsoonal winds in summer and autumn.

The largest flood in the upper Murray was in 1870 and the largest in the Darling was 1864. The largest in the lower Murray was in 1956 when smaller floods in the Murray and Darling Rivers combined.¹³

Prior to river regulation, droughts have at times reduced both rivers to a series of saline pools. In the Darling this still occurs, and was observed in the recent drought.

Native fish have adapted to these extremes in flow and use water levels and water temperature rises as breeding cues for 'the good times ahead'.

The recent floods in the Darling and the Great Anabranch have allowed fish to breed and access floodplain habitats that were unavailable at low flow. Monitoring of the Great Anabranch in late 2010 recorded 16 433 fish from 11 species. Golden perch and carp gudgeons, and introduced carp and Eastern gambusia, were the most common.

'Young of the year' golden perch (fish born that year) were caught prior to the Darling flowing into the Anabranch, indicating these fish probably took advantage of the filled Lake Cawndilla and bred there. Similarly, the majority of the baby carp collected was also thought to have come from this lake. Baby bony bream were thought to have originated from both Lake Cawndilla and the lower Darling River.¹⁴

Jenny Whyman – Wiimpatja women fishing



Jenny was born in 1956 and first lived in a river camp on the Darling at Menindee. Her family lived with a mob of other Paakintji families on one side of the river and

regularly visited the other side. There her aunty lived with Vince Etrich, a Yugoslav man, and they could visit Uncle Jack Kelly, a Mutthi Mutthi man, and Auntie Lou Reeks, a Parappa Parappa woman.

Family, river, fish

Jenny explains why they were all in Menindee:

They worked at all the stations along the rivers. That's how we all got together there. And my mum and dad worked in Menindee, picking fruit, like watermelon, rockmelon, topping onions, picking tomatoes and all that sort of work, and when the work ran out, my mum and dad decided to move to Dareton.

Jenny remembers how everyone would congregate on the riverbank in the afternoons and weekends:

There was a few families and we all got together every afternoon, after school, and particularly on the weekend, we all loved the river, and we'd all go down and catch some fish, some yabby, and some look under the leaves in the river, in the bark, we'd get the yabbies out of there. Some make their own little line out of cotton, and meat; tie the meat on the cotton and get the yabbies. We didn't sit on the river bank, we'd sit on the logs. On the broken branches that sat out in the river. When we got in the water, we'd all just dive underneath and we could catch the fish that way as well.

With the Menindee Lakes nearby, and the river on their doorsteps, Jenny's families were never short of fish to eat.

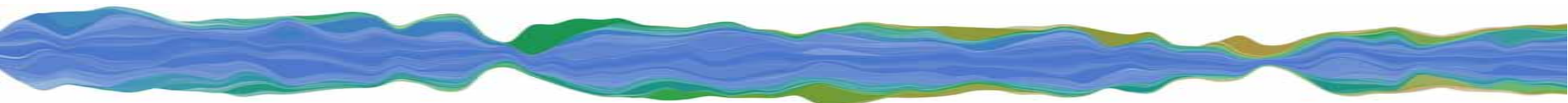
When we were kids growing up, my main fish was catfish. Oh, I could eat catfish all day. But we can't get the catfish now. We also used to eat yellowbelly, perch and black bream. That's the main three fish. I didn't eat cod. But I ate all the other sort of fish if I couldn't catch catfish.

They lived together, played together, worked together and learnt about the river and surrounding countryside together.

We were all one big family and we all shared. When we went out and got the wild food, we all had a bit of that. We were all really close. There was other members of the family on the other side of the river. My mum's sister and her husband, they owned a big block – we just swam across the river to get our veggies and fruit.

Jenny was also lucky enough to enjoy a special fish recipe that her Uncle Vince brought with him from Yugoslavia.

He used to catch the carp and we used to catch the carp for him. And people say 'Oh, how do you eat carp?' and I'd say 'Well...like this'. Before he cooked the carp for us, he used to soak it in big jars with vinegar with some other ingredients. He'd cut the head off, then he'd cut it up in all little pieces and then he'd put it in this big jar, and then, I think he left the fish in there for a week, and when it's all ready, then he'd get it out and cook it for us. It was really lovely.



All the fish were dead

In the drought years from 1985 onwards, the upper Darling declined in flow severely until, in 1991, most of the river from Mungindi to Menindee turned bright green. This was an extended blue-green algae bloom that ran for one thousand miles.

Jenny remembers:

No fish. In the river at Pooncarie, all the fish were dead. I don't know what happened there. They found the fish floating. In Menindee the water was so green, no one could get in it.



Algal bloom on the Great Anabranh in August 2000.
Photo: Bill and Elaine Grace.

Blue-green algae

During the 1990s, blue-green algae bloomed all along the Darling River and tributaries. There was widespread popular belief that the bloom was caused by toxic chemicals running off from intensive agriculture upstream as far as Queensland.

The scientific assessment, after careful study found that two things caused the bloom. Firstly, excessive pumping from rivers with low flows. This was made worse by long periods of sunny days. Combined, these factors created a still and warm water column perfect for blooms of algae.

Secondly, high nutrient levels in the water caused by fertilizer, not toxic chemicals, running off from a range of agricultural enterprises. Animal manure from pastoral properties and human solid waste from ineffectively sewered towns along the river also contributed to high nutrient levels required for algal blooms.⁶ However, it remained easier, and certainly more popular, to blame the cotton industry!



Blue-green algae in the Great Anabranh in 2003.
Photo: Bill and Elaine Grace.

Our river is dry

Bill Lever worries about the lack of flow in the river. While this area always feels the effects of Australian droughts, Bill believes it is the water extraction that has increasingly caused problems for fishers over his lifetime:

There was no irrigation going on back in the '50s really. There was no irrigation water coming back in – it was good natural water. Sometimes there might have been a little bit of rice growing, but not to the extent that they do now. And when those cotton blokes came, they took all the water. Back in the '50s there was none of that, just natural river all the way, practically nothing growing on the side, there was no spraying. Just good water. Once they got a bit of fresh water coming in, especially the Murray, if it went over Hume Weir, off they go. That's the same if you could get good water out of the Bulloo River and country around Tibooburra. The fish just went boom – population explosion then. Fish everywhere.

In the last two years Jenny has joined other Aboriginal representatives from the Murray-Darling region on the Northern Basin Aboriginal Nations Committee. She has travelled to other parts of the Basin and started to see new things about the river.

When I went away for the first NBAN meeting in Moree, I saw the big irrigation channels. I saw the cotton growing, and I was really upset. I was thinking 'our river is dry'. We'd had green algae in Menindee, and we couldn't swim in there. But when I went up there and saw that, it really hurt me. And then I went to another NBAN meeting up in Roma in Queensland; I saw all the cotton in St George, and it hit me again. To see that river dry like that, I was really hurt because those people are holding that water up there. That water should be allowed to flow a natural flow. It has stopped us from getting our fish, our turtles. I still eat turtle, still eat fish, witchetty grubs; all my wild food. Without that, I wouldn't live here. Fish, to me, out of the river, is our main thing.

Great Anabranh pipeline

For the last 10 000 years the Great Anabranh was wet or dry depending on seasonal rainfall. Mostly it was dry.

Over the years Anabranh landholders built a series of blockbanks, retaining water when present but hampering fish passage. Initially, the water was good for cattle, sheep and fish that lived in the semi-permanent pools.

The Anabranh was also used for recreational fishing, swimming and picnicking. Over time the water became salty.

For twenty years, fish scientists and water managers negotiated with graziers for a return of the Anabranh to a more ephemeral state.

By 2006 a pipeline was built from Lake Cawndilla to supply water to these stations, and by 2009 all the built structures were removed. During the recent drought water security for livestock and people who live there was guaranteed.

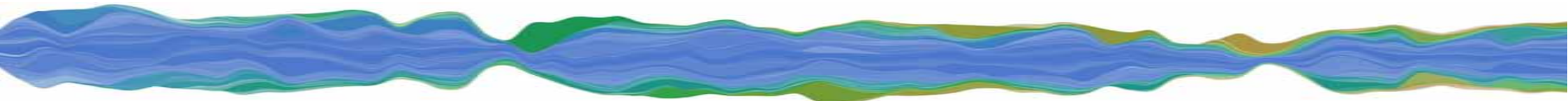
In 2010, water once again flowed down the Anabranh and met the Murray, allowing native fish to use the Anabranh and move for breeding.



Irrigation offtake Tandou Creek. Photo: Scott Nichols.



Pipeline being laid to Bill and Elaine Grace's property on the Great Anabranh. Photo: Bill and Elaine Grace.



Making connections

Getting their hands dirty

When the drought struck the Darling hard in the last decade, Jenny Whyman and her aunties made a special effort to keep going to the river. Jenny reflects that the river was never that dry during her childhood – but as an adult, the dry was a time when they could do their bit for the river:

And when the river was dry, my auntie and I used to go and walk in the river bed. Because what else could we do? Couldn't go fishing. And my auntie used to say to me; 'Look, what are all those sticks in the river? All those broken bottles. They should be all pulled out when the river's dry you know, 'cause when the water's in there, people can get cut, and stick into people when they dive in and swim around.'

Carmel Chapman works at the Wentworth Information Centre. Born in 1941 and raised in Merbein, she has lived in the area all of her life. She thinks that we should listen to a range of knowledgeable people about the rivers:

Aren't we dumb? We don't even listen to what Aboriginal people say and it's in their soul. The Anabranche is the original course of

the Darling River. The scientists say that 10 000 years ago the Darling forced this new course down to Wentworth. But still to me, the Anabranche is highly important. And I don't think you interfere with an original source of a river. Especially the Darling. Patience is what we require. Patience. And a bit of thought about what we are actually doing with this water.



The dry river below Wilcannia, in August 2007. Photo source: William Riley.

William Riley has been out talking to everyone who will listen about the state of the rivers, at local forums, like the Northern Basin Aboriginal Nations meetings and at global forums.

November 2005, I was chosen to go over to Uganda for a world convention on protection of rivers and wetlands. I talked from the heart. I threw the sheet of paper aside, and let it go from the heart and I got a good reception from the audience. I'm trying to tell people. They've got to get off their bottoms. Get off their butts to help the rivers.

Anger and joy came with the rain

Rod Stone is gravely concerned about the management of water and the blackwater events that came with the rains in 2010. In October of that year there were widely publicised fish kills at the Wakool River. Rod says that it was the third in eighteen months:

The angling club sent a letter to the New South Wales government condemning what they've done, through our local MP, John Williams. They've actually been filling wetlands and forest areas like the Barmah Forest for a fortnight, and then leaving them, and then draining the black water back into the Murray and that's what's caused the death of so many fish. In my opinion, there's been enough flow. They should have just let it run through naturally, and as it runs

through naturally, it would have cleared itself. There would have been more fresh water and it wouldn't have depleted all the oxygen, it wouldn't have become as black as it did.

In 2010, heavy rains in the northern catchments flowed down the river, filling the lagoons, lakes and creeks along the way. For the first time in a decade the Great Anabranh of the Darling River flowed down to meet the Murray. Jenny Whyman describes the euphoria that came with the water:

We were going to Broken Hill for a meeting. And I said to my husband 'I hope there's water in this Anabranh'. We went over the bridge, and all of a sudden, I was going mad, and I said 'C'mon, stop, stop, stop!' So we made our own track down to the water and I just took my jumper off, took my shoes off, rolled my trouser legs up and I was in there. Ohhhh, I was in there. And it was really lucky. It had just started coming down. Must have been the second or third day. And I went in and I was getting all the leaves, I was chucking them all out, to see if I could see any yabbies or shrimps. Yeah, I went mad when I saw it 'cause it was dry for a long, long time.

Blackwater

- Blackwater events occur naturally
- They occur when there has been a build up of leaf litter and woody debris on the floodplain, followed by enough rain to submerge this material and high enough temperatures that it begins to rot. The water becomes discoloured and usually oxygen levels drop significantly
- Blackwater events can harm aquatic animals such as fish. Some animals, such as crayfish, have been seen escaping the water during such events
- There can be long-term benefits. Carbon from the decomposing organic matter enters the food chain, increasing the population of aquatic invertebrates which then provide food for fish
- The impact of an event can sometimes be reduced by water releases to dilute flow. However, this is not always possible and can actually cause the blackwater to spread downstream with the pulse of deoxygenated water



The flows down the Great Anabranh in 2010 saw blackwater produced as leaf litter and other plant matter began to rot. Not every blackwater event causes a fish kill and in 2010 no major fish kill was recorded in the Anabranh. Photo: Scott Nichols.



A dry Lake Menindee in 2007. Photo: William Riley.



A wet Lake Menindee in 2010. Photo: Scott Nichols.

Visions for the Darling and the Great Anabranch

The fishing people who contributed to this project have all talked about their hopes for the future of the river. Many felt they had seen some improvements but most don't feel the river is as healthy yet as they would like to see it. Each of these fishers suggested ways to help the river and in turn help provide healthy habitats for fish.

As the president of the local fishing club at Fort Courage, Rod Stone is keen to support ways to bring back the fish. A Lower Murray Darling CMA led initiative to remove willows from the waterways in his area has caught his attention.

Apparently, they're supposed to be coming to do that over the next five years so there'll be no willow trees left in the river here. It will take away some fishing habitat but willows can be very invasive. I've seen pictures of them in streams further east of here where they look like they've actually clogged the whole river up. They just about touched on either side. Actually, Wentworth used to be a bit like that. Fish will still be around snags elsewhere but they won't be around the willow trees.

Commercial fisher Bill Lever thinks that the future of the river revolves around water quality. He remembers what it was like in the past – especially for yabbing – and would like to be hopeful about a new era of clean water:

Queen's Birthday weekend South Australians used to come up in the thousands, craying. This is going back in the '50s when there was good water. Now, the water's changed and we haven't got the quality of water that we had back in the '50s. So that effect's evident in the numbers of fish and crays. If we could get good water they will breed up again. But I don't think that we'll ever get good water again now. That's the finish of it I think. Then again if they send more water down, buy three-parts of the water back off the irrigators, we might do some good.

Clayton Sharpe is aware that there have been many changes in the river over his father's lifetime and over his. He recognises that what one generation sees as normal might not be the way it always was. Helping the river by caring for fish habitat and river environments might be a change that will bring more fish for future fishers.

My father and grandfather used to fish a lot in Lake Victoria and they would catch a lot of introduced redfin. By my generation, they were gone. Before my time there were heaps of catfish, apparently. My uncles and my father talk about them being in pest proportions. They used to get annoyed with how many they would catch. I can't actually ever remember angling one. It's hard to believe that in one generation it can change.



Clayton Sharpe (pictured with his son, Tully) hopes that by caring for the river and its habitats, native fish will still be around for his kids to see.

Photo source: Clayton Sharpe.

Jenny Whyman hopes that it will come back to the basics for the future of the Darling River.

That's how I grew up in Menindee on the river. And, today, I still go back to that same spot over the river. We can't live without that river and the Nguku in the river. And 'Nguku' means water in the Paakintji language.

State of river: 'moderate'

The Sustainable Rivers Audit (SRA) is an ongoing systematic assessment of river health of 23 major river valleys in the Murray-Darling Basin. Environmental indicators (themes) include hydrology, fish and macroinvertebrates, which are monitored and will highlight trends over time.⁷

The Darling Valley was surveyed in 2005. The Darling Valley fish community and Ecosystem Health in the 'Lower Zone' were considered to be in poor condition. A little fewer than half the native species predicted for this zone were collected during surveying (47%) and introduced fish comprised a little over half the biomass (53%).

Bony herring, Australian smelt, golden perch, Murray-Darling rainbowfish were numerous, with carp gudgeon and spangled perch also common. Of the introduced species, Eastern gambusia, and carp were most common. Goldfish were also captured.

Menindee Lakes scheme

The Menindee Lakes Storage Scheme includes Lakes Wetherell, Pamamaroo, Menindee and Cawndilla.

Early newspaper reports indicate the Darling River only flowed 9 out of every 12 months, and the Great Anabranh was 'dry in the middle for eight years out of ten'.^{a,b}

Despite this, it was hopeful that the Anabranh and Lower Darling could provide water for Broken Hill and large scale local irrigation development. By 1914 the Great Anabranh was lowered at its upstream junction with the Darling for a second time to facilitate earlier flows and improve conditions for settlers.^{15,c}

Variable flows in the Darling and the need to find a secure water supply for Broken Hill saw periodic calls for a 'water scheme' to be developed so that the Darling River could be turned into a 'veritable Nile'.^{b,d} The Menindee Lakes were looked to for water storage, although the risks associated with high evaporative losses and erratic Darling inflows caused concern.^{d,b}

Debate continued for over 40 years until works finally began in 1949, with an estimated construction time of 6-7 years and cost of £2 300 000.^e

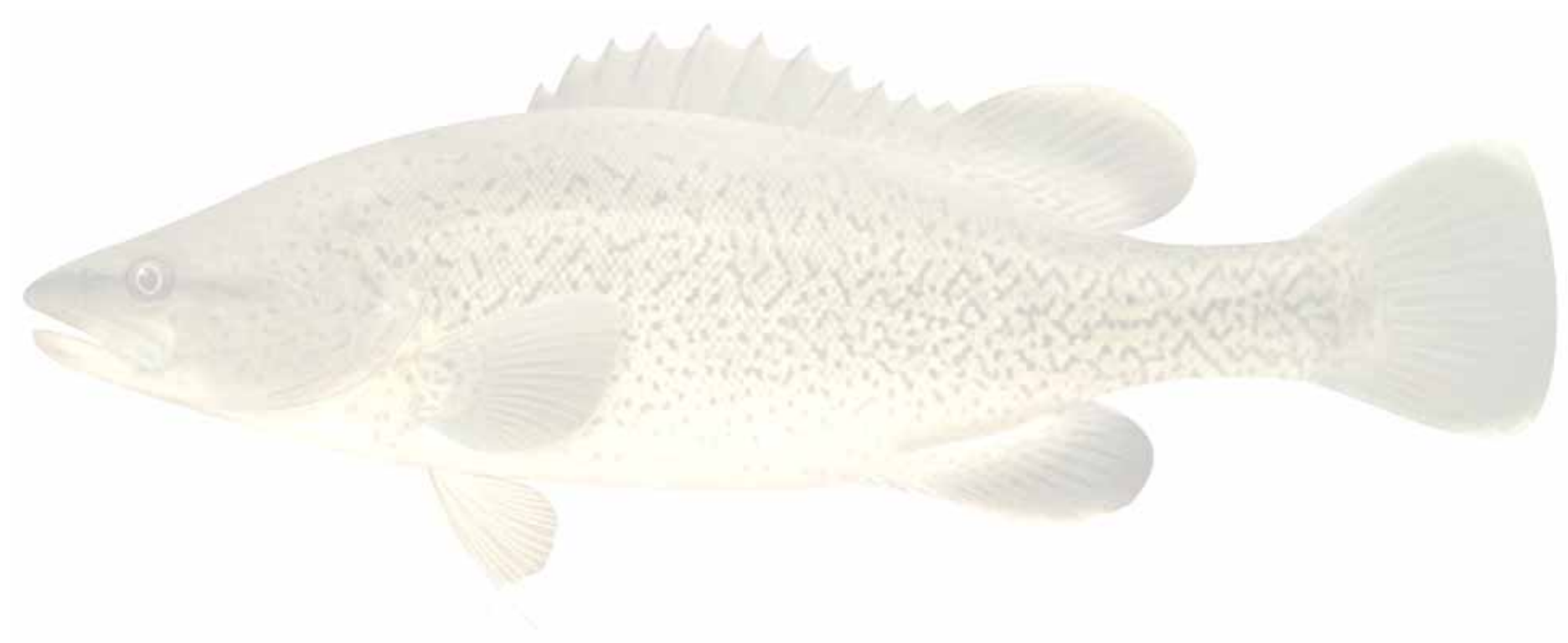
Although project construction took 11 years, with Menindee Main Weir commissioned in 1960, these works provide water security for Broken Hill and at times of high flow can deliver water down the Great Anabranh and onto the lower Murray.

Newspapers.

- a. Barrier Miner (Broken Hill) Monday 11 April 1910, p6
- b. The Sydney Morning Herald (NSW), Thursday 16 February 1933, p8
- c. The Argus (Melbourne), Thursday 20 August 1914, p5
- d. Barrier Miner (Broken Hill), Friday 24 February 1928, p2
- e. The Sydney Morning Herald (NSW), Saturday 2 December 1950, p11



Emu tracks in the grey clays surrounding Lake Menindee. Photo: Scott Nichols.



Murray



Source: Corowa Fishing Club.

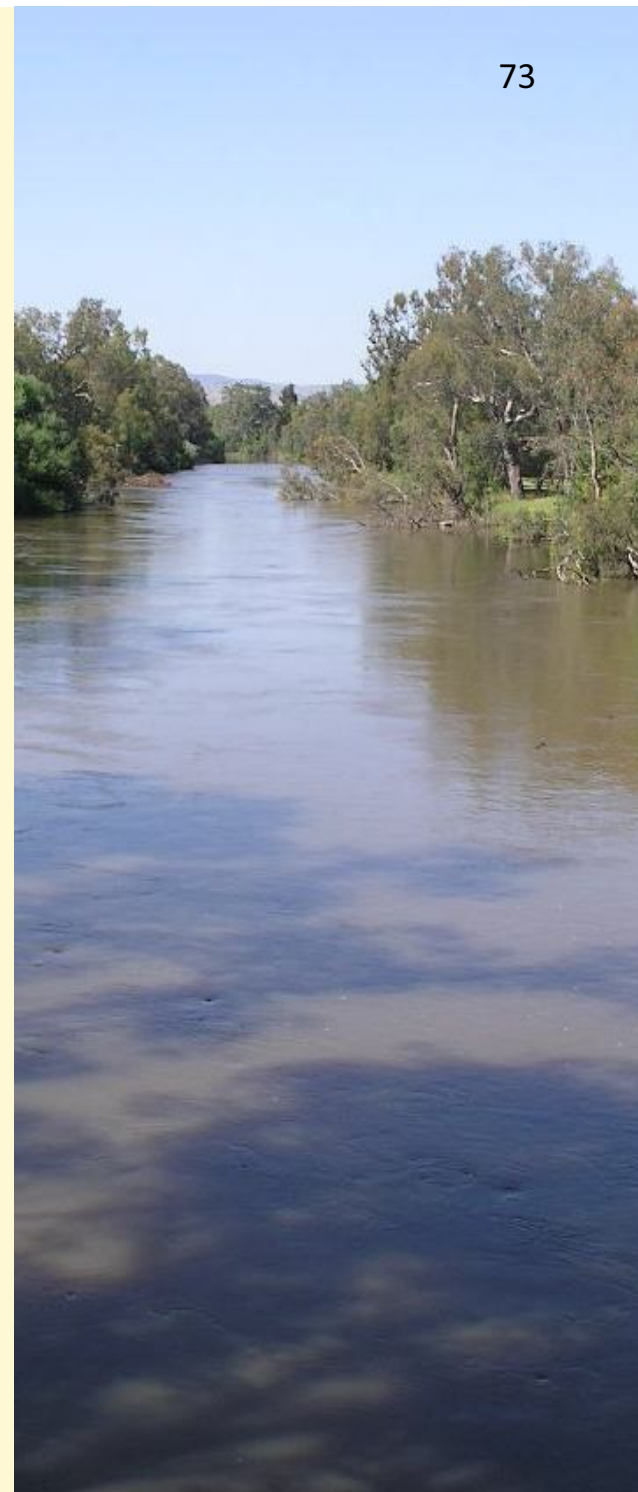


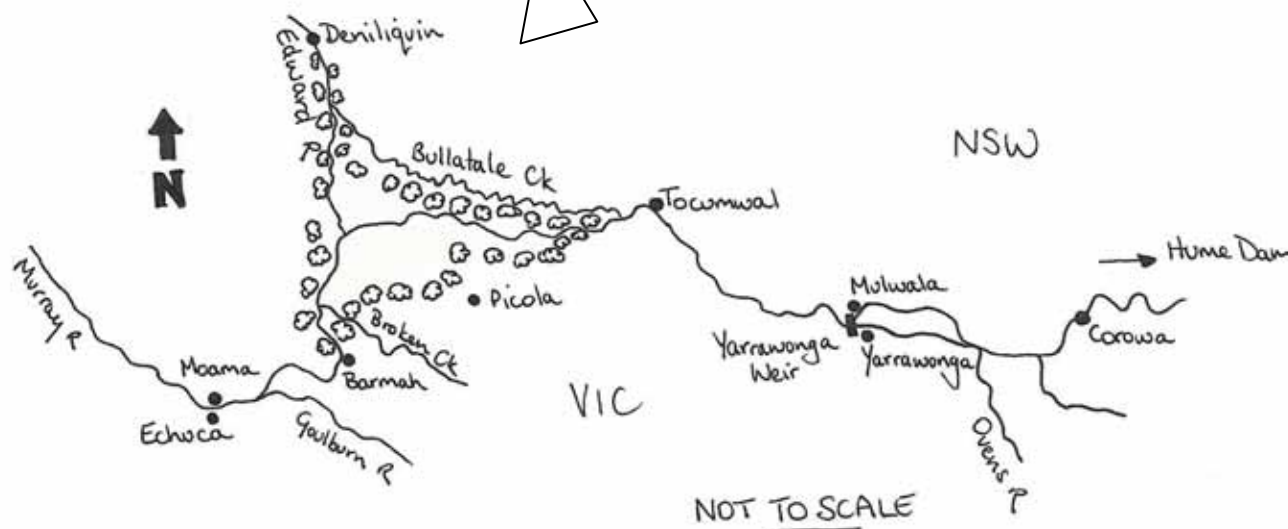
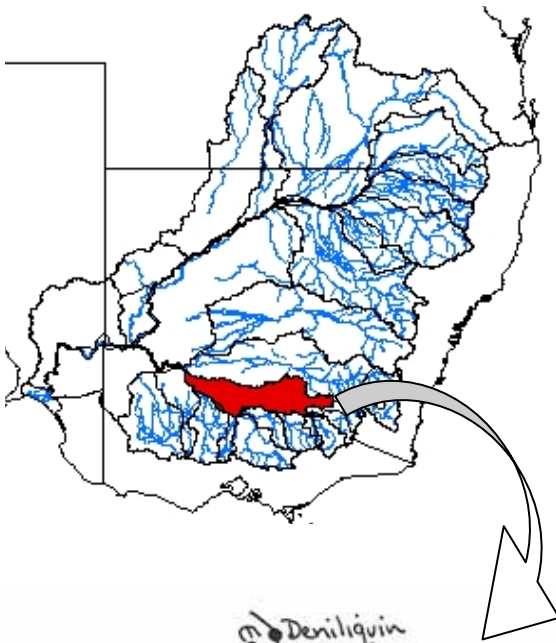
Source: Aboriginal and Torres Strait Islander Pictorial Archive, N3766.34: Henry Atkinson, a Yorta Yorta man in the 1890s.



Source: Colin Green: Colin Green and grandson, Blake.

Source: Scott Nichols.





Gavin Vale is a third generation farmer and fisher. Gavin learnt to fish in the many irrigation channels that run through the Murray River floodplains Picola. Photo: Jodi Frawley.



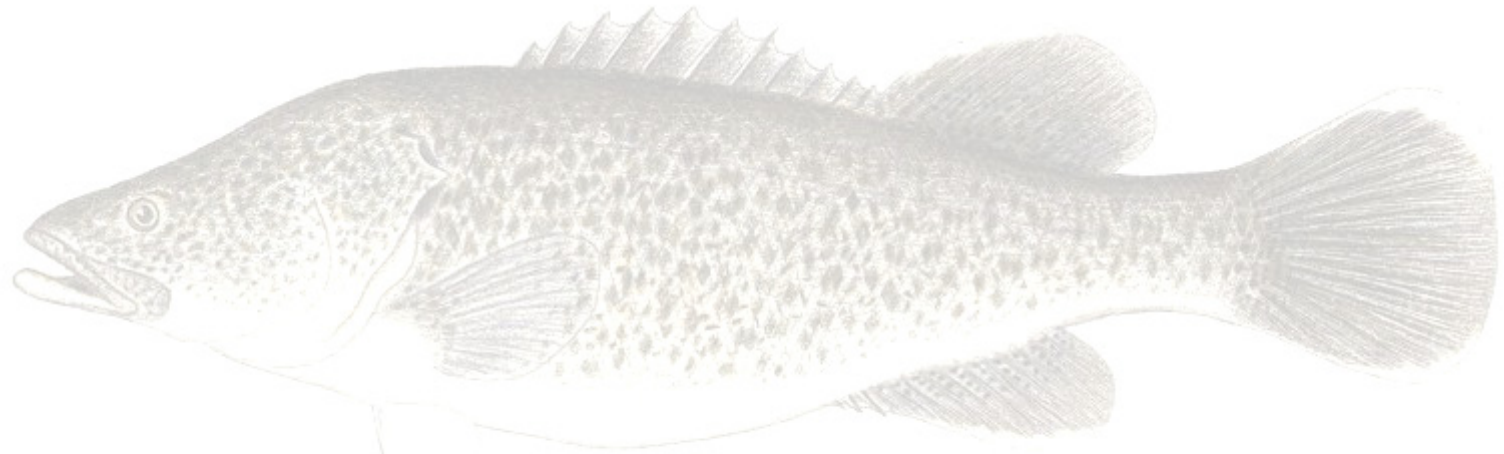
Like his father and grandfather, **Dennis Lean** is a hairdresser in Yarrawonga. Dennis was fishing before he was going to school and continues his hobby today – even selling fishing gear in his hairdressing shop! Photo: Jodi Frawley.



Wally Cooper lived on Yeilima Station on the Murray River. From the time he was three, he and his grandfather lived between traditional Moitheriban culture and modern lifestyle. Photo: Jodi Frawley.



Marg Crago and her brothers **Colin, David** and **Hayden Green** are four of the five Green siblings who grew up swimming and fishing in the lagoon that bordered the family home. Marg, Colin and David photos: Jodi Frawley. Hayden photo source: Colin Green.



The loveliest picnic places abounded along the banks of the river, with sand bars, and shaded gullies, red-gum and wattle trees, and deep quiet pools enjoyed by the anglers. ... Fish abounded such as Murray cod, yellow bellies, catfish, redfin, which was introduced, mussels and Murray cray The water was clean in those days.

A. N. Loughnan (ed). *Harnessed Waters - a River Dammed* (Yarrawonga, Vic: The Yarrawonga Shire Council, 1989), p 13

Introducing the river and its people

The Murray River is the boundary between NSW and Victoria. The river both defines boundaries and unites them with the waters that sustain townships, irrigation and the floodplain forests, including the 70 000ha of the iconic Barmah and Millewa Forest.

The river and its floodplain are the traditional lands of the Yorta Yorta and Bangerang people. The Murray is a very different river to the one the Yorta Yorta and Bangerang peoples once knew and fished.

Baiaame beginnings

Dr Wayne Atkinson, a Yorta Yorta man, tells the creation story of the Goulburn and Murray Rivers:

Baiaame created the river by sending his woman down from the high country with her yam stick to journey across the flat and waterless plain. Baiaame then sent his giant snake along to watch over her. She walked for many weary miles, drawing a track in the sand with her stick, and behind her came the giant snake following in and out and all about, making the curves of the river bed with his body. Then Baiaame spoke in a voice of thunder, from up high. Lightning flashed and rain fell, and water came flowing down the track made by the woman and the snake.¹

The arrival of the Europeans

Hamilton Hume and William Hovell crossed the Murray upstream of Albury in 1824 and declared it be named the Hume River. There they saw Aboriginal people setting fish traps made from sticks and wattle boughs and noted:

The river abounds with that species of cod fish which is common in all the western rivers. In the lagoons they caught a kind of bream or carp, of the weight of about two pounds, and of the finest possible flavour. ... Fish caught in the river, seem to form the principal part of their food.²

The abundant water and regular flow from the spring snow melt made this area prized by both sheep and cattle graziers.

The 1850s gold rush started the river-boat trade that connected the Upper Murray to Adelaide.

Fruit growing, dairying, wheat and fodder cropping joined the continued sheep and cattle grazing in the area. New industries brought new people to the area. Aboriginal and Anglo people were joined by Chinese, Italian and, more recently, people from Africa and Asia.



Commercial fishers, such as David Rolton pictured in about 1957 (above), plied their trade to local towns, and sent stock to market by river and rail.

Photo: NLA- NLA.PIC-VN4189240.

Nineteenth century dreams of controlling the unpredictable river flows led to the major engineering plans of the Murray Water Agreement: 26 weirs and locks between Echuca and Blanchetown, and a channel system to deliver water for irrigation. By the end of the 1940s, Yarrawonga Weir, Weir 15 at Euston and Weir 26 at Torrumbarry had been built.

Eleven weirs on the lower Murray were also finished, but plans for 13 other weirs from the River Murray Agreement were abandoned.

Today, flows in the river are controlled by Hume Dam – the first of 15 structures on the main channel. By the time it reaches Corowa, the Murray has changed from a small clear stream to a fast flowing river, its waters tea brown. Near Yarrawonga the Murray enters Lake Mulwala, where the skeletons of old drowned red gums are a stark memorial to the way the river has changed.

As industries changed, so different nutrients and wastes ended up in the river, changing the water quality for the fish.

Fishing for recreation and for food has been a constant throughout these changes. In recent times, fishing-based tourism has developed and brought big summer influxes of people to the area.



Juvenile red gums line a lagoon on the Murray.
Photo source: Colin Green.



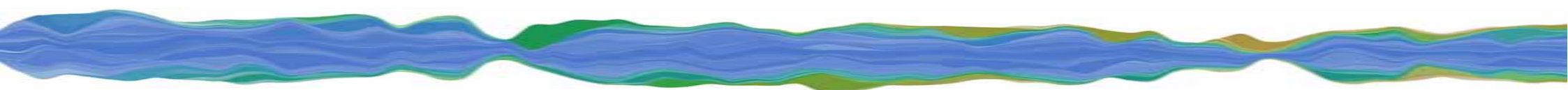
Yarrawonga weir, viewed from the downstream side, creates Lake Mulwala. Photo: Scott Nichols.



Lake Mulwala's drowned red gum forest. Photo: Scott Nichols.



Lake Mulwala used to be drained for weir maintenance. The snags and woody debris, so loved by Murray cod, are clearly visible. Photo: Dennis Lean.



Gavin Vale – A poacher's paradise



Gavin is the fifth generation of his father's family to live right near the Barmah Forest, where they were originally timber workers. For three generations they have run a sheep farm at Picola.

Folklore and Fishing

Gavin learnt to enjoy fish through the simple pleasures and personal folklore of his childhood home.

Fish was a part of our staple diet. My mother always caught a fish for our tea on Friday nights. We always had fish and chips and that was great. If she couldn't get fish, she'd always have a thing she called mock fish that was made with potato. In the whole of my growing, we never, ever went without fish.

Gavin was born in 1957, the year after the largest Murray–Darling floods in living memory. Gavin recaps the family folklore about fishing and this flood.

My father tells me that in 1956, and that was a year before I was born, it was a wet winter

and then lots of water late, and the river and forest was flooded 'til Christmas. The fishing was phenomenal. He caught five fish on one Bardi grub and it was just the skin of the grub left by the time he'd finished. They used to use rubber bands, just to hold the grubs on the hooks. The cod just went berserk and back those days, they took every fish.



A frozen bardi grub – a favoured bait for catching cod. The one pictured is about 6cm long. These grubs are the larvae of various types of moth or beetle. While originally referring to longhorn beetle (*Bardistus cibarius*) larvae, fishers along the Murray River more often apply the term to the larvae of *Trictena* and *Abantiades* moths. These grubs live about 60cm below ground and feed on the roots of river red gums and black wattles.⁷ Photo: Scott Nichols.

Gavin also knows the community folklore of much earlier days – of a history of taking huge numbers of fish that relied on the cross-cultural relationships between Aboriginal and non-Aboriginal fishers.



River red gum forests are adapted to cycles of flood and dry. These trees in the Barmah Forest benefit from environmental water allocations. Photo source: MDBA.

Around 1850, Joseph Waldo Rice, one of the first settlers in the Barmah area, used to fish on the Moira Lakes with the Aboriginal people. Together they used their fish traps. I don't know whether they caught yellowbelly or Murray cod. The Aboriginal people used to help him and they loaded them in drays. And then they drove them to Bendigo to the miners.¹⁷

Fishing the channels

Gavin himself learnt to fish in the many irrigation channels that run through the plains around the Murray River at Picola.

All my early fishing was done in the channels that ran through our property which were prolific with redfin. When I got home from school I'd go down and go fishing. I would have been probably eight or ten. I have caught brown trout and yellowbelly out of the channel system but in my time, the main fish we caught were redfin.



An irrigation drain. Photo source: from Arthur Rylah Institute technical report #176.

Spoilt for choice as he grew up, Gavin continued to fish in the channels, but could also venture into other spots that were all close by.

The only reason we ever fished in the river or the creeks close in the forest area was for Murray cod. It was a prize to catch a cod and that was your aim, to catch a big cod. Spent a lot of time trying, and not much time succeeding, I s'pose. But there is a certain amount of fun in that.

Poachers in tinnies

Gavin believes that the coming of the aluminium punt - the flat bottomed tinnie - saw a big change in the number of fishers on the river, and the number of fish that could be taken out.

That was the poachers' paradise. Because you could sneak in over mud banks and things like that. You could pull right into the bank, you could get out of it easy, it was comfortable, you didn't need a big motor. It got across the water.

Fish in irrigation channels

One of the major impacts of the irrigation industry has been the alteration to the volume, timing and fluctuations of water flow. The direction of many native fish movements is driven by flow volume. Many fish move upstream to breed in response to an increase in flow. But it's not just changes to volume that impact on fish. A massive amount of water is diverted each year from rivers into irrigation channels. A substantial number of fish go with it and are lost into irrigation channels, from which they are unlikely to escape.

It is thought that most fish die fairly soon after entering the channel system. They get killed or injured moving through the various regulating structures (weirs, turbines, pumps) or find themselves stranded by the system drawdown at the end of the irrigation season, when no water is diverted into the irrigation system. Other impacts include barriers to fish movement, enhanced dispersal of exotic species and the loss of native fish eggs and larvae through direct pumping.

Native fish found in the Murray irrigation channels included five threatened species: Murray cod, Murray-Darling rainbowfish, unspecked hardyhead, golden perch and silver perch. Murray cod are probably washed into the channels system when very young and few survive beyond the juvenile phase once they are there. Golden perch enter the channels later in their life history.

Drifting eggs and larvae appear to be coming from the river and not from successful spawning within the channel system. This means there is also significant loss of eggs and larvae from the river into the channel system, which means the number of juvenile fish in the river itself also declines.¹⁵

Fishing's the trophy

Gavin often fished in the river while camping with his uncles and his cousin, David. They taught the boys how to tether fish to keep them fresh until they went home.

You'd tie the fish up just like you'd tie up a dog. We'd put 'em on a muddy bank where we knew there was no snags. You tether them through the two soft bits of skin on either side of the nose and you can hook quite easily, just make a small hole through there. My uncle always had a bag needle which he'd thread through. I've tethered fish up to thirty pound.



Tethered Murray cod in the 1940s. Photo: Fred Bailey (NSW DPI collection).

Gavin and his family have seen people on the river exploit this way of keeping fish.

I saw a lot of people abuse the fact that they could tether the fish and take big amounts of fish out of the river, and I never really thought that was good. Once they go over sixty centimetres they're not all that nice to eat so why keep them, why kill them and why have them stuffed. You know? The trophy is what you feel in your heart, not what you have hangin' on the wall.



Upstream of the Mulwala Irrigation Canal inlet regulator. Such conditions favour both predators, such as pelicans, and alien fish, such as carp. Photo: Jodi Frawley. Pelican photo: Scott Nichols.



Downstream of the Mulwala Irrigation Canal inlet regulator. Native fish larvae (pictured) are mostly killed when they go through this type of structure. Photo: Jodi Frawley. Larva photo: Lee Baumgartner.



The plaque commemorating the 'turning of the sod' for the Mulwala Canal in 1935. The then NSW Premier, the Hon. B.S.B. Stevens, MLA, did the honours 'in the presence of a large and representative gathering of citizens'. Photo: Jodi Frawley.

Dennis Lean – Barbers, bait and bobbing



In 1911, Dennis' grandfather opened a barber's shop in the main street of Yarrawonga. Like his father and grandfather, 68 year-old Dennis is a hairdresser.

Fishing & haircuts are in the family

When he took over the shop 27 years ago, he got his chance to indulge his hobby and expanded the shop to include fishing gear. There he swapped fishing stories for haircuts with his clients.

Yarrawonga, on the Victorian side of Lake Mulwala, is a great place for tourists, especially if they are interested in fishing. Dennis says:

We get people from nearly all over Australia to fish. It's a very, very popular area. We get them from Hervey Bay, Forbes, Canberra, Harden, Geelong. A lot of Sydney people come down here. It's a very popular area for Murray cod, that's what they mainly come for.

Dennis and his family lived on the Lake until he was eleven. He learnt to fish with his siblings and family.

I was probably fishing before I went to school. My father, he was always a mad keen fisherman, my grandfather he was the same. It went back, right back through the whole family. And my uncle he was a keen fisherman. We've been into the shooting and fishing all our lives. When I was a kid, we used to tie springers off the willow trees in the backyard to catch redfin. And you'd get up in the morning go swim around to get the fish. It was a beautiful lifestyle.

Redfin was the family's favourite eating fish when he was growing up.

But, you know, we had no money, we struggled, and that sort of thing all contributed to the kitchen. We had a wire cage on that jetty. Then every time we caught redfin we threw them in there so we had a supply of fish. And if Mum wanted fish for tea we'd go down and get a few. We had ducks, chooks, ferrets, lambs - you name it, in the back garden. It was a menagerie at times.

Now it's illegal to put a live redfin back into the water.

Redfin FAQs

(*Perca fluviatilis* - English perch)



Are redfin native?

No, they are a native of Europe and Asia and were introduced to Australia in the 1860s. They are now widespread throughout temperate regions of Murray-Darling Basin.

Why were redfin introduced?

Redfin are a sport fish popular with recreational anglers. Non-native fish were thought to be better sport and better eating than native species.

What sort of habitat do redfin prefer?

Redfin inhabit a variety of habitats, but prefer slow flowing or still habitats, particularly those where there is aquatic vegetation.

Are redfin a problem?

Yes. Redfin eat native fish and compete for food and space. Redfin are also a host of the epizootic haematopoietic necrosis virus (EHNV), which many native fish species are susceptible to.

What are the control options?

In NSW waters, including the Murray River, redfin are now a Class 1 noxious fish. This means it is illegal to keep them alive or use them as bait. Don't transfer them between waterways, stock them in dams or return redfin to the water alive.

Tent cities and relief work

Yarrawonga weir, Mulwala channel and Yarrawonga channel were built between 1934 and 1939. Hundreds of men and sometimes their families came to work on these projects, causing a temporary population explosion. Some men were sent from Melbourne under Unemployment Relief Schemes implemented during the depression. They came and went in 10 week blocks. Others stayed for the duration and many made the district their permanent homes.

Some housing was provided, but many came to live along the river in tent cities. Water was carted in buckets, and timber was cut from local forests for rough building and firewood. Butchers and bakers visited 'The Grove', but families also fished to supplement their diets. Health inspectors visited the camps, nominally checking on sanitation and reported on unlicensed dogs. A warning 'coo-ee' along the river sent giggling kids scurrying with their pets into the safety of the forest.⁵



Building the canals was hard work but provided welcome employment during the Depression. Photo source: <http://www.irrigationhistory.net.au/>.

The coming of the Lake

The Yarrawonga Weir was finished in 1939, creating Lake Mulwala. In 1989, 87-year-old Jim Pidgon recalled the waterways before the weir:

*The common was beautiful with its lagoons and marshes and wildlife. There were always lots of boats on the river and very few motor-boats, and the children of my generation were not glued to the television with its video fantasies. We had the real world of the river on our doorstep. We fished and swam and hunted in its lagoons.*⁵

After the weir was built, the authorities dropped the water levels for maintenance every four years. Not only was it an artificial lake, it also created the conditions of an artificial drought.

Dennis remembers how this changed the habitat for the small creatures of the river, which in turn changed the fishing. The cycle was repeated just as the river was recovering from the last one. Dennis says:

To my way of thinking, it comes back to the shrimp population in the water, first year after they drained the water it is very hard. We'd drop four or five nets and you might get half a dozen shrimp. And you'd head to the deep water to get them. Because in the

River boats

In the 1840s, locals dreamed of the river as a transport route. A decade later, wealth from the gold rush brought shallow-draft steamboats that moved produce, including fish, to Echuca. There they connected with the rail that took goods to market in Melbourne. By the time the locks and weirs were built in the 1930s, rail and later road transport had replaced river trade.

The post-war era saw the rise of tourism across the Murray. Echuca was popular for its history as an inland port, where tourist could enjoy the river from the restored riverboats.

Desnagging to clear channels for this new generation of riverboats and other river craft continued until the late twentieth century.



Low river levels effectively grounded the river boats, slowing or even halting transport of people and goods up and down the rivers. Photo source: Wentworth Historical Society.

shallow water shrimp have all died because the water's gone. They live in the willow roots and rocks and all that sort of thing. And the second year they'll start to pick up, third year they'll be going pretty well. Fourth year you could catch them anywhere. When the shrimp are thick, you can go and stand on the boat ramp and they'll bite your legs. They'll have a go at you. We used to catch them by hand.

Canoes, catfish and carp

Dennis and his mates also made their own tin canoes. Then they would roam around in the Lake and river and explore the different fish in different areas.

We all had a canoe each. We used to go over to the lagoon near the golf club because that was beautiful catfish country and you'd get a lot of catfish. We used to get long boards, tie three or four droppers to them, about three foot long, take them out and then go back in the morning and find them. I went over there one morning, and this board bobbing along. Oh, I'll get that. So I dived in and swam out, grabbed the board. The catfish spun around and spiked me in the stomach. And I thought, this is going to hurt. So I left the board and headed for the shore. It did hurt too – it burned. It's sort of a poison, I mean, they'll bite you up!



Canoes made of bark were commonly used by Aboriginal people on the Murray River well into the nineteenth century. Photo source: State Library of South Australia, SLA: PRG 422/3/802 – Moira Native Bark Canoes.

Dennis has seen big changes to the catfish population since the arrival of the carp.

When the carp came that put pay to the catfish. When the carp first hit here, the kids were down near the weir and we were shovelling them out with pitchforks that's how thick they were. It was like a blanket. Balls Lagoon over there at the golf club was probably the last real habitat of catfish. We used to be able to go up to the billabongs, at Colombo and Yanco. They all had good supply of catfish, they still do to a degree. Barrenbox Swamp was probably the home of catfish, brilliant up there. But the carp came and they competed for the same food and that was the end of the catfish. The old carp, she does some damage.

Removing the snags

In the past barges removed snags with steam-driven winches to clear passages for larger boats. The water then moved along the channel faster, scouring the riverbed as it went. Snags were also removed from the rivers as it was thought they caused erosion of river banks and increased the incidence of flooding by reducing the capacity of water that the river channel could hold.¹¹

In many cases the presence of a natural load of snags may reduce erosion by protecting the river banks. Similarly, the notion that snags increased flooding is now known to be largely incorrect.

Almost 25 000 snags removed from the Murray River between Hume Dam and Yarrawonga (headwaters of Lake Mulwala) from 1976 and 1986 - a distance of only 200km.¹²

The removal of snags ('large woody debris') is a Key Threatening Process under the NSW Fisheries Management Act 1994 and the Victorian Flora and Fauna Guarantee Act 1988.



A natural snag load is a good thing for a river ... and its fish. Photo: Colin Green.

Wally Cooper - Moitheriban traditions for a modern Murray



Wally Cooper was born in 1947 and lived on Yeilima Station on the Murray River – a place for spelling brood stock from Flemington Racecourse.

From the time he was three, he and his grandfather lived between traditional Moitheriban culture and modern lifestyle. On the station they helped look after the Barmah Muster, but in the forest Wally's grandfather taught him about the river from Yarrawonga down to Echuca.

Tickling fish

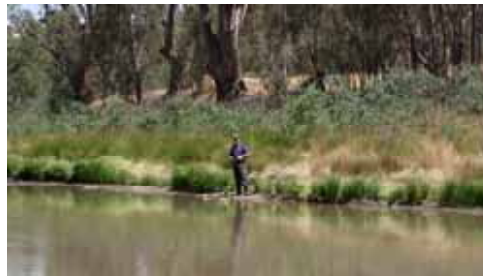
Wally remembers the Murray of the 1950s:

I can remember when I was about eight years old, the river was so clean. It was a massive, beautiful, clean river. You could see through the water and you could see better in the deep part than you can today. And you could probably see fifteen feet in front of you when you were diving down.

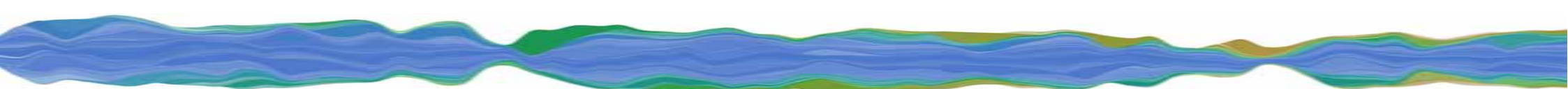
This clear water was perfect for diving and Wally's grandfather taught him one traditional way to catch fish – by tickling them!

I used to watch my grandfather. The snag would be comin' out of the river and the current would be dropping in the water slowly. He'd get in upstream and he'd just float down along like a log, coming down toward the fish and as he came towards the yellow belly or the cod, he'd run his fingers under the fish. And you can see the fish, they'll feel the tickling. Grandfather would move his hand towards the gills and the gills just open up. He'd get up real close and go bang with the two fingers and he'd have a fish. That's it. No fishin' line.

Danny, Colin Green's son, does his own version of 'fish tickling' when the flows are low and the carp numbers are high in the lagoon close to the Green family house. The following series of photographs show.



Carp hunting, November 2009. After finding a spot with lots of carp (above), Danny Green gently moves in to tickle a carp, and hoists it out of the water. Photo source: Colin Green.



As well as learning the traditional art of fish tickling, Wally also fished out of boats and off banks, with hooks and lines, along with the rest of his community. Finding the right bait meant learning to read the local feeding habits of the fish they were chasing.

What we'd do is check the fish to see what they were eating and then we'd get the bait according to what we found. Because that's what the fish would be eating for the next month or so. The seasons and the weather determine if it's shrimp or worms or mature larvae of insects.



Terrestrial insects, such as mayflies (pictured), are an important part of native fish diet. It's not just bardi grubs that will attract the attention of a hungry Murray cod – a fly made to mimic a mayfly fallen into the water is also irresistible at certain times of year.

Photo: Luke Pearce.



Allowidgee, pictured fishing using a bark canoe and reed spear in a way common to Yorta Yorta men. He is shown here at Maloga on the Murray River. Photo source: State Library of South Australia, SLA:PRG 422/3/704.

Special river creatures

Not all the animals in the river area were available to everyone in the community. Wally remembers that water rats were valued for their meat and their skins. However, only the elders could eat the meat, and the skins were made into pouches that could only be carried by certain people.

Trout cod, now a protected species, were another special animal to the Moira Forest people, and they were restricted for everyone.

Even when we caught the small trout cod, grandfather would say, 'Don't eat him, put him back.' Because the trout cod wasn't in abundance like the Murray cod.

One of the river animals that Wally doesn't see anymore are a special type of mussel.

I remember there used to be a beautiful white mussel. From two inches down to about the size of your thumbnail. They were in abundance all along the river. You'd find them round the lake system and also along some hard banks into the sandy loam areas. We used to dive for 'em and pick 'em up and take 'em home and eat 'em. Absolutely wonderful.

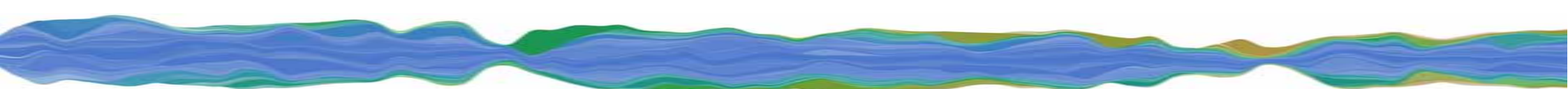
Impacts on the river

Over Wally's lifetime industry and agriculture have had impacts on the river. The Green family remember the devastating impact of spraying the tobacco. Colin Green remembers:

When I was in primary school I used to stand out in front of the house when they aerial sprayed the paddock next door and wonder what the cool mist was – it was DDT. But it felt nice.

David Green thinks that the sprays affected the fish:

We never ever found a fish before that with a spinal deformity. Behind the dorsal fin there was spinal curvature.



Trout cod

(*Maccullochella macquariensis* - blue nosed cod, blue cod)



Photo: Gunther Schmida.

- Large deep bodied fish, growing to 85cm and 16kg, but more mostly less than 5kg
- Associated with deeper water, pools with cover such as logs and boulders and faster flowing water
- They move less than 500m from their home snag, with occasional explorations of 20-60km before returning home
- Adhesive eggs probably laid on hard surfaces
- Eat other fish, yabbies, aquatic insect larvae, and shrimp
- Potential threats include interactions with trout, redbfin, habitat modification such as desnagging, sedimentation, removal of riparian vegetation, barriers to migration and cold water discharges from large dams
- Listed as 'Endangered' in NSW, ACT and the Commonwealth and as 'Threatened' in Victoria

But like all families, not everyone agrees. David's brother Colin thinks that a shag shaking, then dropping the fish could just as easily be blamed.

Wally's worried also about the chemicals harming the fish habitat as well as the rest of the environment along the river. A poisoned river means less fish for all fishers.

In the old days, they really killed the land with all those chemicals, like DDT and Dieldrin. We had to stop it. You've got to know how to put on different poisons that you're running through our river. With the ecosystem, everything is so magnificent and everything goes in the cycle. And you take somethin' out here and something over here has to die. If we didn't stop it then we wouldn't have a lot of things today.



Low water exposes the snags so loved by Murray cod.
Photo source: Colin Green.

Cummeragunja

Aboriginal people had lived on and fished the Murray River for centuries before a missionary established a school at Maloga in the 1870s, which was later moved to the government settlement at nearby Cummeragunja.

By 1887, William Cooper, Wally Cooper's great uncle, was among many Aboriginal residents who petitioned to secure land selections there to grow wheat.

In 1934, frustrated by government policies which had undermined farming, William Cooper appealed to the NSW Premier for Yorta Yorta autonomy at Cummeragunja. His plan was to irrigate the lands from the Murray River so that they could grow tomato, vines, tobacco, citrus as well as raise cows and experiment with lucerne and pigs. Traditional fishing and hunting would compliment the modern agricultural development and make the Yorta Yorta self-sufficient.

These plans were quashed by the NSW government, who installed an unsympathetic manager and eventually the Aboriginal people withdrew their labour in 1939. During this long strike a large group of Aboriginal people walked off the settlement completely and moved to riverbank camps along the Goulburn River near Mooropna, where they lived for many years.

The Green Family - A lagoon for a back yard



The five children of the Green family – Marg, Colin, David, Hayden and Pauline (not pictured) – were born in Corowa in the late 1940s and early 1950s. Their father, George, was born near Yarrawonga and spent his entire life on or near the river. The family lived in 'Brocklesby House', an old homestead built in 1857.



Living by the lagoon

The family's small acreage overlooks a horseshoe lagoon, the largest in a series of lagoons that join when flooded by the Murray. The kids made their own fun in the surrounding bush, paddocks and State Forest adjoining the lagoons. It was known as 'The Lagoon' to the Greens, 'The Chinaman's' to the locals and 'Dairy Lagoon' on the map. David recalls:

Dad remembered the Chinese market gardeners. They had a huge steam-driven pump down on the Lagoon. Later, Italians took over and they grew vegetables then tobacco. Now the land is used for grazing.



The view of 'The Lagoon' near the Green family house after it filled in late 2010. Photo: Scott Nichols.

With the lagoon so close, they all learnt to swim when they were little – diving for mussels with their Dad. They remember:

We went down there from when we were four years old, diving for freshwater mussels that Dad would find in the mud with his feet. The Lagoon was full of them. The earlier people must have eaten them because shells have been found up on the bank. No doubt the Aboriginal people would have eaten them. But we thought they tasted horrible.

The kids made canoes from old sheets of corrugated iron, sealed with melted tar and paint. One of these boats was called 'Fish and Chips'.

Leeches

While not everyone's favourite river creature, leeches are part of life near a lagoon.

Leeches are a segmented worm, related to earthworms, which feed by sucking blood from passing animals. It is for this reason that leeches have a long history of use for medicinal purposes in both Aboriginal and European traditions.

Wayne Atkinson, the historian, talked about his Yorta Yorta grandfather, Henry Atkinson, photographed here on a Murray riverbank near Cummeragunja in the 1890s:

Puppa Henry is one of many who gathered leeches for medical purposes and used them for traditional healing practices.



Photo: Aboriginal and Torres Strait Islander Pictorial Archive, N3766.34.

Fishing at any time

Fishing was part and parcel of daily life on the outskirts of town. Hayden said:

You could just come down and fish any time. You could just come and catch a fish every morning. No worries at all. There were that many there. Mainly redfin. Beautiful fish, one of the nicest eating fish you'll get. But it's not a native fish.

When the Greens were on the lookout for native fish in the lagoon they chased blackfish.

We'd only catch the blackfish at night. We'd go down just after dark, light a fire and just sit down just on the bank and catch them. But the blackfish will be gone forever now, they'll never come back. Because they were an extremely delicate fish.

'The big cod'

The Green's family home was surrounded by bush, paddocks and lagoons. At different times the kids would come across old timers who lived in the bush: Phil the Charcoal Burner, Johnny Hollowtree and Gunboat Smith. There was also a big cod that was just as well known to everyone in the district. A fish story told to the Green kids by their father is vividly recalled by the boys:

He was a legend because everybody knew about him. We knew guys that had set 500 pound breaking strain line with car tyres. It pulled our uncle into the river, and he was 26 stone. And Dad tried and it pulled him down the river for about a kilometre. But they saw it. They could get it up to the top but he'd just roll and break the line. Could never land it. Had eyes like dray wheels, Dad used to say. Beard of spinners, gravel rash on his belly and sunburn on his back.

Blackfish

Gadopsis marmoratus (river blackfish, slippery, greasy, muddy, slimy)



Photo: NSW DPI.

- Maximum size 35cm, commonly 20-25cm
- Pair of fine, white, soft spines under the throat
- Found in upland and lowland streams, prefers habitats with good cover – woody debris, aquatic vegetation or boulders
- Spawns from October to January when the water temperature is greater than 16°C. Eggs deposited inside hollow logs, or on rocks and undercuts. Male guards and fans the eggs
- Eats aquatic insect larvae, terrestrial insects that fall into the water, occasionally other fish
- Very small home range (10-26m)
- 'Endangered' listing in SA and Snowy River population.



A large cod caught with a lure. Photo source: Corowa Fishing Club.

Spinners & spoons

Spinners and spoons are types of lures that attract fish by reflecting light as they move through the water. Spoons are a simple metal lure that looks like, well, a spoon! Its wobbling motion attracts fish. Spinners have a blade that rotates (spins) as the lure is retrieved, reflecting light so that it looks like light glinting off fish scales. Today there are many variations of both these types of lures, but in their early history they were literally just rounded metal plates that spun or wobbled around a hook like the aeroplane spinners pictured here.



Photo source: lureandmore.com/viewtopic.php?f=286&t=2479&p=18677.

The drying of a lagoon

In the 1950s and '60s the Lagoon would be topped up from the Murray and then slowly drop over the summer season. In the summer the boys would take their boat out at night with a home-made fish finder.

The lagoon would go through its cycle and then clear completely to pristine clear water. At night we just put a headlight off a car on the end of a pole four metres down and could see all the little fish at the bottom. That was before the canal was put in.

As tobacco came to the district in 1960s and '70s, a canal was built to ensure water security for irrigators. The Greens remember these changes:

The Lagoon had a natural ridge originally, like a barrage, but about 40 years ago they cut a canal through, which allowed water from the Murray to be used for ever-increasing irrigation. The construction of Dartmouth Dam also had an impact on the Lagoon. With the change in the natural highs and lows the ecology changed quite a lot. From then on with the increase in irrigation the Lagoon could be pumped almost 'dry' which killed a lot of stuff on the bank.

During the recent drought, the Greens have seen the lagoon completely dry out – something they have never seen before. Over the last decade, the basin has filled with leaves and young gums have sprouted in the floor of the lagoon. Since the 2009-10 rains and floods the lagoon has filled – but it is still no place for fish.



Blackwater is visible in this photograph of the lagoon near the Green family house. Blackwater events occur naturally when there has been a build up of leaf litter and woody debris on the floodplain, followed by enough rain to submerge this material and high enough temperatures that it begins to rot. The water becomes discoloured and usually oxygen levels drop significantly. Fish can die if oxygen levels get too low. However, this process enables carbon from the decomposing organic matter to enter the food chain, increasing the population of aquatic invertebrates which then provide food for fish. Photo: Scott Nichols.

The drying, and wetting, of the lagoon.



January 2009



January 2010



November 2010. Photo sequence source: Colin Green.

Making Connections

Easter rituals on the river

John Douglas grew up fishing in the Murray, but ended up living at Alexandra and working in fisheries research at Snobs Creek Hatchery. Fishing and family have kept him connected to the Murray River. Every Easter the Douglas family – grandparent, kids, cousins, uncles and aunts, all converged on Gunbower for their annual camping getaway. He's been going now for over forty years.

Yeah we camp within Gunbower Forest, near Koondrook. I don't know when we first started doing that; I was pretty young. Although they are getting on in years, my parents still make the pilgrimage. My sons and nieces associate Easter with the Murray River. My nieces have not had an Easter that was not spent on the river. The annual camping event is a chance for the whole family to get together. We chat, sit around a campfire, eat, drink tea, fish – it's a special time.

Yarnin' about fishing

Richard Kennedy is a Ngilyampaa man who grew up at Lake Cargelligo and fished the Lachlan River. He now works for the North East Catchment Management Authority in Albury. He feels that he has a responsibility

for the Koori country he lives in, even though it is not his own country.

I've been employed to get more Aboriginal people involved in landcare. I've engaged a local group of men to look after a block of land on the Murray River. It's 30 acres, it's got the river and a lagoon system with an island. It's got different species there, river red gums, wattle, different types of grasses and sedges growing all around. So that attracts animals. Oh look, there's yellowbelly, redfin and a lot of carp. We'll utilise it for various themes, including cultural activities and getting the young and old fellas out there. We'll sit around and have a yarn, talk about the fishing and talk about the old stuff. Everybody's got a little story. There's so many things with mental health issues today. Just getting out and sitting on the river bank, there's nothing more peaceful, serene. You're listening, birds are singing, you know, that's something that you miss.

Locals looking after the lagoon

David and Colin Green's sister, Marg, remembered it was their mother who understood that some of the newcomers to the area might need the help of the older locals when it came to caring for the lagoon.

Chinese on the Murray

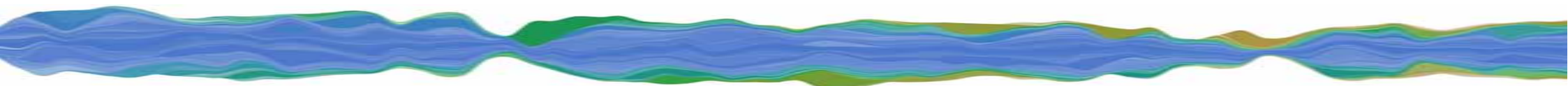
The 1850s gold rush bought many new people to Australia, among them a large contingent of Chinese. They arrived in organised groups and lived together on the gold fields all over Victoria and NSW.

Many of these men returned home, but some stayed on in Australia working as market gardeners. Their descendents still live in today's rural areas and cities, like Richard Ping Kee, of the Moree Recreational Fishers Association.

Chinese gardeners favoured sites close to water supply and townships. They diverted water through a series of trenches and sluices in addition to watering plants from buckets equipped with bamboo nozzles. Nutrients for their vegetables came from a combination of animal by-products, waste and nightsoil.

Produce was often sold door-to-door from carts and barrows.⁶ One of these Chinese market gardens serviced the tent cities that formed through the construction of the Yarrawonga Weir.

Many places called names like 'Chinaman's Lagoon' or 'Chinamen's Creek' can be found throughout the Murray-Darling Basin, echoing these former gardens in rural Australia.



Mum was a quiet achiever and campaigner for the environment, including the Lagoon. Before it became fashionable, she campaigned against the use of DDT. You see we had Italians growing tobacco next door. So that they would understand not to put the DDT and dieldrin drums in the lagoon she arranged for warnings outlining the dangers to be written in Italian and sent to the growers.

Fishing clubs for fish

Once a year the Corowa Angling Club hold a community bowls day to raise money. Ken Strachan, Kelli Cunningham, Merrilyn Strachan, Peter Tidd, and Graham Ellis are keen participants, along with over one hundred other people who come along. The club members sell raffle tickets and last year raised \$5 000. This money is used in the 'dollar for dollar' scheme through NSW Fisheries. They've been buying fingerlings of cod and yellowbelly to release into the river since 1988. Ken believes that restocking is helping to maintain healthy fish numbers in the area:

Since re-stocking has come into its own, we've started to catch yellowbelly in this area, where before you very seldom ever got a yellowbelly, so the re-stocking is really improved the yellowbelly numbers.

Quieter times

Jody Liversidge lives in Shepparton and while she and her husband Harry and their son fish the lower reaches of the Goulburn they also travel to Lake Mulwala chasing cod. She would like to see less speedboats and skiers in the good fishing spots:

We've had friends that have been up there fishing and actually seen massive cod floating, because they must have been hit by a boat. So they are dead, or nearly dead, floating. If they get hit on the head by a speedboat they're not going to survive.

Part of life

Gavin Vale explains the many ways that the river and fishing have always been part of his life:

We holidayed on it, we swam in it, we fished in it, we irrigated from it, we used to graze our cattle in the forest. We just love it, we love what it is. My forefathers were timber millers and I can take you to the original sites of those mills, and that forest has just got something in it. I don't know what it is, it's a heart thing, it's something that you really can't explain.

Fishing for science's sake

Over the twentieth century, trips to camp along the rivers have been a crucial part of the research on native and introduced fish. In 1949-50, J.O. Langtry investigated the biology of native fish.³ His field-work took him to camp-sites along the Murray River to the Hume Reservoir. There he met people like G.E. Clark, a commercial fisher, as well as a variety of poachers who lived off the bounty in the forest.

Langtry understood the importance of local knowledge about fish, where they lived and how to catch them under different river conditions. His science complimented this local knowledge by working out important information about the breeding, diets and life span of the fish.⁴

Native fish researchers John Koehn, John McKenzie, Ray Donald and John Douglas, who were interviewed for this project, have all followed in Langtry's footsteps, camping and fishing alongside recreational fishers while adding to our knowledge about Australian freshwater fish.



A fisheries technician releasing a tagged golden perch. Photo: NSW DPI.

Visions for the Murray

The fishing people who contributed to this project have all talked about their hopes for the future of the river. Many felt they had seen some improvements but most don't feel the river is as healthy yet as they would like to see it. Each of these fishers suggested ways to help the river and in turn help provide healthy habitats for fish.

Respect

William Cooper (1861-1941), a Yorta Yorta man, fought for land rights at Cummeragunja and had great hope that life along the Murray River would be a matter of respecting the environment.

Our men have been able to succeed in the past and given a chance we are sure that many of them will succeed in the future.⁸

In 2004 the Yorta Yorta signed a joint land management agreement with the Victorian Government regarding the Barmah Millewa Forest areas. When celebrating this agreement Wolithiga Elder Henry Atkinson talked about the importance of fishing within connection to country. Like many landholders, Henry wants people to seek

permission to come onto these river banks to fish:

I personally am looking forward to the day when I can sit on the bank of the mighty Dhungala (Murray River) and fish exclusively on my own land without the need for a piece of paper to say what I can and cannot do and knowing that only my people walk here, sit here and fish here. I'm not saying that I want others excluded from the river system but I just want a little area where everyone who treads here has the same thought in their hearts.⁹

One of the ways Moitheriban people ensured bountiful catches of fish was by limiting the harvest of female fish and respecting them as critical for having fish into the future. Wally Cooper thinks that all recreational fishers could learn these lessons.

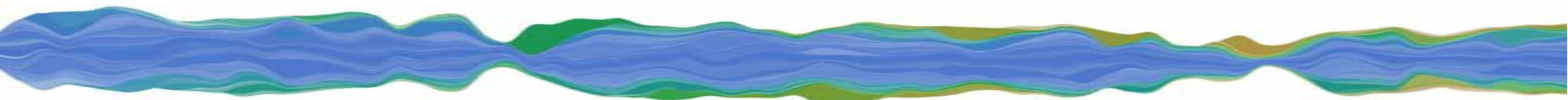
We need to educate them of the importance of breeders. Think about farms with stud bulls, stud rams and stud horses, you don't eat them. And that's the same thing with fish. You've got to get your breeders and keep them in abundance. If you don't keep them then we haven't got a future. And that's what we got to look at, the future of our fish.



Juvenile golden perch – the future of the fishery. Over 50% of juveniles like these can die going through or over a weir. Nearly 100% of adult small-bodied natives can die this way. Photo: Lee Baumgartner.

Richard Kennedy agrees:

You'd take a certain size, you wouldn't take the little ones, you wouldn't take the old ones, the breeders. You'd chuck them back. We need to get those cultural flows back through, to get water back on country, to get the environment right again. I suppose it comes back to wanting to be involved in a particular thing like water. People have got to be confident about the way it's being managed if there are going to be better outcomes in the future.



J.O. Langtry was a biologist who travelled the Murray River in 1949-50 to gather information about native fish. He fished the Murray and talked to commercial and recreational fishers and all other types of people who lived along the river. He thinks that it is important to think about those things we can't see if we want to help the fish:

The maintenance of healthy river flows means it is necessary to concentrate on looking below the landscape's surface – by rehydrating landscapes and recharging aquifers. The sustainable way of doing so is to capture more rainfall in the topsoil and thus recharge the aquifers with a view to restoring their contribution to river flows.¹⁰



Encased in all this concrete is a 'vertical slot fishway' that allows larger migratory fish like Murray cod, trout cod, golden perch and silver perch to migrate past Yarrawonga Weir. Photo: Scott Nichols.

Fish need to move

All native fish need to move between habitat areas at some stage in their life cycle to spawn, seek food or find shelter. Many species need migrations over extended distances to complete their life cycle.^{13,14}

Structures that span the width of the waterway can act as barriers to fish passage by creating:

- a physical blockage: most native fish can't jump more than 10cm, so anything higher than this is a barrier
- a hydrological barrier: the water being forced through a culvert, for example, or over or under a weir is too fast or creates a pressure barrier
- artificial conditions that act as behavioural barriers to fish: for example a long, dark passage will be avoided by fish.

The impact of such barriers on fish passage will vary depending on structure design; the nature of flow, debris and sediment movement in the waterway; and the swimming capabilities of resident fish.

Fishways (also known as fish ladders) are used to help fish get past weirs less than 6m high. They work by providing a series of small hydraulic rises and resting pools that allow fish to 'step' their way up and over the barrier. 'Vertical slot fishways' are the most common type of fishway in the Murray-Darling Basin.

Fishways built as part of the Hume to Sea project on all mainstem Murray weirs include fishways designed for large species (Murray cod, golden perch, silver perch) and a second fishway for smaller species (gudgeons, Australian smelt, rainbowfish).

State of river: 'poor – very poor'

The Sustainable Rivers Audit (SRA) is an ongoing systematic assessment of river health of 23 major river valleys in the Murray-Darling Basin.

Environmental indicators (themes) include hydrology, fish and macroinvertebrates, which are monitored and will highlight trends over time.¹⁶

The Central Murray Valley was surveyed in 2005. The Central Murray Valley fish community was considered to be in Poor Condition and Ecosystem Health in Very Poor Condition.

Only 45% of predicted native species were caught from the 'Middle Zone' (near Corowa). Although native fish were relatively abundant, the community had lost much of its native species richness and its biomass was dominated by alien fish (77%).

Abundant Australian smelt, un-specked hardyhead, Murray-Darling rainbowfish, carp gudgeons, and flat-headed gudgeon dominated the native fish. Carp dominated the alien species, while goldfish, Eastern gambusia, and redfin were also caught.



Imagine the fish population in a healthy Murray River! Photo: Scott Nichols.



Goulburn



Source: Luke Pearce.



Source: Seymour Anglers.



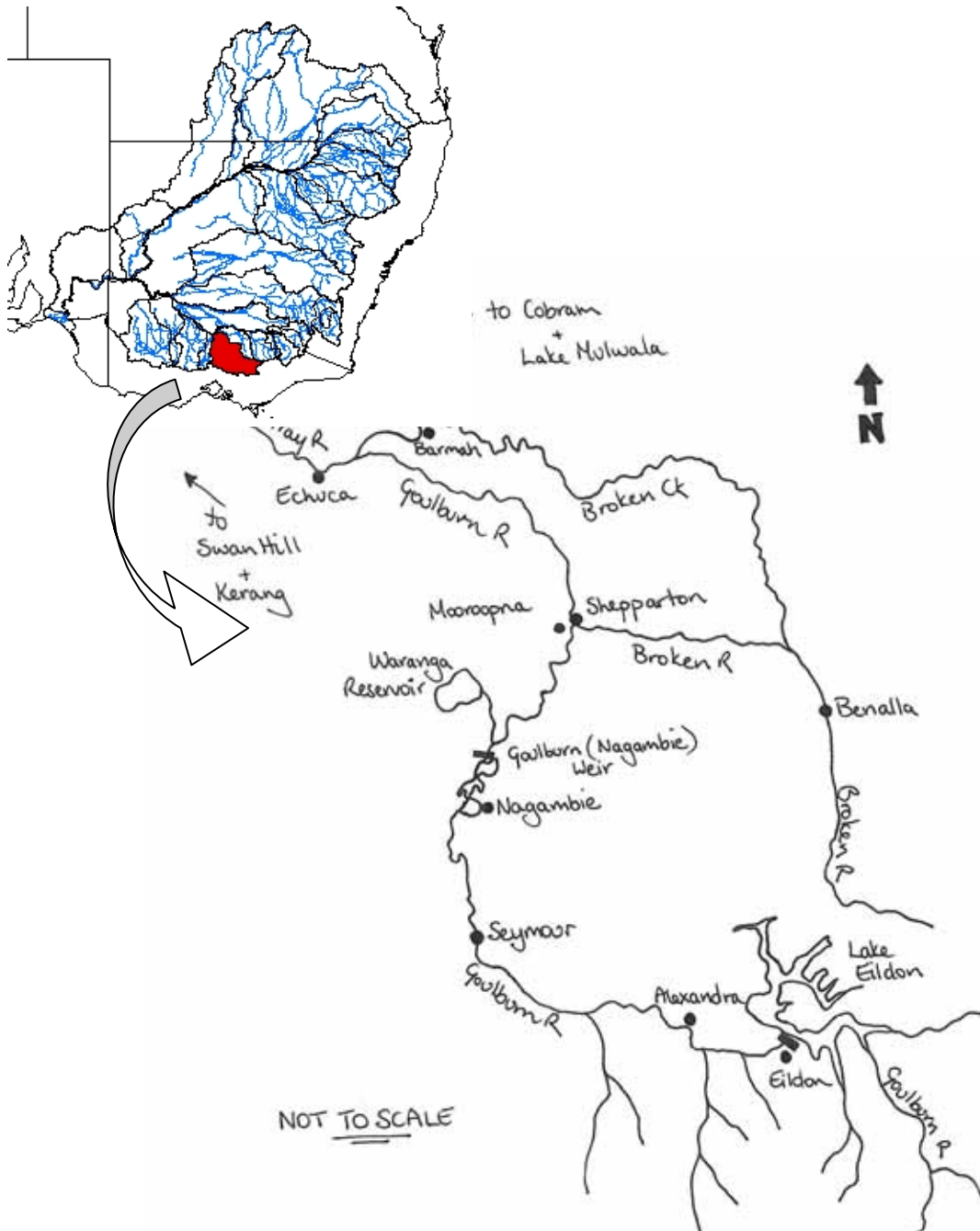
Source: Seymour Anglers.



Source: Seymour Anglers.

Source: Jodi Frawley.

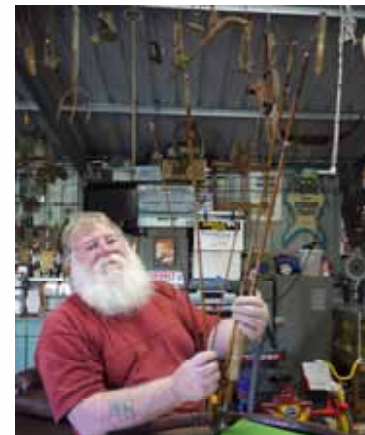




For nearly 90 years, **Ken Gilmore** has lived by and fished in the Goulburn River. Photo source: Ken Gilmore.



Mick Hall is a passionate and competitive fly fisher. Photo source: Mick Hall.



Donny Richter is teaching his grandson the art of fishing, not just how to fish. Photo: Jody Frawley.



Kaye and Gary Gibb are members of the Seymour Angling Club. Photo: Jody Frawley.

*... the water was **clear**; we could see the **fish** swimming about; the **banks** of the river were solid with **trees**. We used to **fish** beneath its shade.*

The Argus (Melbourne, Vic.), Friday 8 October 1937, page 12



Introducing the river and its people

The Goulburn River's cold, clear waters rush westward down from the steep hills and mountains of the Great Dividing Range toward Seymour. The river then turns northward and meanders through hills and plains until the river meets the Murray upstream of Echuca. These are the traditional lands of the Taungurung, Bangerang and Yorta Yorta peoples. However, the Goulburn River today is not the river the Taungurung, Bangerang and Yorta Yorta once knew and fished.

Beginnings

Dr Wayne Atkinson, a Yorta Yorta man, tells the creation story of the Goulburn and Murray Rivers:

Baiaame created the river by sending his woman down from the high country with her yam stick to journey across the flat and waterless plain. Baiaame then sent his giant snake along to watch over her. She walked for many weary miles, drawing a track in the sand with her stick, and behind her came the giant snake following in and out and all about, making the curves of the river bed with his body. Then Baiaame spoke in a voice of thunder, from up high. Lightning flashed and rain fell, and water came flowing down the track made by the woman and the snake.¹⁴



Allowidgee, pictured fishing using a bark canoe and reed spear in a way common to Yorta Yorta men. He is shown here at Maloga on the nearby Murray River.
Photo source: State Library of South Australia, PRG422.3.704.

The arrival of the Europeans

Hamilton Hume¹ and William Hovell² passed through the Goulburn River area in 1824, seeking a passage from Sydney to Spencer Gulf. The team camped near the present site of Seymour for two days at Christmas so that they:

might avail themselves of the fine fish which abound in its waters, as well as refresh the cattle.³

Early British settlement followed the rivers. The first grazing properties were set up on the banks of the Goulburn in the early 1830s.

The gold rushes of the 1850s bought many new people to northern Victoria. The gold rushes and grazing, dryland farming and horticulture all needed different types of workers, bringing new people with new needs to the river and new ways to catch fish. Chinese people joined diggers and Aboriginal people and, by the 1860s, new towns supported the smaller yeoman farms championed by the government.



Boating on the river at Echuca (date unknown).
Image source: Wangaratta Library.

Problems were emerging however from mining activities. The shaft mines that had been sunk in the Upper Goulburn caused heavy metals and silt to be washed into the river.

One old-timer lamented in 1896:

When my husband and I came here first the water was clear; we could see the fish swimming about; the banks of the river were solid with trees. We used to fish beneath its shade. The goldmines did this, they cut the timber down for firewood and pit props, and bushfires killed the trees on the mountains, and then the floods came and tore the river banks to pieces; and you see what followed.⁴

By the 1890s the lower reaches of the river were supporting production of wheat, fruits, wine grapes and a wide variety of fodder crops. Grazing, dairy farms, piggeries and butter factories continued to flourish in the upper reaches.⁵ However, the decades of land clearing increased siltation and the altered flow of the river changed the habitat for native fish.

In the twentieth century, carp arrived and the river was regularly stocked with non-native fish, such as trout. Water is now stored in Lake Eildon and controlled by Goulburn Weir at Nagambie. Flows peak in summer to meet irrigation needs and drops off in winter/spring.

The Goulburn became a popular spot for people, including Aboriginal people, to fish for the introduced trout and redfin. It remains one of the most popular inland angling spots for native fish as well, including Murray cod, yellowbelly, Macquarie perch and blackfish.



Catching a large Murray cod is a memorable moment for any fisher, and Jody Liversidge is proud of this beautiful 35kg fish she caught in the Goulburn River in 2006. Photo source: Jody Liversidge.



Ron Bain looking at the old Goulburn Bridge, now part of a local heritage walk. He has seen major changes to the river, the biggest came with the building of the weir. *It used to be a beautiful river*, he says. Photo: Jodi Frawley.

People and towns along the river

Northern Victoria has always been one of the more heavily populated rural areas of Australia. Many of the townships along the river began with an inn and a punt, assisting travellers with livestock and providing services to the gold fields from the 1850s. Alexandra, Seymour, Nagambie, Mooroopna and Shepparton all grew in conjunction with the changes in surrounding industries: grazing, dairying, mining, forestry and agriculture. The river was vital for the growth of these places.

From the 1870s rail links to Melbourne brought many more people. In the 1920s, Shepparton Preserving Company and Ardmona Cannery capitalised on productive local fruit growing and as a result large numbers of seasonal workers came and went from the area.¹⁰



Trips to the river for picnics and fishing were common for Aboriginal peoples, townies, farmers and itinerant workers alike. Photo source: Jim Hanley.

Ken Gilmore – True story! I'm not telling you a lie!



Photo source: Ken Gilmore.

Ken Gilmore was born in 1922. He and his nine brothers and sisters were raised at *Hughendon*, a grazing and dairy farm and the only property left in the district that has a settler's title on it from the 1860s.

Catch all the fish you want

Both the Rubicon and Goulburn rivers border the farm and were close enough to the homestead that the family fished regularly along its banks.

We used to swim in the river every day during the summertime. And we'd all go fishing, especially if there was a thunder storm approaching. We used to go down armed with worms and so forth and we'd get onto a shoal of bream. We'd fill a sugar bag in about half an hour and what we couldn't eat we used to let go because we didn't have any refrigeration back in those days. Therefore we weren't greedy, but you could catch all the fish you wanted.

'Bream' were what Ken's family called Macquarie perch. Others knew them as black bream, Murray bream, white eye or blackfish. They were plentiful in the Goulburn River when Ken was growing up. They have since become very rare. Another local fisher, Jim Hanley, also remembers catching them.

The Macquarie perch have been gone for many years. I've never seen one come out of the river upstream from Nagambie Weir. But my father used to catch them and Macquarie perch are still locally living in the Hughes Creeks.

Kids going fishing

With a big family of cousins all living locally, the Gilmore kids would often hang out amongst the shady trees lining the rivers.

When they were sent to go rabbiting, they would take their rods along. And a game of cricket on the flat for some of the kids meant that others could throw a line in while they waited for their turn at the bat. Ken recalls the fish they caught:

There were all types: not many yellowbelly, compared with the cod and the bream. They were the main ones. But there were the odd

yellowbelly. Blackfish too. We used to like that then, little 'greasys' we used to call them. They were very sweet. Nice little fish to eat.

Ken remembers that other fish had to be hunted in the off-river areas.

They used to get catfish in the old days. In the lagoons mainly. They weren't in the river. We weren't very fond of them, though. Some people like them. I didn't like the look of them. They're horrible, horrible looking things.



Melbourne railway workers used to regularly come to Hughendon for week long spells of camping and fishing. Ken remembers: *We got a lot of people from Melbourne, year after year. Some came every year for 50 years. They used to pitch their tents on the Goulburn, and then they bought their caravans.*

Photo source: Ken Gilmore.

Macquarie perch

(*Macquaria australasica* - macca, Murray bream, black bream, mountain perch, white eye, blackfish)



Photo: Luke Pearce.

- Medium sized fish: can reach 46cm, but usually less than 35cm and 1kg
- Found in the cool water in the upper reaches of the Murray-Darling in Victoria, NSW and the ACT
- Spawn in October-December when adults move into tributaries and spawn at the foot of pools
- Eat shrimp and small, bottom dwelling aquatic insects
- Potential threats include interactions with trout and redfin, sedimentation, removal of riparian vegetation, barriers to migration and cold water pollution
- Listed as 'Threatened' in Victoria, and as 'Endangered' by the Commonwealth

Catching fish?

Like many people along the Goulburn River, Ken saw all sorts of ways to fish: rods and reels, handlines, gill nets, drum nets, wire netting and set lines.

My uncle used to have a property up here and he had a set line. He was pretty old and he used to like a fish and one day he left his line in with a worm on it, and he went back the next day and there was no sign of a line. He said 'Where the hell has that line got to?' Anyway, he had a look around, he found the line, he gave it a pull, the next thing a wild duck flew up, out of the blackberry and he'd caught a wild duck on the hook with a worm. True story! I'm not telling you a lie!

Ken remembers the fun he used to have with his friends when they would go fishing.

A Yugoslav friend gave me some lines and they had little bells on the top of them. I was a bit of a devil. I used to ring these bells myself and they used to come racing up to see what I had on my line. Next thing, they were all sitting beside me because I was getting all the bites and it was only me ringing the bells!

The coming of the cold water

The original weir on the Goulburn River, Sugarloaf Reservoir, was built between 1915 and 1929. During construction the weir had to be drained on at least two occasions, generating 'blackwater' events and leading to massive fish kills.

After being modified in 1935, it was enlarged in 1955 and renamed Lake Eildon. It filled in one year with the 1956 floods. This new dam serviced the Goulburn Valley irrigators. It also kept the river levels constant with water from the cold depths of the lake.

Ninety two year old Ron Bain remembers these changes.

Terrific changes! The biggest change was when they built the weir. See they had a small wall, and it operated for quite a few years and then when they built the bigger one, it lowered the flow of water down the river considerably. And then of course it lowered the temperature of the water; and the cod didn't like that. It used to be a beautiful river, you know. It used to get a bit of a flood every two or three years. And of course it left lagoons, so there would be nice fish in the lagoons as well. But all that's gone, there's none of that now.

A river of weirs

In 1884, MLA Alfred Deakin led a 'Royal Commission into Irrigation' and travelled to California and India to investigate infrastructure and schemes. Australia's first major structure was built on the Goulburn River in 1887. This weir formed Lake Nagambie, which became a famous fishing spot for introduced redfin as well as for native fish. By 1893 the weir's channel linked up 400 miles of gravity fed reticulation on the western side of the river.⁵

Sugarloaf Reservoir was built between 1915 and 1929, to increase the storage capacity for the area. Bigger changes were afoot in the 1950s when large dams were engineered to mitigate the impact of flooding and protect communities against drought. In 1955 the new dam - Lake Eildon - was opened, replacing the reservoir.

Unlike towns further downstream, the dam helped the Goulburn River district to escape the worst of the huge flood of 1956.



An old postcard of the Goulburn Weir (date unknown). Image source: Wangaratta Library.

Lake Eildon changed the river of Ken's youth. He was used to swimming in the river but once the weir went in, it was too cold. Ken also remembers how the weir changed the way the river flooded.

As soon as the weir was put in, the water went down to about 10 degrees. You couldn't swim in it. You'd freeze to death if you jumped in. You'd soon jump out again. In the old days, the floods would be up and gone in a couple of days but when they filled the weir up in '56, when we had floods here - they would last about a month. Well, it probably did affect a lot of fish. It happened after they built the weir.

Don Collihole agrees with Ken that the cold water changed the habitat for the native fish.

Pre '56, they used to catch heaps of cod down here. And then they finished Eildon, the water got that cold coming from down the bottom, the cod just couldn't breed.

Don's mate Geoff Vernon, born in 1950, represents a generation of fishers that has never known the Goulburn in its natural state. He caught the introduced trout, rather than the native cod, Macquarie perch or yellowbelly. He remembers:

Mostly trout, 'cause in those days, it was a pretty cold river and that's about all there was around.

Cold water pollution

- Lake Eildon is a large impoundment (3 334GL)
- In such large, deep impoundments the water column can form distinct layers ('thermal stratification') with a layer of cold water forming at the bottom of the dam
- The water is released from the deep parts of the dam, which means the water that flows downstream is colder than would occur naturally
- This is known as 'cold water pollution' (CWP). The impacts of the cold water extend at least 100km downstream¹¹ and this stretch of river is dominated by cold water species such as trout
- CWP can change the types of plants and animals that will live in the affected areas of the river. It can also reduce growth rates in fish and delay or prevent their successful spawning or recruitment. This can lead to increased vulnerability and reduced survival⁹



Lake Eildon. Photo: Fern Hames.

Mick Hall – Fly flicker extraordinaire



Photo source: Mick Hall.

That's a long journey from Relubbus on the River Hayle in England where he was born in 1941.

Fishing got hold of me

He got an early start with trout fishing by exploring the river that ran alongside the family cottage. He was four! He came to Australia in 1949 and as a teenager reacquainted himself with trout in the rivers near Melbourne. At fourteen, he says, he was hooked:

That's when it got hold of me. You know, that disease – it's lasted all my life. I've played around with other stuff but trout fishing's been my love.

As a young man Mick lived on the outskirts of Melbourne, so he and his mates could head up to the river at a moment's notice.

Mick Hall was the first Australian to receive the prestigious Sportsmanship Award at the 'One Fly' event in Jackson's Hole, Wyoming, USA, in 1996.

They even took mid-week jaunts by skipping out of work early some days and driving the hour and half to the Goulburn. They would fish for a few hours and be back on the road by 9.00pm. At the weekends they'd camp.

I first started coming up in the '50s as a teenager. I had a car and couple of mates and we'd do the typical thing. Camp on the river, drink too much, fish too much, stay up all night, drive back home the next day, go to a disco or something, then off to work on the Monday morning. But every weekend we used to come away fishing.

Fishing in the Goulburn River in the early days meant chasing whatever was in the water. But Mick decided early on that it was fly-fishing that was worth pursuing.

And I always wanted to learn to fly fish. I could see there was a lot of merit because there were so many challenges in it. We were at the Thornton Bridge and we'd had a big day fishing since very early in the morning. This guy came up the river and he's flicking a fly line around. I said 'there's some the other side. I've been watching them rising'. And he goes and he catches them. My jaw just went ba-boom; 'I gotta do this. I just gotta do this!' I've been a 'fly flicker' every since.



Bill Austin giving would-be fly fishers a distance casting demonstration at Eildon in 1945. He is handling 30 yards of line with an Australian-made cane rod. Photo source: Mick Hall.

Reading the river

Trout fishing in the Goulburn River area and in Lake Eildon is mostly done off the banks, rather than from in boats. For Mick, finding the perfect little stream where trout lived was a matter of tramping around the upper reaches of the river and learning as much about trout habitat as he could.

Mick remembers that in the 1960s, as it is today, it was the colour of the water that was an important indicator.

You could read the rivers by the colours. In the smaller mountain streams, you'd see various colours of khaki that reflected back off the bottom and the deeper the colour, the darker the water, the deeper the water and that's where you'd find the fish. Especially if it had surface movement on it like bubble lines or where the water was tumbling a little bit. Because that gave protection for the fish. They couldn't be seen from above by the birds. When you got good at it, you really did get the results. But it took time.

The lure of the fly

Fly fishing depends on the artificial fly looking tasty to a fish: the best ones look like the insects the fish eat. Mick has spent many hours with feathers, yarn, twine and hessian threads copying what he has seen in the river.

Through the spring and summer months we always get a lot of insect hatches, a lot of terrestrial stuff; from beetles through to grasshoppers, ants, this sort of thing that were on the water all the time, as well as our aquatic sources; be they stone flies, be they caddis, midge or mayfly. It's all there, and we've seen their major occurrences, and then the fish feeding on them. And from this we've learnt more about the bugs and their habits and what they needed. And just how vulnerable they are to changes in the system.

Aboriginal Fishing gear

Over the nineteenth century Aboriginal people continued to live along the Goulburn River. Women carried fish hooks made from mussel shells and used kidney fat for attracting the fish. Hooks were attached to coil made from river reed and cast into the river or trolled behind boats around deeper holes in the river. Short spears were used for diving and longer spears were used from canoes.

Aboriginal men also used a spear set aside entirely for killing fish. At five feet long and an inch thick the spear was not thrown, but used as a lance. Peter Beveridge, observing fishing in Victoria and the Riverina in the 1880s, noted: ... *they select a stretch of shallow water, full of reeds and other aquatic plants, over which the wary fisherman propels his canoe Every now and then he thrusts the plain end of the stick sharply to the bottom, thereby disturbing the feeding fish. As a matter of course they rush away from the disturbance shaking the plants in their hurry, which at once tells the keen-eyed fisherman the position of his prey*.⁶

Different sorts of nets were used for different creatures from the river: some for Murray crays and others for catching birds, including ducks. Nets ninety metres long and one and a half metres wide were weighted on the bottom with clay and had floats made from reeds.

These nets were drawn through the water by the men, and the women and children sorted and picked the catch of cod, silver and golden perch, catfish, blackfish and turtles.



The 'red tag' (left) is a classic fly used to catch trout. Flies are designed to mimic the food that each fish species chases. Mayflies- like the Aussie March Brown (*Atalophlebia australis*), right, are favourites of both trout and native fish.

Photos: Luke Pearce.



Native fish, such as Murray cod, can also be caught on a fly. The flies that attract native fish are different to those that attract trout. Photo: Luke Pearce.

Cod visit when its warm enough

While he might have chased trout throughout his life, Mick was also on the lookout for native fish and how they interacted with the introduced species.

By the time Mick had started fishing here the cooling of the Goulburn River had already changed the habitat for native fish.

Little natives in mountain streams

Several species of smaller native fish occur in colder mountain streams, including recreational species such as blackfish (slipperies, muddies) and others, such as galaxias (several species of *Galaxias*, also known as jollytail).¹³



Barred galaxias. Photo: Gunther Schmida (Photo source: MDBA).

- Several species of *Galaxias*, with a maximum size of between 15 - 20cm but more likely around 8 - 10cm
- Barred galaxias (pictured) are only found in the headwaters of the Goulburn River. They were severely affected by the Victorian Black Saturday fires. Remaining populations were kept in aquaria until vegetation in the catchment grew back, then they were released back into the wild
- Barred galaxias are a relatively long lived fish – up to 13 years old!
- Barred galaxias are listed as 'Threatened' nationally
- Mountain galaxias lay eggs on the underside of stones in the head of pools and riffles. These fish are thought not to migrate, and have a small home range of about 19m
- Mountain galaxias are the only native fish found in the alpine zone above the snowline during winter

We don't get a lot of the cod and yellowbelly right up in the Upper Goulburn to Lake Eildon. They may come up and visit, during the summer months when the water's warm enough for them. As a matter of fact, the little blackfish that we've got around here are in absolute abundance. There's lots of them. And so, we found there's very little conflict there 'cause the high mountain streams are the ones that the trout really do prefer but sometimes they'll move down to where the cod are.

Mick points to the use of heavy machinery and farm chemicals as being a concern for fish. As well as removing snags, machinery is also being used to remove invasive weeds like willows from some areas along the river bank. Mick agrees that governments are now doing a better job than before, but thinks authorities still need to be vigilant about other animals that may be affected.

This is a little bit controversial, because up on the Rubicon where they're doing the removal of willows, I found two dead platypus. One was badly decayed and the other one wasn't; it was a young animal. I don't know if it was because they'd been dislodged, or if it was the poisons they were using, whether it was contractor doing it, I don't know. Maybe the deaths of platypus are not related to these works, but I mean, they just go in and blast away at everything.

Willow woes



Willows being removed – one control option.

Photo: Helen Shimitras.

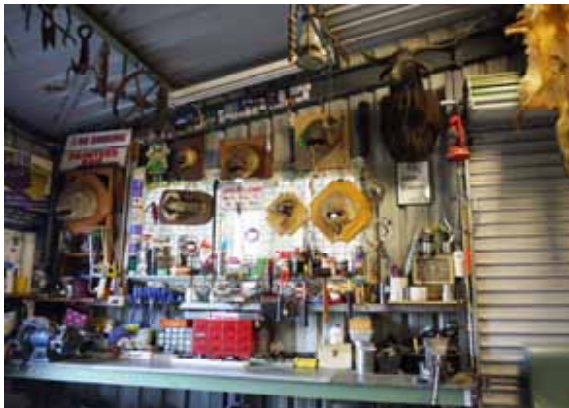
- Willows are invasive and are spread both by seed and as fragments which travel downstream
- Although some fish will shelter under willows, willows can dominate riparian areas, displacing native species. They create dense shade and produce significant leaf fall in autumn, which depletes dissolved oxygen levels and changes the food supply within the aquatic ecosystem
- Willows can also modify channel shape and capacity, divert flow, accumulate fine silt and contribute to erosion
- If willows are being removed, it is important to ensure they are replaced progressively with native trees. The complete removal of all trees overhanging the river will result in water temperatures that are higher in summer and lower in winter and also increase native fish exposure to predators

Donny Richter – Changing habits



Donny was born in 1948 and raised in Melbourne. He was apprenticed as a painter and decorator and as a young man moved around northern Victoria. He lived in Boort in the Mallee and then at Barmah on the Murray River. After a stint in Geelong, he returned to Shepparton,

finally putting, as he says, 'a big taproot down' in 1983 at Murchison. His three acre block sits high on the bank of the Goulburn – plenty of room for a big shed that houses his boats, caravan, multiple fishing rods, hundreds of lures and half a dozen cod trophies.



Donny's workshop. Photo: Jodi Frawley.

A cod would live there

His love of fishing started out small, learning to fish with his family.

My father was a builder and he was always working, and only during holiday times would he take me and my younger brothers fishing. As life went on, I went out on my own - 16, 17, 20 - fishing, and bought my first boat. It cost me \$290. Little six horse power Chrysler motor, and from there it's just grown, mate. Bigger and better.

As a young man, Donny and his mates would head out on camping trips on the river. Finding the right spot was crucial to making it a good fishing weekend.

Well, first, we'd like plenty of shade. And we'd set the camp up there, but then, when we go down the river in the boat, we'd look for spots where we thought 'a cod would live there', like an old, dead tree in the water or a heap of branches laying around, or a bit of a swirl under a log and a big, hard clay bank – we'd always look them out.

We'd just catch them all

In these early days Donny and his mates would catch as many fish as they could.

But back in the old days we'd do everything wrong. We'd put in cross lines and springers and set lines that we would leave overnight. We could have up to 40 springers in and catch 10 fish. A couple of cross lines and you could get up to 20 cod at a time.

Big catches of fish meant big stories at the pub.

We'd just catch them and had to bring them home and get in the pub and brag. 'Oh, we caught this many fish'. What we did it for: I don't know. You'd give them away or they'd go rotten.

How to fish - properly

All this changed in 1977 when, at age 27, Donny met his mate Noel Anderson.

Noel taught me a lot about fishing and catching cod and lure fishing. And, yeah, I would like to say 'Thank you, Noel' 'cause he was the one who put me on the straight and narrow, instead of springers and cross lines. He knew all the tricks, he knew where to put lines in, where to fish and all that stuff. He

was the one that really showed me how to fish – properly.

For twenty years, Donny and Noel went fishing once a month.

Donny intends to teach his six-year-old grandson, Charlie, everything that Noel taught him.

Well, at the moment, I'm taking my six-year-old grandson fishing. I'm not going to teach him the old ways. I want to teach Charlie what I've been taught for the future generation. What he learns from me, it'll help him and maybe he can help someone else later on.

Of crays and carp

Over the road from Donny's place is a steep clay bank that slides down into the waters of the Goulburn: a perfect spot for Murray crayfish. When he's up for a feed, Donny moseys over to the river and drops in a net with a punched tin of dog food for bait.

In front of my place you can put a net in to get the Murray crays. I'll pull that net up, and I'll say 'I'll have you and you', and the rest I tip back into the river. Why be greedy? They're always there. Why take 20, when you only want two.

Carp have been a big problem in the Goulburn River over the years. Donny remembers a time when the river was boiling with them.

I can remember at the Weir, you'd look over, at the bottom of the spillway there would be thousands and thousands of carp. The water was just bubbling with them. Years ago, you'd go up the river and there'd be carp on the river bank. People have caught them and throw 'em up there and they'd stink.

Donny thinks things have changed over the dry years of the drought. He hears different ideas from his fishing mates as to why the carp might not be as plentiful as before.

The carp seem to be gone. I don't know why. There are lots of theories; they reckon the cod are eating them, but then, I don't know if the water might be getting too cold for them and they're heading further north, I don't know.

Murray crays

(*Euastacus armatus* - Spiny cray)



Photo: NSW DPI.

- Reported to grow to 3kg and are the 2nd largest freshwater crayfish in the world
- Confined to River Murray and tributaries, and found only in the main channels
- Prefers cool, strong flowing water, with higher oxygen content
- Active through the coldest months from May to October
- Slow growing: 5-10g in 1st year, may reach 40g after 2-3 yrs
- Breeding weight is 200-250g, which takes about 6-9 years
- Breed late autumn and early winter, carrying eggs ('berried up') until October
- Steady decline in numbers since 1940s
- Continuing reduction in size in NSW since 1960s

Kaye and Gary Gibb - From the ocean to the river



Kaye and Gary were both born in the early 1950s, but grew up fishing in completely different parts of Australia. Kaye learnt to fish doggy mackerel off

the Queensland coast near Townsville; while Gary took day trips to the Wakool River with his Dad and brothers.

Kaye came to Victoria in 1973, but left fishing aside for most of her life, taking it up again when she met Gary ten years ago.

I got tangled up with Gary. He was a keen fisherperson and said if I wanted to go out with him I could go. I said 'Oh, yeah, I used to fish quite a bit at home'. So, we started going out with the Seymour Angling Club once a month.

Fishing – you never forget how

It was a bit like riding a bike; a skill that Kaye had not forgotten – *It's just a refresher more so than anything else.* Kaye did have to adapt what she knew about ocean fishing, and Gary taught her what to look out for out on the river.

It's a different type of fishing to the sea fishing. There are different baits because up North you did mainly lure fishing for the fish we caught. We use different lures and baits down here for the different types of fish. I had to learn where to go, what snags look good.

Gary and Kaye like to fish in the lakes around the Goulburn River. Fishing from the boat in the stiller waters gives them the opportunity to use berley to attract the fish to where they are. Gary explains:

Berley is used more in the lakes because, otherwise, if you're in the river system, it just flows away too quick and you're just feeding the fish or attracting fish further down the river. Unless you've got your own little berley bombs which hang over the side of your boat. We use berley pellets that are like chicken pellets – all ready made-up, ready to go. Sometimes we add our own little ingredients – fish oils or ground up baits. Just to give it that smell and to add as an attractant.

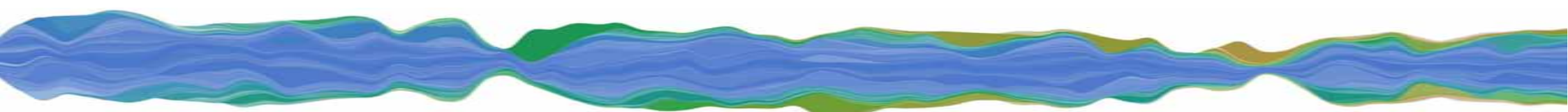
Kaye and Gary both like catching a big cod when they are out on the river.

The ultimate in fishing probably is to catch a cod. They're a very lazy fish to catch though. They're big, like a big log just pulling, or a big snag or something. Very good when you do get a nice one.



Jim Hanley, another local fisher, likes to fish for cod in Lake Mulwala. Photo source: Jim Hanley.

One of the changes that Kaye and Gary have seen is the ban on trout cod in Victoria. Since this ban was introduced, they, like many other fishers on the Goulburn and other nearby rivers, have seen a return of the trout cod to their regular catches.



We do sometimes catch a few trout cod but because they're a protected species we've got to let them go. You think you've got a lovely fish on, until you bring it up and say 'well, oh, I've got to let this one go'. Beautiful looking fish, but of course, I can understand why they have to let them go.

Fishing weekends away

The Gibbs rarely miss the Seymour Angling Clubs' monthly weekends away. They set out on Friday and set up camp, usually on the riverbank. The competition starts on Saturday morning and finishes on Sunday with a weigh-in for first, second and third prizes. They fish for six to eight hours each day and either use keeper nets or photograph the fish so they can release them.

Different places they visit mean different fish.

There's quite a few silver perch in the Goulburn but we're not allowed to keep them. You can go as far as Yarrawonga or Mulwala, Echuca and back down towards Cobram. When we go to Nagambie, there's quite a few cod. We've got one place, that's a good little Murray cod place, close to Seymour. We get permission off the owners and go down there. Some of our members have caught cod and most of them have been released because they want to keep them in the river here.



Trout cod (background (*Maccullochella macquariensis*) also known as blue nosed cod or blue cod) and Murray cod (foreground (*Maccullochella peelii*) also known as Guduu, Pondee or Pondi) look quite similar and have been known to hybridise. Photo: NSW DPI.



These cod, caught in 2006, were the first cod Jim Hanley and his fishing mates had caught from the Goulburn River in 30 years. Two weighed in at 8 pounds and two at 6 pounds. Photo source: Jim Hanley.

Fishing in the dry

Since Kaye started fishing again, drought and dryer rivers that have been the norm. Kaye has noticed that the fish can adapt to the wide swings in the water levels associated with droughts and floods.

She says:

They don't seem to breed as much in a drought because they know that there's not as much water, there's not as much feed. Since the 2010 floods, there's more feed around, so, of course, they're going to flourish more.

Timber in the river

Kaye has also noticed that the long dry spell followed by the rising waters of the last year has caused many more red gums than usual to topple over.

Just recently, there's been quite a few trees from the bank fallen into the river, and I know that's good for the fish, but, I think, you've still got to clean the rivers out a little bit to let the water flow.



Ken Gilmore is another fisher who thinks that the riverbanks are different than they once were:

Black wattle. They used to fall in a lot. One of the engineers in Alexandra, he had the idea he was going to clear the banks to stop the trees falling in the river, but no one agreed to that. There's gum trees whose root systems seem to be weakened and they seem to be falling in more than what they used to. About 15 acres of land went in up here, you could hear it falling in. The water got underneath the banks and, all of a sudden, you'd hear a great 'whoosh' and in the middle of the night about half an acre of soil would fall in the river and go down the river.

The irony is that more snags in this part of the river may have protected the banks and prevented the undermining of the tree roots.

Nonetheless Gary Gibb worries about desnagging – he can see both sides of the argument:

Not so long ago they were pulling all the trees out to clean the rivers and waterways up. It cost a fortune. Now, they're putting logs back in or letting the trees go in there. It may be a great thing for the fish habitat. It may not be in some ways. It does tend to silt up the rivers, and to stop a lot of flow. Now, depending on what you want: Do you want to clean the rivers out or keep them flowing? Or, do you want to block 'em up? It's good for the fish, perhaps, but it's still got to have a lot of flow. So, it's good and bad. And the other thing is, of course, a lot of snags. Well, it's good for the fishing, but not so good for the boater that wants to go out there and put his boat in there. You gotta try and get around them and all that but in a fast flowing river, like the Goulburn, it can be dangerous. But, fish do need habitats and they need breeding places – and it does slow – but ah, what can you say? That's it. That's the way I feel.

Snag FAQs



Natural snags. Photo: Fern Hames.

Why were snags removed?

Up until 1995 snags were removed to improve navigation and because they were thought to increase erosion and flooding.

Why are snags important?

Snags provide habitat for native fish like Murray cod and trout cod. Snags are used for shelter, territorial markers and as ambush sites. To these species, a snag is home – Murray cod have been recorded migrating 240km upstream and returning to the same snag¹⁶, and we now know that 80% of Murray cod are found within 1m of a snag!¹⁷

Do snags cause erosion?

In certain instances small-scale and short-term erosion may occur, but in many cases snags may reduce erosion and are important for bank stability.

Are snags just thrown in?

No. A great deal of scientific and engineering analysis goes into determining the right position, size, number and type of snag put back into the river. Permission from State agencies is also needed prior to works.

Making connections

Working for fish

Wally Cubbin has fished the Goulburn since 1958. He's the Secretary of the Nagambie Fishing Club and a representative on VRFish, a recreational fisher organisation in Victoria, whose motto is 'Fish for the Future'. Wally sees advocacy as an important way to work toward a healthy river and bring back the fish.

I'd been collecting a lot of data on the fish kills over the years from the different agencies. Dr Paul Sinclair, the Director of Environment Victoria, came to Nagambie and he had a look at it all, he had a look at the pictures and he said, 'Would you be interested in getting the Goulburn Valley Association of Angling Clubs to help with an audit on Goulburn-Murray Water? As to the way that they manage their waterways, ecologically and environmentally?' And I said, 'Yes, we would. We'd like to do that.'

Fly fisher Mick Hall understands the importance of habitat, for both native and introduced game fish. He campaigns for habitat care and is involved with the Native Fish Strategy people to improve the general health of the river for all fish.



John Douglas (centre) wants to share his childhood fishing experiences with his own sons. John is shown here with his brother Ray (front) and Uncle Ian.

Photo: Bruce Douglas.

Mick has been an advocate for the 'Adopt-a-Stream' program, a Victorian DPI Fisheries initiative.

What I envisaged from 'Adopt-a-Stream' was maybe getting projects like those being done in the United States. So many of our scientists just think 'Fish' and nothing else. The bottom line is to consider all the life that's in the river. It's the in-stream habitat that is just so important of the survival of everything. The bird life and water-fowl disappears with willow removal. You don't see them back again 'til there's cover back again. You've got to plant so that you've got shaded areas, you've got what nature gives you in mountain streams. 'Cause that's the way it survives, if you don't, it just chokes itself and dies.

Fathers, brothers and sons

Fishing has been an important way for John Douglas to connect both with nature and with his two sons. John is both a fish scientist and a passionate recreational fisher. Born in 1960 and taught to fish on the Murray River, he has been living in the Alexandra area for most of his adult life. He says:

I always had this thing – I liked going fishing with the old man – so I thought it'd be nice to go fishing with my kids. If they wanted to go, they went. If they didn't, I don't think I forced them. My oldest one is not that keen on it at the minute, but the younger one's pretty keen. But then the older one will come back and he'd be looking at the weather, going, 'Oh, we should sneak down the river.' So it's a social thing, we can catch up and you can stand in the river and have a fish and chat. So it's pretty good.

Ron Bain is 92 years old and remembers how, as a young man, he and his brother, father and brother-in-law would pack up the flat-bottomed punt and head off fishing.

We'd get the local carrier to put our boats on his truck and go up to Alexandra and then we would float all the way down the river. We'd spend over a week and that'd be our annual holidays. We'd sleep on the islands in the days when there were islands on the river. And we'd

float our way down, spinning as we went. There were fast rapids in the river too, you know, and by golly, it was good fun. Coming down there.

Fishing from Dhungala

In 2004 the Yorta Yorta signed a joint land management agreement with the Victorian Government regarding the Barmah Millewa Forest areas. The Yorta Yorta connections to the Goulburn River are deeply felt and when celebrating this agreement Wolithiga Elder Henry Atkinson talked about the importance of fishing within connection to country. Like many landholders, Henry wants people to seek permission to come onto these river banks to fish.

I personally am looking forward to the day when I can sit on the bank of the mighty Dhungala (Murray River) and fish exclusively on my own land without the need for a piece of paper to say what I can and cannot do and knowing that only my people walk here, sit here and fish here. I'm not saying that I want others excluded from the river system but I just want a little area where everyone who treads here has the same thought in their hearts.¹⁵

If we look after the river, the river will look after itself

In his social welfare work with the Salvation Army, 49-year-old Daryl Sloan has met many different people who camp along the Goulburn River. These days, the needy and homeless live in the bush around Shepparton. But Daryl points out that there is a long history of riverbank camps – including the 1939 camps of Aboriginal people at Mooroopna, Anglo-Australian seasonal workers and European backpackers of today.

New Australians and old Australians lived on the banks, where there was a promise of seasonal work dependent on irrigation. The bush offered privacy, warmth from a fire and a place for fishing and other food. But the lack of services mean that these camps still pollute the river. We need to use some common sense about the future. If we look after the river, the river will look after itself.

Mooroopna

After the strike against Government interference at Cumeragunja in 1939, a large group of Aboriginal people walked off the mission to settle in riverbank camps along the Goulburn River near Mooroopna.

They built makeshift tents of hessian and tin on 'The Flats', the low-lying land between the river and the highway and later groups moved over the road to Daish's paddock. They worked at the Ardmona factory, the McLennans' Flour Mill and at farms outside of town. Fishing and hunting along the river provided food for survival and a place for the mob to gather.

Beatrice Aitkinson remembers:

'We had no social services or anything. It was hard but happy times. Everyone shared, whether you were short of an onion or whatever, you could sit down and talk'.⁸

The 1974 flood was so high it washed away 324 houses in Mooroopna. The camp was also inundated and people had to move to higher ground; rebuilding once the water receded. This area is now known as Rumbalara.⁸



A postcard showing the Mooroopna Road in flood (no date). Photo source: Wangaratta Library.

Visions for the Goulburn

The fishing people who contributed to this project have all talked about their hopes for the future of the river. Many felt they had seen some improvements but most don't feel the river is as healthy yet as they would like to see it. Each of these fishers suggested ways to help the river and in turn help provide healthy habitats for fish.

Ecology and industry

At 26 years old Hayley Purbrick is the fifth generation of the Purbrick family to live at Tahbilk where they have a very successful winery and farming business. She grew up fishing in Lake Nagambie with her brother. In recent years, the family has turned their attention to the Tahbilk wetland that sits in the centre of the family's land. It was once a wet and dry anabranch of the Goulburn River, complete with horseshoe lagoons. The Goulburn Weir changed this. The weir pool kept the water level in the wetland high and the horseshoe lagoons filled permanently.

Hayley and her family are helping to rehabilitate this precious place. A healthy population of threatened freshwater catfish co-exist with the ecotourism ventures that the family have introduced.



A smoking ceremony at Tahbilk welcoming guests to a 2010 Native Fish Awareness Week event, overseen by Taungurung man, Roy Patterson. Photo: Jodi Frawley.

Hayley would like to see more recognition that there has been a generational shift in environmental attitudes, particularly, she says, in relation to river rehabilitation and management.

I'd like to see Nagambie people embrace their waterways and actually utilise them in a positive way. I think I really appreciate that with water, you have to have a balance between ecology and recreation. I would like to see the future of the waterways being shared properly amongst all parties. People underestimate how much water there actually is in Australia and how it can be shared quite easily.

Hayley disagrees with the way the media pits the environment against economic development. Instead she thinks that there is a bright future ahead for our waterways.

It shouldn't be a competition between environments and farming because I think people would find that a lot of young farmers are actually very environmentally aware. They just need to know how much water they're going to get and they'll work around it in an efficient way. I don't think that the government agencies are talking to the right people when it comes to sharing water. They're talking to the existing generation and I think the existing generation has done a great job but that the next generation is quite different in their way of thinking. They are environmentally aware, and they don't want to see the waterways lost because they use them for fishing and skiing and boating as well as for irrigation.



Tahbilk Lagoon. Photo: Fern Hames.

State of the river - 'extremely poor'

The Sustainable Rivers Audit (SRA) is an ongoing systematic assessment of river health of 23 major river valleys in the Murray-Darling Basin. Environmental indicators (themes) include hydrology, fish and macroinvertebrates, which are monitored and will highlight trends over time.⁷

The Goulburn Valley was surveyed in 2005. The Goulburn Valley fish community was rated as being in 'Extremely Poor Condition'.

Alien species were 63% of the total biomass and 58% of total abundance. The fish community had lost most of its native species richness and was dominated by alien species, mainly trout.



The Goulburn River, with snags and overhanging riparian vegetation – ideal for fish where they can find it. Photo: Jodi Frawley.

Trout FAQs

(*Salmo trutta* - brown trout, *Oncorhynchus mykiss* - rainbow trout)



Rainbow trout. Photo: Charlie Carruthers.

Are trout native anywhere in Australia?

No. Trout were introduced into Australian waters in the late 1800s. Brown trout are native to Europe and western Asia. Rainbow trout are native to North America.

Do trout breed or are they all stocked fish?

Both. Trout breed very successfully in our waterways and have established self-sustaining populations in many rivers. They are also heavily stocked. There is significant level of investment in trout stocking in both NSW and Victoria.

A fly's life



The mighty 'Red Tag' fly. Photo source: Mick Hall.

The Red Tag above is a copy of the original as first published in the *1888 British Angling Files* by Michael Theakston and edited by Francis M Walbran.

First known as the Worcester Gem, it was actually Walbran who added this pattern to this book. It was used as a fly for grayling rather than trout.

It appeared in Australia very early and by the 1920s had developed a strong reputation in Victoria.

When writing of the Goulburn River at Eildon for *The Hardy's Anglers Guide 1937*, the famous Victorian fly fisherman G. Reg Lyne states:

In early morning and evening, about a mile downstream from the outlet there is an excellent dry fly rise, the best killing patterns being Wickham's Fancy, Coachman, Royal Coachman, Whirling Dun, Cocky-Bondhu and Red Tag.

Text courtesy of Mick Hall.

Ovens



Source: Jodi Frawley.



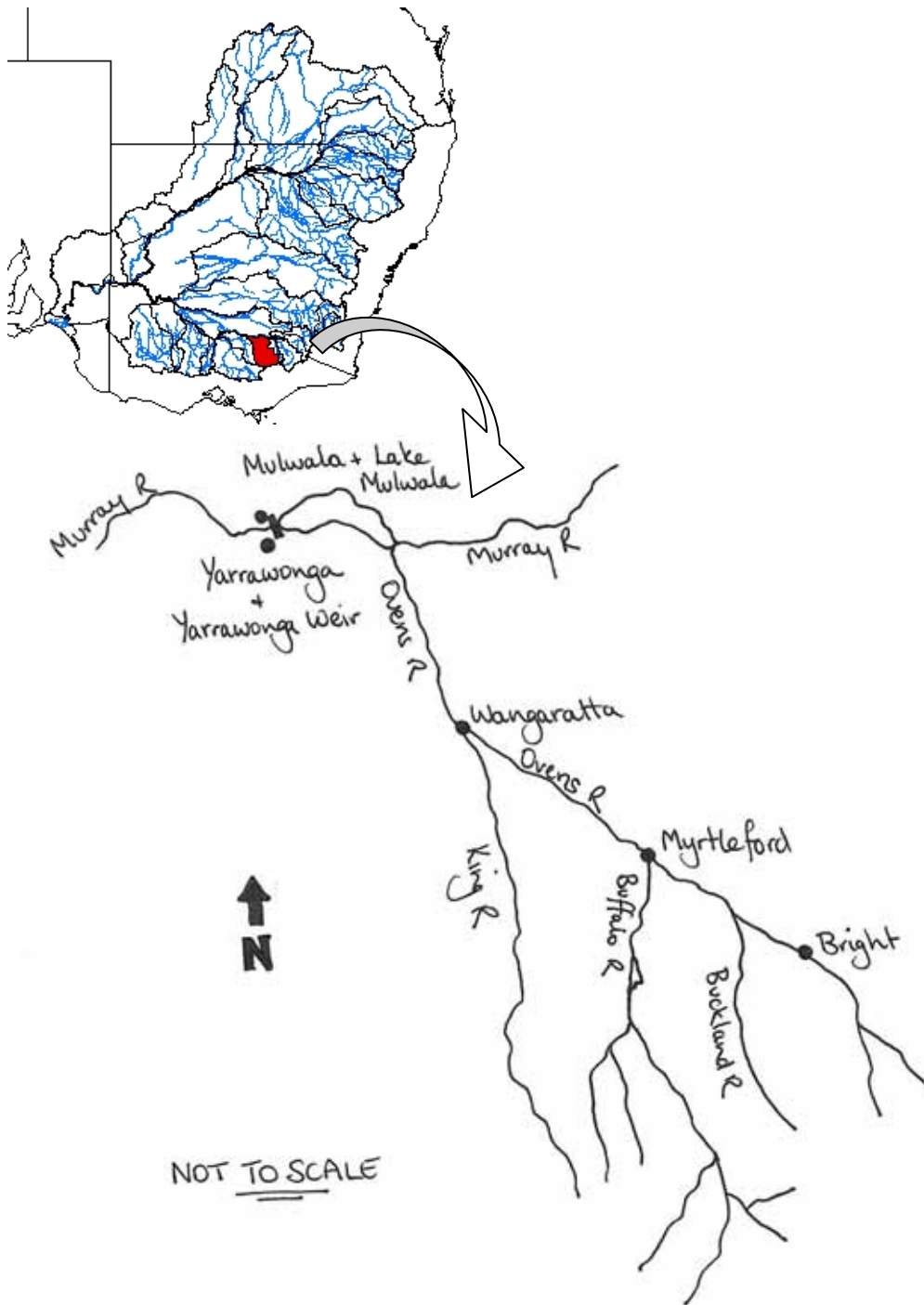
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(Ovens R Valley 1867 Guerard
PIC S7723 LOC1241-B).



Source: Luke Pearce

Source: Scott Nichols.





Tom Cameron, with his grandson Archie Ward. Tom has lived all of his life around the Ovens River and learnt to fish from his Dad in the 'backyard' – the river. Photo: Jodi Frawley.



Lyell Hogg and **Ollie Evans** have been mates and fishing buddies for over 50 years. Photo: Jodi Frawley.



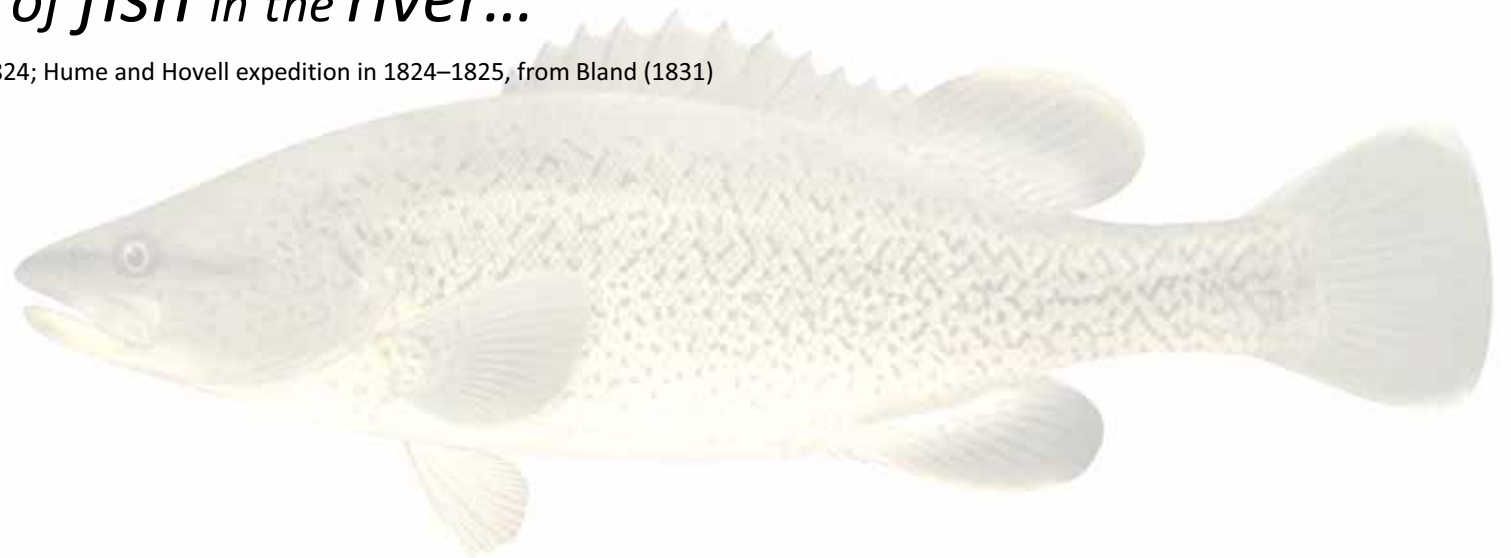
Gary Daws recalls that it was fishing for the mighty Murray cod that bought his parents together. And one of the biggest influences on his fishing was a Murray cod called 'Arthur'. Photo: Jodi Frawley.



Keith Snowden is carrying on a family tradition of fishing. He has also changed and adapted what and how he fished as he learnt to 'think like a fish'. Photo: Jodi Frawley.

*Just before sunset they cross the **Ovens** and then immediately halt for the night; having travelled about fifteen miles. They caught an **abundance** of fish in the river...*

31st December 1824; Hume and Hovell expedition in 1824–1825, from Bland (1831)



Introducing the river and its people

The Ovens River rises in the Victorian Alps where it is linked to significant freshwater meadows and marshes. It flows past Harrietville, Bright, Myrtleford and Wangaratta where it is joined by the King River on its way to meet the Murray near the top of Lake Mulwala.

These the traditional lands of the Bangerang people and their neighbours the Taungurung and Yorta Yorta peoples.

Baiame, Wiinya and Toonatpan

Bangerang men Kevin Aitkinson and David Edwards relay the Bangerang creation story, regularly retold while fishing on the riverbanks.

Long ago in the Dreaming, the river did not flow through Bangerang Country. So the people asked Baiame (Creator) for help. Baiame decided to send his Wiinya (wife) to help them. He asked his Wiinya to make a mark with her kunna (digging stick) in the earth to Tocumwal and Echuca. After his Wiinya had completed her task Baiame sent the Great Serpent Toonatpan and asked the Great Serpent to follow the mark his Wiinya had made in the earth. Baiame then created a great storm with much thunder, lightening and rain. The river was filled bringing life to the country. The people, the animals and the plants arose out of the country.¹

For the Bangerang people, living near the rivers was like living near a supermarket. When the Murray and the Ovens Rivers were in flood, fishing became a communal activity. Large groups of people netted fish and crayfish, speared fish and, as the river began to subside, built weirs to trap fish returning from the swamps to the main channel.²

Many dispossessed local Aboriginal people moved to the Maloga Mission from 1874, or later to the Cummeragunja Settlement, both on the Murray River. Those who remained worked and lived along the Ovens River.



An unknown Bangerang man with his canoe and fishing gear featured on an early postcard. Image source: North East Historical Society Collection, Wangaratta Library.

The arrival of the Europeans

Hamilton Hume³ and William Hovell⁴ crossed the Ovens River in 1824, while seeking a passage from Sydney to Spencer Gulf. Cattle and sheep grazing followed, especially along the lower reaches of the river. The population boomed after gold was found at Beechworth in 1852.

The rush bought Americans, English and Chinese to live along the riverbanks. Fishing was an important way to supplement their diets. However, the sand and gravel unsettled by the gold dredging began to fill the river's deep waterholes.

The Chinese made market gardens along the river to supply fruit and vegetables to the goldfields. They were also the first to grow tobacco: 'chop chop' and 'stinky' were two forms of dark leafed tobacco grown in the Ovens and King Valleys. Tobacco remained a key industry in the Valleys over the twentieth century.

Grazing, gold mining, tobacco and plantation forestry all needed different types of workers, bringing new people with new needs to the river and new ways to catch fish.

Plantation forestry and associated milling were important local industries and both used the river for water. Excess poisons and siltation historically associated with the gold mining, tobacco and plantation industries caused devastation for fish and the river at different times.



Early industry had significant impacts on the river.
Image source: Wangaratta Library.



A postcard showing children swimming in the Ovens River at Bright. Image source: Wangaratta Library.

Due to its proximity to the Alpine regions the Ovens River has always been a popular spot for visitors. Trout were introduced early and fly fishers along with other fishers, hunters, bushwalkers and, more recently, grey nomads have all enjoyed the distinctive river corridors of these picturesque valleys and plains.

The Ovens River is one of the last largely unregulated rivers in the Murray Darling Basin and is particularly important as a reference against which to assess the state of other lowland rivers in the region. There are areas where the riparian vegetation has been replaced by willows, there have been significant water quality issues and there are far too many pest fish.



A sandy bend on the Ovens. Photo: Fern Hames.

Acclimatisation Societies

As the gold rush dwindled, Victorian governments were left with the challenge of finding ventures that would keep people in the colony. At this time, it was common to transport plants and animals to and from all the continents of the world for economic, medicinal, social and scientific purposes.

What were known as 'Acclimatisation Societies' formed in local communities and brought many animals and plants, including foxes, rabbits, willows and blackberries, to Victoria. Roach, tench and Atlantic salmon all arrived this way.⁵

An acclimatization society formed in Beechworth in the 1860s where a special reserve was set aside to assist in the naturalization of plants and animals.⁶

Many of these plants and animals have had long-term adverse impacts on the Ovens River, and indeed across the Murray-Darling Basin. Plants, such as willows, have altered the riparian areas and had a profound impact of how and when organic matter enters the waterways. Rabbits have caused massive and irreversible erosion and soil loss, which has contributed to sediment loads and the siltation of wetlands and rivers. Fish, like carp and redfin, have different but significant impacts on native fish and managing these impacts – if not actually controlling the spread and number of the fish themselves – remains a high priority in the rehabilitation of the rivers.

Tom Cameron - 110% freedom to use the river



Tom was born in 1937 and has always lived in the lower Ovens River area.

I grew up on a small farm. One of a family of eight. With none of the conveniences that people suffer today. No electricity, no motor car, only a telephone and a radio. We lived off farm produce.

My father being of Scottish

descent and knowing how to obtain fish from the river, we had a lot of Murray cod, a lot of wild ducks and a lot of rabbits as well as good cooking.

River for a backyard

Tom's father was born in the area in 1907 and he taught Tom and his brothers how to fish.

My father could tell you where every fish lived in this river. He grew up on it. He could follow the fish all around the river and the lagoons and the creeks. In a raging flood he could go down there and successfully catch cod because he knew the river so well.

Living so close to the river meant that Tom could treat it like one big backyard. He would get home from school and head straight to the river.

As a kid we would run around down there, bare leg and bare footed. No fear of it. Always had a dog with us. I was a bit of a pot hunter. I fished for food. In the war years we had an envious supply of Murray cod and redfin. My mates and I had a big camp down there every Christmas for a few weeks. We had 110% freedom to use the river.



A postcard showing a simple hut by the Ovens River, at Horse Shoe Bend. Proximity to the river in those days meant a plentiful supply of fish, as Tom and his family knew first-hand. Image source: Wangaratta Library.

The Camerons lived close to where the Ovens River meets the Murray. Over Tom's life the waterways have shifted and changed, especially in response both to small and large floods and to droughts.

Tom explains how the river channel, lagoons and wetlands change:

We grew up calling the backwaters 'lagoons' but they are not a lagoon in the true sense. They are old river bends that were cut off by the river changing course and I can show you a spot within half a mile of here where one day it's going to change course again because it's cutting heavily into the bank and it's got a natural course to follow after it does that. So the Ovens River is a moving target. There's several hundred acres in there. If I took you down to Puzzle Bends and left you and you didn't follow the road track out, you would stay there. Every time you crossed a loop you'd think you were looking at where you've been before. It was all so similar.

The shifting banks and watercourse meant that snags were plentiful in Tom's fishing world. And snags meant lots of cod – a specialty of his father's fishing prowess.

I did actually see them catch 91 and 96 pound cod – probably dozens, if not hundreds of 50, 60 pounders. I tell the people that all those Murray red gums leaning over into the river aren't from the floods. It's where my father used to tether his bigger fish! They had them tethered all 'round the river and then he would give them to people. A very generous man.



Snags are a natural and vital feature of a healthy Ovens River. This area of the so-called North Beaches is a reserve where there are large remnant river red gums, as well as young trees, and a natural 'snagging' of the waterway is occurring. Photo: Scott Nichols.



A Murray cod in amongst snags, the place where Tom's Dad knew he would find these fish. Murray cod use snags as territorial marks, ambush and spawning sites and as shelter. The majority of Murray cod will be found within 1m of a snag! Photo: Luke Pearce.

Riparian vegetation *food – and more –for fish*

Riparian vegetation refers to the trees, shrubs, herbs, grasses and vines found in the 'riparian zone', the 'land which adjoins, directly influences, or is influenced by a body of water'. This mix of vegetation is important because it:

- is a key source of organic material for the aquatic system. Aquatic invertebrates feed on decaying material and in turn provide food for fish and other invertebrates. Woody material falling into the water provides fish with shelter and forms a substrate for food, such as algae, and for depositing eggs
- is a direct source of food for fish. Insects falling from overhanging vegetation can be a significant part of some fish species' diet during the warmer months
- provides shade which reduces daily and seasonal extremes in water temperature
- stabilises riverbanks, helping to reduce bank erosion
- intercepts and slows surface runoff and filtering or taking up pollutants and nutrients
- contributes to habitat diversity, including woody debris, rock ledges, overhanging vegetation and undercut banks.

The Ovens River has areas of good riparian vegetation. For example, the riparian zone downstream of Wangaratta is rich in perennial native grass and herb communities around billabongs in the river red gum forest-woodland. This is more like the natural state of the river than other areas upstream which are more affected by weeds, such as blackberry and willow, and by so-called 'river improvements' of the past.¹¹

The impact of people

Since Tom was young the population around the Ovens River has increased. He has seen the impacts of this increase on the Ovens River and in particular what ends up in the river.

First of all, you get rubbish which is washed down from upstream. I've chased people and had some rather big confrontations for dumping garden prunings down there. There's a bit of briar there that's come down from upstream. A few miles upstream there are blackberries. Just all sorts of weeds. Maybe some of them are native. A great stash for vermin: foxes and other little animals – lots of cats. It's pressure of people.



Small boats are a feature of family fishing. Tom argues it's not these that are a problem so much as the bigger boats. Bigger boats, he says, and more people on the river have not been good for the birdlife in and around the river. Photo source: John Douglas.

However it's not just the number of permanent residents that's increasing. There are also many more tourists and travellers from other areas who bring their boats to the Ovens so they can enjoy going fishing. Tom recalls:

Up until about 1970s, early '80s I would take the wife and kids down in the boat to have a look at the bird nests that were in every backwater. On a little sapling that had fallen down that was out in the water, or the top of a tree that was in the water there'd be a nest, just bobbing in the water, but now they're all gone. In my opinion it's not because of any action except too many people on the water. Row boats didn't do any damage. Small boats did very little damage, a bigger boat makes waves. They don't have to be very big to upset a birds nest.



Ibis nests are typical of bird species that live and breed in and around wetlands and floodplains.

Photo: Peter Terrill.

Ovens River Improvement Trust

The Ovens River Improvement Trust was established in 1953. Premier Thomas Hollway argued for the River Improvement Act 1948, saying: *It is a sad commentary on our civilization that since the advent of white settlement our rivers have actually deteriorated.* The trust set about removing obstacles in the river that were thought to impede flow and cause erosion. The decision makers believed they were rehabilitating the rivers by allowing the water to flow away quicker, thus protecting farmers from flood.¹⁰

This misunderstanding of the role of timber debris ('structure') as habitat for fish and other animals led to continual de-snagging works within the river. As scientific and community understanding of river environments and their wildlife increased, advocacy mounted to reverse these policies.

Many locals began to call the organisation the 'Ovens River Destruction Trust'. The trust was disbanded in 1997. Re-snagging programs are now improving habitat for fish.

Water plants



Watershield, a native water plant that is now uncommon, in the Tahbilk Lagoon, Goulburn River. Photo: Fern Hames.

There are many different types of water plants; some of which float on the surface, while others are submerged and attached to the gravel, mud or rock of the riverbed.

Water plants provide habitat, food, refuge, spawning and nursery sites for fish and invertebrates. They also stabilise sediments, act as a physical filter and influence physical and chemical components of water.

While there are many native water plants, there are also introduced species some of which can cause problems, particularly when abundant.

While historical information about many native water plants is limited, there appears to have been a significant decline in the abundance of some native water plants in many inland rivers of the Basin.

Lyell Hogg and Ollie Evans – Myrtleford mates



Lyell was born in Merbien, west of Mildura, in 1929. He had older brothers and sisters, lots of aunts and uncles and a whole bunch of cousins who lived around that part of the Murray. But Lyell was the only one who was born in Australia; everybody else migrated from Scotland.

Getting to know the river

Lyell moved to Myrtleford in 1953 to be closer to his wife Pat's family, working in the district as a carpenter. He had to learn to adapt to a very different river than he was used to in his childhood.

Up there, in the Murray, we used heavy gear most of the time and sometimes a hand line wound around our hands. We could plant it a mile out in the river. I fished on my own most

of the time. But it's a different style of fishing in the Ovens. We used the light gear there. Mainly I fished for trout and used a five, six or seven pound line. Light rod. You wouldn't think of using seven pound line in the Murray.



Lyell with some of his collection of fishing gear, including his half-sugar bag used to keep the fish he caught. Photo: Jodi Frawley.

Fishing mates

Ollie, born in 1936, started fishing with Lyell as a young man and they have been fishing companions ever since.

I was living next door to Lyell in 1958. So we've been fishing together a few years. As a matter of fact, I did learn a lot off him – especially spinning in a small creek because he was an expert at it.

One of the things that Lyell and Ollie always took fishing was a hessian keeper bag. Hessian bags were used to pack sugar, wheat and potatoes in different parts of the Murray-Darling Basin. Fishers, like Ollie and Lyell, have adapted them to use as keeper nets, cushions for long spells on the river, and as tackle bags. Lyell explains how he and Ollie used them to keep what they caught:

We always had about three of them – a bit over half sugar bag each. You'd catch a fish, and put it in the bag after you'd dipped it in the water and you would hang it on your back. You were wading in the water anyway and we would put a few gum leaves in among the fish and they'd keep all day. The leaves more or less just kept them separated.

Poisons in the river

From the 1960s until 2006, tobacco was one of the main crops grown in the Myrtleford area. Ollie remembers how dangerous poisons were commonly used in the early days in this industry and the effects this had on the fish:

About 1968, I took the kids over the Owens River and I was going to fish the Buffalo Creek and the Junction up at Maloney's Bridge. I went up a hundred yards, and there was a couple of dead fish and I thought 'now that's very strange.' I went up a bit further and there was a log across the creek and I went to step over it and I'm not telling lies, there would have been thirty or forty greasies (blackfish) and trout backed up against the log and they were dead. They sprayed for the tobacco with the aeroplanes, and that was high up at Buffalo Creek. And about seven mile of that creek was completely buggered because the poison got in.



The river blackfish (*Gadopsis marmoratus*). This and the two-spined blackfish are both found in the Owens River. Photo: Gunther Schmida.

Two-spined blackfish

(*Gadopsis bispinosus* - slippery, slimy, greasy)



Image: Gunther Schmida.

- Small to medium sized fish, reaching 35cm but usually less than 20cm
- Pair of fine, white, soft rays located under the throat and body has very fine scales and thick mucous coating
- Nocturnal fish restricted to larger, deeper, cool, clear upland or montane streams with abundant instream cover – usually boulders and cobbles. Very small home range of about 15 metres
- Spawn in November-December, laying adhesive eggs in rocky areas. Males guard and fan the eggs
- Eat aquatic insect larvae and occasionally other fish and crayfish
- Threats include cold water pollution, smothering of eggs and spawning sites by sediment, and predation by pest species, particularly redfin and trout
- Listed as 'Vulnerable' in the ACT

Tobacco farming

Tobacco was initially grown in the Chinese market gardens of the gold rush. An export market emerged when tobacco cropping was interrupted during the American Civil War. By 1929, tobacco crops took up half the cultivated land along the Owens River. The post war era added many new migrants, mainly Italian, to the tobacco farming mix.

In 1952 a Tobacco Research Station at Merriang employed extension officers to provide up-to-date information about fertilizers, insecticides and improved varieties.⁷ In line with advice of the time, DDT and Dieldrin were commonly applied, in some cases by aerial spraying. These poisons drifted into riparian zones and had terrible consequences for fish and other animals in the river. As the impact of these poisons was better understood, agricultural practices changed.⁸

By 2006, due to changing market demands, tobacco was replaced by other crops.



A tobacco farm at Myrtleford. Image source: http://en.wikipedia.org/wiki/Owens_River.

Community awareness and concern helped to change these practices. Improved pest control techniques also reduced the impacts to the river. Ron Dawson, who lives downstream from Ollie and Lyell at Everton, recalls how people make a connection between the changes in chemical use and the changes in the fishery:

Anecdotally people associate the improved cod fishery with the demise of the tobacco industry. Old timers here will talk about big unexplained fish kills in years past and they've put that down to chemical spillage. The tobacco industry has now closed down and whether it's coincidental or not the cod, or native fishery, has improved in recent years. So some people, anecdotally, will be saying there's got to be a connection. Whether there is or not, I don't know.

Fire and water

Fires, perhaps surprisingly, can be detrimental to river health. Ollie and Lyell have seen the damage that can follow a fire, particularly when there is heavy rain after it. They recalled a specific incident when fish were affected:

They had a cloud burst in the Buckland. And the river was down to holes and the fish died because there was that much charcoal washed in. They suffocated.

Gary Daws also remembers the effect of the combination of a big fire followed by a heavy rain event:

After the 2006 fires, there was a downpour up in the Buckland Valley and the river at Myrtleford was like liquid chocolate, it would just go 'blop, blop' like boiling mud pools. The interesting thing was, the first things to die were the trout and the carp. After a while, you'd walk down to the edge of the gravel and there'd be a little run of very clean water right against the edge there. And the little blackfish would actually have the top of their heads out of the water just in that bit of clean water. The shrimp were exactly the same. The birds were having a ball!



The aftermath of a large fire can be catastrophic for waterways – and fish. Image source: MDBA.



Photo: Anthony Wilson.

In the Ovens River near Wangaratta snaggy habitat is still present naturally (above) and is being reinstated where it was once removed (below). Both old and new snags act to provide shelter and spawning sites for native fish like Murray cod and trout cod, helping them to survive.



Photo: Fern Hames.

Gary Daws – Snorkeling for Arthur



Gary grew up at Gunbower, five kilometres from the mainstem of the Murray River between Cohuna and Torrumbarry. His mother also grew up there but his father was originally from Bendigo.

It was fishing for the mighty Murray cod that brought his parents together.

My father met my mother because he used to regularly go up there fishing. He lived in Eaglehawk, Bendigo, and fished in the Loddon. In his 20s he went further afield cod fishing. Gunbower was the place to go. During the Depression, after two or three days fishing, he used to load the cod up on the running boards of the old car. He'd stop at all the pubs, like Dingley Inn, all the way through on the plains to Bendigo, selling cod.

Exploring the river

In the 1960s Gary moved to Myrtleford and started working a tobacco block – right next to the Ovens River. He set out exploring the river, on foot and in a boat.

It used to be you'd get in a boat, you'd know what was underneath you without a sounder because we used to swim in there. We'd know that a cod lived there because we would see him. It was the sort of thing you'd do on a hot day and then in the evening. You'd go and throw a lure in because you saw him that afternoon. We used to do a fair bit of that. It was good fun.

Meet Arthur

Then, in the late 1960s, Gary met Arthur.

The fellow over the road and I spent five years trying to catch one particular fish in the pump hole. The fish was called Arthur. Five years we tried to catch him. He was 98 pound and didn't live in a lot of water.

Big cod like Arthur were something to behold.

They're just like pigs. You take them out of the water and put them on the ground, there's just nothing to support their guts, you can sit them upright because their belly just goes out. They just look like an old, fat pig.

Fish traps

The many creeks that run into the Ovens River were perfect for traditional Aboriginal fish traps. These were often thatched with wattle and set across a running channel, catching fish as they moved.

Fishers, both Aboriginal and non-Aboriginal, also used nets that could be dragged through the wider parts of the river. Aboriginal women continued to make nets from reeds, but everyone also used the new European materials. For example, drum nets were sometimes made of knitted mesh, but could also be made with wire and hessian. These nets could also have wings to direct fish into the trap.

In 1948, Inspector Howe caught 1 cod, 5 trout cod, 5 Macquarie perch and 14 redbfin in the Ovens River, even though the conditions were not ideal for using a drum net.⁹ Shrimps, crays and yabbies were caught with smaller nets called drop nets.

Aquatic ecologists have developed specialist nets, including fyke nets and box traps, for the collection of fish for research purposes.



There are rules about the types and size of nets that can be used which vary from state to state. Photo source: <http://new.dpi.vic.gov.au/fisheries/about-fisheries/legislation-and-regulation/illegal-fishing/illegal-fishing-nets-destroyed>.

But Arthur was better than the pair of them.

You'd be there in the boat, dragging an aeroplane spinner, then came floppies, so everybody had floppies, they were about the only lure that you used. You'd get him on the line and he grabbed this thing and there'd be just nothing left of it.

Arthur was foiled by a different sort of fisher.

Some young blokes from Melbourne came up spear fishing. They had all the gear. We didn't know they were there until it happened. Arthur ended up getting speared but it wasn't a good thing because he was a bit of a challenge to us.



No, not Arthur, but any large Murray cod is an awe-inspiring fish, especially close up. Photo: Gunther Schmida.

Seeing the river like a fish

This got Gary thinking:

Before that, the only snorkelling I'd ever done was looking for gold. I'd never thought to look out for fish. It's amazing how close you can get to them.

So Gary started to explore underneath the river, adding this knowledge to what he knew from walking around, going swimming and being out on his boat.

You'd sort of climb down through the branches of a snag. It was only about 10 or 12 foot of water. It was sitting right on the bottom and the light was dappled and now I know why Murray cod have got that pattern on them. He was only a small fish, but he was impossible to see, 'til his eyes moved. Marvellous camouflage.

Gary still fishes for a feed whenever he can, but now he has a different outlook, partly thanks to Arthur.

I don't think I'd ever take a fish out of the water that was more than 20 pound now.

Think like a fish...

Where some of us see mess, fish see protection and refuge. In the photo below woody debris will provide protection from predators when water levels rise, as will the scour hole that forms around it.



Photo: Fern Hames.

Where we see beautiful reflections on the dark water, fish will sense low dissolved oxygen levels and will try to avoid these areas.



Photo: Scott Nichols.

Keith Snowden – Thinking like a fish



Keith Snowden was born in 1948 and grew up on the Ovens River just upstream from Wangaratta. Keith's father and son are both builders like him, but the fishing gene goes back at least one more generation.

What about a fish?

As a youngster he would fish with his grandfather on the riverbanks right near the house.

I'd go up and see Pa - he was a Gallipoli veteran and he'd say 'what about a fish?' I'd be across there probably an hour, and come back with a bag full of redfin. We were always supplying fish to everyone. There was another house up the road, where dad's brother's got an acre of land off the farm as well, so dad would take fish up there.

He enjoyed many fishing excursions with his family, including his mum, dad, uncles and grandmother. But he has one treasured memory of his grandfather, from when he was twelve years old.

I was out there fishing away, using a hog back which is a rotating blade spinner with red wool behind it and all of a sudden, between two holes, where the water runs a bit quickly it went 'bang', took off and I thought 'Jeez, I got a big cod'. I got it out and didn't know what it was. It would have been four or five pound. I was so proud. Something different. I took it straight up to grandad who by that stage was bedridden.

His grandfather, who always called him 'Doc', made out that he was disappointed not to get a redfin.

But things were not as they seemed.

He said 'oh look, don't worry about that Doc', leave it here, I'll get out of bed and cut it up for the cats' I said 'Okay Pa, sorry I didn't get you a redfin' but I thought this would have been alright to eat.' So I left it there and went home. I described it to my father, and he shot up the road in the ute. Anyway, he walked into the bedroom and my grandad was just finishing the tail part of the fish!

Keith doesn't know what sort of fish it was that he had caught, but he thought it looked like an estuary perch.

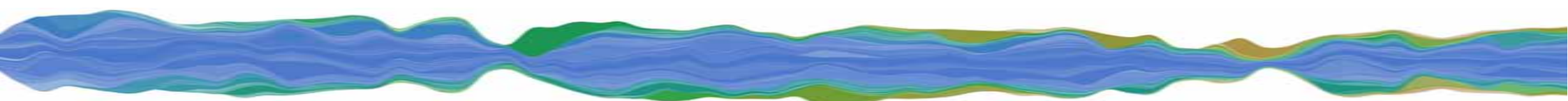
It's possible that what Keith had landed, and his Pa had eagerly eaten, was a Macquarie perch.



A Macquarie perch – possibly what Keith caught as a youngster. Photo: Luke Pearce.



Members of the Snowden family with their catch. Photo source: Keith Snowden.



Snakes – a fisher's friend

Keith may have inherited his grandfather's sense of mischief as well as his love of fishing. He liked to keep his good fishing spots from getting too well known. So Keith and his mates took advantage of the local abundance of snakes. The swampy land around where Keith lived is a haven for little frogs when the rain comes, but this attracts the venomous tiger and brown snakes. Keith used most people's wariness of these creatures to his advantage:

We spread the rumours around Wangaratta to all the fishermen: 'You can't go fishing down there, there's too many snakes'. Worked for years.



Black snakes are also frequent hunters around wetlands and riverbanks. Photo: Alan Lugg.

A snake goes fishing ...

It appears that even early European use of the Ovens River had quite dramatic impacts on local fish populations – and unexpected benefits for some local snakes.

A newspaper report of 1871 describes large numbers of small and large fish being incidentally captured by a water-wheel driven bucket irrigation system:

We have heard a good deal ... of the extraordinary number of fish taken out of the Ovens River by the baskets of Mr Henley's wheel ... which he uses for lifting water for irrigation. ... The buckets are rather deep and as the fish endeavour to make their way up the river they get into them as they pass, evidently to escape the force of the down current and are thus lifted and emptied with the water into the [river]. Large and small fish keep constantly turning up, and of all kinds, ... within half an hour some two dozen fish, chiefly bream [silver perch], weighing from a few ounces to three and four pounds each. The small ones are of course returned to the river, but ... at least a hundredweight of saleable fish in 24 hours is the rule and not the exception.

(The Argus (Melbourne, Vic.), Wednesday 25 January 1871)

The large fish were kept in a enclosure with flowing water and 'caught' for sale whenever needed! The article goes on to note that an observant tiger snake had also identified the ready source of abundant small fish and regularly fished for a meal at the site where the small fish were released from the buckets.

Learning to think like a fish

Keith learnt from his dad about how to get the best results when he was out in other parts of the Ovens River.

We didn't just go into the water and fish. As my Dad would say 'think like a fish, and where would you want to stay predominantly in the river'. We would read the water. The river was always changing. We would look for an area where we thought fish would be looking for an easy feed. We knew they were going to get an easy feed in the swift current. Or we would look for where cod would lay in the eddy of the river, in other words in the backwater or still. It was always very predictable where to get a cod.

Reflecting on the sorts of fish that he has caught over his lifetime, Keith remembers how he adapted his fishing depending on what was abundant at different times. He remembers what the old timers told him about the fishing 'in their day':

When I was really young, before I started really fishing, the rivers were full of catfish, yellowbelly, cod, and silver perch. I don't know about Macquarie perch. The old timers of that era say there was no problem to catch yourself a feed.

When redfin arrived, it changed what fish were available. Keith adapted, then changed again when the redfin population dropped.

Then it went through a period when the redfin took over and they just cleaned all the native fish totally out – they had the river to themselves. Then in my lifetime, we went through an abundance of redfin to nearly zero. The carp came into the system and they cleaned the redfin out. That's when I started changing my fishing methods to go after cod. So it was sort of a thing you did. Switching from one to the other. What I've noticed now is that the King System and the Ovens System are abundant with cod and trout cod. There are still big fish in the system, but I don't know whether there are as many as there used to be. Whether their dying out happened by accident or by nature, I don't know.



Catching redfin was also a feature of John Douglas's childhood fishing experience in this part of the Basin. John (front) pictured here with his brother Ray.
Photo source: John Douglas.

State of the river – 'poor'

The Sustainable Rivers Audit (SRA) is an ongoing systematic assessment of river health of 23 major river valleys in the Murray-Darling Basin. Environmental indicators (themes) include hydrology, fish and macroinvertebrates, which are monitored and will highlight trends over time.¹²

The Ovens Valley fish community was surveyed in 2007. The Ovens Valley fish community and Ecosystem Health were both considered to be in Poor Condition. Only 59% of predicted native species were caught; these were only half of the total catch and a quarter of the biomass. The community had lost much of its native species richness and alien fish were abundant.

Several native species were recorded however, dominated by the two blackfish species, carp gudgeons, flat-headed gudgeon, Australian smelt, trout cod and Murray cod. Of the introduced species, Eastern gambusia were sometimes abundant and there were moderate numbers of carp, redfin and the two trout species.



Australian smelt, one of the more common native fish in the Ovens River. Photo: NSW DPI.



Areas like this, with good riparian vegetation overhanging the river and only a few introduced willows can still be found along the Ovens River.
Photo: Fern Hames.

Making connections

Greg Sharp, is a Fisheries Officer based in Wodonga and his duties take him to many northern Victorian rivers. He is a passionate fisher and can see the value of community involvement in helping the rivers.

There are some people who wish they wouldn't take the willows out because they believe that erosion is a result of the willow removal. But people are definitely more conscious of fish habitat and streamside habitat. There's an area called Tatong just above Benalla. In the early 1990s I was involved with this fishing club through some funding for planting of vegetation and stock exclusion on Hollands Creek and Ryans Creek. Here an angling club could see the benefit of having good vegetation along the sides of the stream.

Adam Pascoe, Gary Daws' son-in-law, is a passionate advocate for catch and release fishing. His interest in both fishing and the environment led to being involved in riparian rehabilitation activities along the Ovens River and its tributaries.

I became involved with the CMA and doing works down here to replant native species around the place and putting logs back in the river. I don't know if it's so much fishing, but it's just an enjoyment of the environment and things like platypus and birds and the sugar gliders.

Fishing – an essential part of life

Keith Snowden enjoys his busy and social life in Wangaratta, but there is nothing he loves more than the chance to go fishing.

I like to go to Rotary on a Monday night. I enjoy that, but I get more enjoyment being on a river system with a mate, or my son, or by myself, it doesn't matter. When you're at home the phone's going in the office or your mobile phone's going for work. It's just the peace.

Recreational fishing is not just a part of life on the weekends or holidays for Gary Daws. At his farm, right on the Ovens at Myrtleford, Gary found a way to make it a part of daily life.

When we were working all the time fishing was my relaxation. I didn't even like people coming with me. I'd go down the river with two or three stabbies and sit on a log, just catch fish and think about things. It was just having a quiet time at the end of the day. It was good. Sometimes I brought fish home, sometimes I wouldn't worry about it. If I thought we needed a feed I'd bring home a fish but most of them went back in the river, which is good. I'm quite happy for the purists never to take a fish and only ever use a lure. Good luck to them. I like to catch a fish to eat.



Lyell Hogg with his fishing gear. Photo: Jodi Frawley.

A love of fishing can build a deep understanding of a river and its fish – as well as provide an enjoyment and satisfaction that spans decades.



John Douglas as a youngster fishing on the lower Darling. Photo source: John Douglas.

Visions for the Ovens

The fishing people who contributed to this project have all talked about their hopes for the future of the river. Many felt they had seen some improvements but most don't feel the river is as healthy yet as they would like to see it. Each of these fishers suggested ways to help the river and in turn help provide healthy habitats for fish.

Changes in how we look at things

One of the biggest changes that Lyell Hogg and Ollie Evans have seen is in the way that the younger generation fish. Where once fishers would take everything that they caught, there has been an intergenerational change that will be good for the future of the Ovens River. Ollie says:

My grandson does catch and release fishing. If he gets a cod, he'll keep the first one. We went out one morning on the Ovens River a couple of years ago and he got five and he kept one.

One of the changes that people would like to see for the rivers is the management of introduced species – and not just those in the river.



A growing understanding and celebration of native fish, like Murray cod, are contributing to changing attitudes towards fish and rivers – and what they need to be healthy. The photo above was taken at the Yorta Yorta youth event at Shepparton weir during Native Fish Awareness Week activities in 2010. Photo: Jodi Frawley.

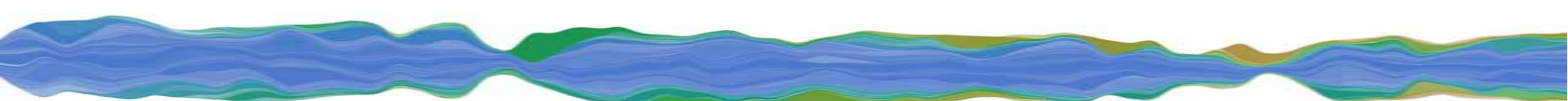
Pat Larkin, who lives near Wangaratta and the Ovens River says:

One thing I don't believe we've paid enough attention to is the introduced predators and the introduced plants that are pests in our aquatic systems. We used to see a lot of swans nesting around the edge of Lake Mokoan. Very few actually hatched because foxes were getting the eggs, if not the parent. We also have pigs, not far from here. If you show 'em water they will catch fish. The deer predate on plants I suppose, but

they seem to be manageable. Foxes, cats, and pigs, I think, have made a massive difference to our ecology. And to the availability of other species. If you take certain species out, other species dominate. I believe the whole ecology is related.

Ron Dawson is an environmentalist and a fisher. For a number of years he served as a ministerial appointee on the management board that replaced the Ovens River Improvement Trust. Over the years he has seen a general change in attitude that he believes will help in the future.

There has been a hell of a change now in terms of environmental issues people are aware of: issues like fish habitat. It's very different really. I'd love to see the demise of European carp. I think they've really changed the river and environment. Their biomass in the waterways is just horrendous really. I'd just like to see the continued improvement in water quality and increase in breeding of native fish, as well as the promotion of catch and release.



Upper Murrumbidgee



Source: Luke Johnston.



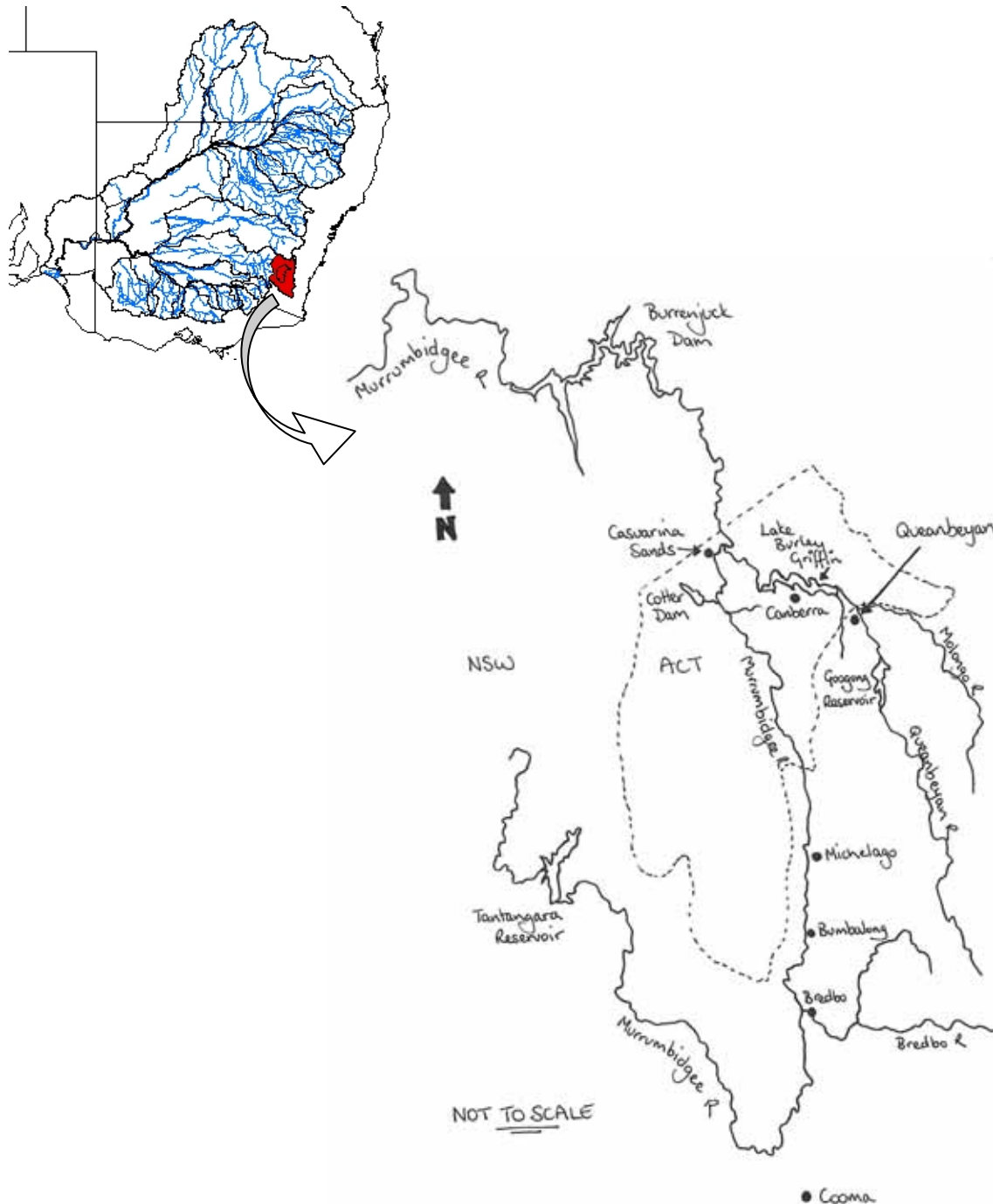
Source: Charlie Carruthers.



Source: National Library of Australia
(nla.pic-vn4649970-v).



Source: Scott Nichols.



Bryan Pratt – a scientist and passionate angler who has fished the Murrumbidgee for over 40 years. His two tackle shops in Canberra give him the opportunity to talk with other anglers about the state of the river. Photo source: Bryan Pratt.



Darren Roso has been lucky enough to get his feet wet in the Murrumbidgee with his job. By doing so he has seen many changes – both good and bad. Photo source: Darren Roso.



Dick and Gay Lawler (and their dog **Kevin**) enjoy 'Glanroe' – the old shepherd's hut they have lovingly restored on the banks of the Murrumbidgee. Photo: Luke Johnston.



Adrian Brown is a Ngunnawal man and a ranger with ACT Parks and Conservation Service. Adrian wants to honour his ancestors by caring for the river and teaching others to do the same. Photo source: Reconciliation News, Issue 14, April 2009.

Everybody who can hurl a line into a river has caught trout, *cod*, *bream*, *perch*, and *gadopsis* [***blackfish***] in the Murrumbidgee, but most do it with a hook baited with white grub, worm, shrimp, frog, and other foods.

The Sydney Morning Herald, 1 December 1904, page 11



Introducing the river and its people

The Upper Murrumbidgee cuts its way through the Snowy Mountains in south-eastern New South Wales, snaking its way south, then turning north before dropping into the lowland and heading west to join the Murray downstream of Swan Hill.

The Upper 'Bidgee floodplain is only a couple of hundred metres wide, a stark contrast to the kilometres-wide floodplains in other parts of the Murray-Darling Basin. When the floods come, they come up quickly and roar through the narrow valleys.

These are the traditional lands of the Ngunnawal and Ngarigo peoples.

Aboriginal traditions

For over 20 000 years the Aboriginal people have lived around the Murrumbidgee River. The Ngunnawal people lived mostly in the Canberra area, while the Ngarigo lived further upstream on the lowland plains. The local rivers were used for ceremony and song, hunting and fishing by all Aboriginal people.

The Canberra area was an important meeting place for Aboriginal peoples travelling to the mountains for initiation ceremonies.

Neighbouring language groups, Wiradjuri, Walgalu, Ngarigo, Yuin, Jaimatang and Gundungurra, met at Kamberri over the summer season. The Ngunnawal guided male initiates on the journey to ceremony places through Ngarigo country and along a pathway of the Murrumbidgee.¹



Kambah Pool. Photo: Scott Nichols.

The arrival of the Europeans

In 1824 the first squatters arrived in the Canberra area, followed by others who favoured land that adjoined the many rivers and streams in the area.² Mining for gold and tin brought new people who camped along the river.

As rail arrived, so too did the first naturalists and other early scientific workers.³

By the time of Federation, the river and fish habitat had changed. John Gale bemoaned the state of the river in 1903.

What a contrast fishing in the Murrumbidgee presents to the days of auld lang syne! Some of us old residents can look back to the period when an evening's fishing in the big river was invariably rewarded with a haul of heavy fish, varying in size from 7lb to 20lb or even more, whose aggregate weight was enough for a pack-horse to carry.²



Children playing in the 'Bidgee, Tuggeranong, circa 1910. Photo copy of original: National Library of Australia – Mrs W.A.S. Dunlop's photograph album PIC_8441_46_LOC_Album 316A.

Many more people came as Australia's capital was built between the Queanbeyan and Murrumbidgee Rivers. The development of Canberra changed the area, particularly by demanding far more water than before for new building, domestic and public use. The artificial Lake Burley Griffin was created, changing the look and feel of the area and how people used it.

But Lake Burley Griffin wasn't the only change made to the Murrumbidgee's flow. Once, river levels would rise with the spring snow melt before falling slowly over the summer. Today the snow melt is collected in Tantangara Dam before being returned to the 'Bidgee below Burrinjuck Dam. Tantangara Dam, completed in 1960 as part of the Snowy Mountains Hydro Electric Scheme, now diverts 99.6% of the headwater flows.

This has impacted on regular flow, flood levels and flood frequency, changing both the habitat for native fish, and opportunities for them to breed. The river between these dams is a shadow of its former self.

In the post war period many southern European migrants arrived to live and work in the area and on the Snowy scheme. Inevitably pressure grew on existing river resources. Fishing for pleasure overtook fishing for food and has become a vital part of recreational activities along the Murrumbidgee corridor.



By the 1930s, grazing country had been cleared right to the water's edge. Photo source: Helen Shimitras.

Grazing the river plains

While stockmen thought the high country was perfect for running cattle and horses, squatters in the mid-range plains of the Murrumbidgee preferred sheep.

Early grazing runs were large and sheep moved across the river plains in the care of shepherds. Rudimentary stone huts were built over the 1840s and 1850s to house the shepherds as they moved the sheep around. These huts were built from local stone and rarely had more than two rooms. They included a stone hearth, a place for wood fires that provided warmth and heat for cooking. On the plains, shepherds lived off birds and small mammals but some huts were built along the river, which meant they could feast on fish, mussels and Murray crays.

The sheep meant more nutrients were washed into the mountain streams. The wood fires, so essential for the shepherds, contributed to the deforestation of the sparsely wooded high country.

The increasing use of the river, for both livestock and the people who looked after them, meant the Ngunnawal and Ngarigo faced fierce competition for river resources.³

Dick & Gay Lawler - 'Glanroe' on the bend



Dick Lawler's childhood home was 'Hillydyke', a grazing property seven kilometres from Michelago. He was born in Sydney in 1939, but has lived in the Murrumbidgee corridor all his life, as did his parents and grandparents.

As young boys, Dick and his brothers loved going to the river.

As a child in the 1940s our only access to the river was on horseback. It took quite a bit of pestering my Dad to get us there. We had to saddle the horses, dig worms, prepare fishing gear and get mum to make the sandwiches. We always fished the same hole, about 30 metres from Shallow crossing.

The Lawler children would fish all day and only then would they be allowed into the water.

When we finished fishing the best part of the day began. We would swim the horses and either ride them in the water or hang onto their tails and be pulled along.

Louis Margules, born a few years earlier in 1931, lived nearby at Cotter and as a child fished with Herb Williamson. Herb was the local bus driver, whose ambition was to catch *more fish than he could give away to eat*. Together they explored the nearby Cotter River.

You would fish all the parts of the Cotter. We had names: Dead Man's hole, Perch Strait, the Blue Hole, the Toe Wall, the Gauge. They were all places where you would say you were going fishing. If four of you went fishing, it was unheard of to come back with less than twenty trout and five or six very big black perch.¹¹

Trout but no big fish

The Murrumbidgee River was stocked with trout from the 1880s. By the time that Dick was fishing as a youngster, the native fish were on the wane.

We always caught fish: rainbow and brown trout and the occasional Macquarie perch or cod. No big fish.

Trout FAQs

Brown Trout (*Salmo trutta*), Rainbow Trout (*Oncorhynchus mykiss*)



Rainbow trout. Photo: Charlie Carruthers.

Where are trout found now?

Trout are now widely distributed across cooler upland streams within the Murray-Darling Basin, particularly NSW, ACT and Victoria.

Why are trout a problem?

Predation of native fish by trout has caused significant impacts on some native galaxias and is suspected for other native species.

After Dick married Gay, they took up 100 acres of 'Hillydye', replete with the ruins of an 1840s shepherds hut. In 1983 they restored the stone building and built a cottage garden to match the building.



'Glanroe' holds many happy memories of fishing in the 'Bidgee for Dick and Gay. Photo: Scott Nichols.

Dick and Gay live in Canberra now, but escape to their weekender, 'Glanroe', to enjoy the peace and quiet of the Murrumbidgee corridor. They both have fond memories of the early days at the hut.

We used to fish and we used to catch trout. We knew we would have a meal of trout every weekend when we came out, without fail. And we used to catch enough to smoke them and give them away as Christmas presents to friends.

Floods and carp

The floods of 1991 bought new pests right to Dick and Gay's front door.

In 1991, the carp appeared on the lawn after a flood. They migrated by using the shallow water around the edges. They won't go out in the middle if there's an easy way around. We used to catch as many trout as we wanted to up until 1991. But they've dropped off a lot since the carp have come in.

Darren Roso has watched the changes in the carp population since he arrived in the area in 1988.

I was here during that unfortunate stage when they invaded. They were up to about Casuarina Sands when I turned up. And in my time they've completed their invasion of all suitable habitat in the ACT, apart from perhaps the lower Cotter. It's been pretty tragic. I've watched silver perch decline, basically because of that. Although Murray cod and trout cod just love carp. Often times you'll catch a cod and as you're removing the lure, you're sort of looking down the throat and there's a carp's tail just beyond the oesophagus.

Managing stock

Stock with unmanaged access to waterways can do a lot of damage to fish habitat. Increasingly, graziers recognise that managing access benefits both their stock and the river. Some of the recommendations for being more fish-friendly in the grazing areas around the 'Bidgee include:⁹

- Maintain groundcover: this layer of grasses, other plants and plant litter slows rainfall run-off, helps retain soil moisture, protects the soil from the impacts of rain and captures nutrients before they can reach waterways
- Feed the pasture, not the creek: by managing soil fertility and only applying the nutrients that are needed in appropriate amounts, nutrients are not applied excessively – saving money and minimising damage to waterways
- Protect the riparian zone: fencing off the waterway and establishing native tree, shrubs and grasses slows run-off, protects riverbanks, minimises erosion and captures nutrients
- Establish off-stream water points: cleaner water for stock and reduced access to the water's edge, greatly reducing damage to riverbanks, pugging and the addition of nutrients to the water

Bryan Pratt – the best of both worlds



There were two Bryan Pratts born in 1937. One is an ardent scientist and the other is a passionate angler. The scientist came to Canberra in 1965 to work for the Australian National University; and the angler found the

mecca of streams, rivers, lakes and dams for weekend fishing pilgrimages.

Angler and scientist

Bryan moved from university research into public sector conservation work in the 1970s where he found that the two aspects of his life had important crossovers.

The basic thrust of all this is if you can find anglers that are good scientists or scientists who are good anglers, or get a population of both and get them together, you can learn an amazing amount of information about the things that are right under our noses. We don't necessarily recognise the importance until someone puts it altogether. Astute, observant, consistent anglers can provide a lot of basic information without realising just how important it is to do that.

Round and forked tails

Bringing these two elements together, meant getting out and talking to other fishers in the Murrumbidgee corridor.

I found enough old cockies and anglers who knew about perch being in the river back in the 1800s and 1900s, and I kept saying what sort of perch? Did they have a forked tail (silver perch) or a round tail (Macquaries or golden)? And enough of them remembered the round tail to make me believe that golden perch used to also occupy this upper section of the Murrumbidgee River. And curiously enough in about the 1910 to 1920 the reports of what looked to be golden perch stopped. I reasoned that what happened in about 1910, the golden perch population and the silver perch population migrated downstream to warmer waters. And when they decided to come back upstream in the Spring of about 1911-12, low and behold, something was in their way, Burrinjuck Dam which was finished in 1911.

While golden perch and Macquarie perch are still found in the Upper 'Bidgee, silver perch did decline and have died out above Burrinjuck Dam.



Golden perch

Macquaria ambigua (callop, yellowbelly, Murray perch, white perch)



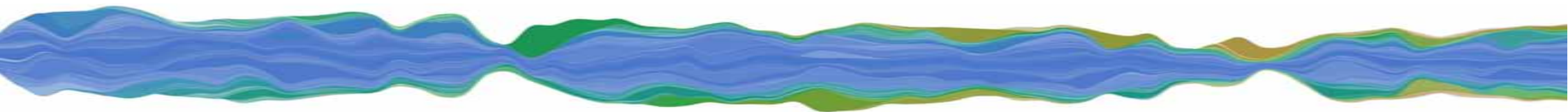
Macquarie perch

Macquaria australasica (macca, mountain perch, black bream, Murray bream, white eye, blackfish)



Silver perch

Bidyanus bidyanus (grunter, black bream, silver bream, bidyan)



Thinking about stocking

One of the major changes Bryan has seen over his lifetime is the shift in importance of introduced and native fish.

The interesting thing is that for many, many years we gave precedence to the imported species. Trout for example; they were the holy grail. I remember having a conversation with a director of an Australian state fishing authority about Burrinjuck Reservoir. He said, 'Bryan, what's the point. They're only native fish. What are you worried about.'

Slowly this is changing. Native fish have become popular sporting fish in their own right – and the impacts of introduced fish on the rivers are now part of the agenda of river management.

My point is that trout are a superb sporting fish in their place. In other places they represent a danger to other species and we should have a harder think about whether we stock them in those areas. It's heresy to fishers when you say 'you shouldn't be stocking trout', but we should think about endangered frog and fish species and other things too. It's important that before we go ahead and stock we need to think more deeply about what we would have done in the past. We now know more about the implications.



Trout have long been a feature of fishing in the 'Bidgee. This group and their catch were photographed in 1935. Photo source: National Library of Australia (nla.pic-vn4649970-v).



Now more fishers recognise the thrill offered by our native fish. Recent surveys found Murray cod greater than 100cm in the ACT part of the UMDR. Photo source: Kevin Clark.

Desnagging - losing fish habitat

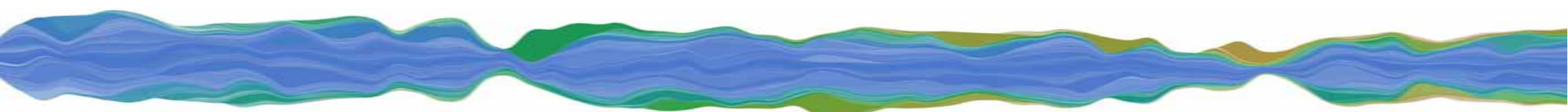
In the twentieth century throughout the Murrumbidgee desnagging works were undertaken to create clean, clear channels. As both a scientist and an angler, Bryan remembers how he advocated for a reverse of this policy.

I kept protesting to the people involved that the channelization of Australian rivers, making them as straight as possible, transferring water from the upper reaches of Point A to Point B at the downstream end, was the quickest way to get rid of the water. They did that by removing obstacles, removing the snags. And removed significant habitat for the very sorts of fish we thought we might be protecting. In those days the community didn't assign value to particular fish species.

Homing in on the snags

Changing the mindset of policy makers meant showing the importance of the ways fishers read the river and understand the habitat of native fish.

Simple things like resnagging a river which was absolute heresy years ago. We knew that snags were important because when you go fishing for Murray cod, you ignore significant sections of the river and home in on the snags. That's where the fish are.



Common sense now says in retrospect we should be putting more snags in the river. If you've got something that can be bred or maintained in the wild naturally or restocked, they do form an interesting and valuable social resource. And also they might have all sorts of other follow on effects that we don't know about yet.

Unlike many parts of the Basin, the river runs fast in the Upper 'Bidgee. Darren Roso explains a different approach used here.

We put in two rock groynes in the river close to Tharwa in about '99. There was about four or five kilometres there where the river was very broad and sandy with no habitat to speak of. Prior to the rock groynes going in, we caught nothing but European carp and gold fish and galaxids. But then two weeks after we did another electro fishing run, and we caught trout cod, Murray cray, plenty of shrimps and a couple of yabbies.

The best of both Bryans

Bryan now owns two tackle shops in Canberra where he continues to talk about the value of scientific and local angler knowledge to everyone. He says:

That's why there were two Bryan Pratts. One was a scientist, one was a fisherman. Put the two together - you get the best of both worlds.



Part of the Upper Murrumbidgee at Tharwa.
Photo: Charlie Carruthers.

1909 - a call to stop ringbarking trees

Dr. A. J. Brady, president of the Rod Fishers Society, reported to the Fisheries Board ... [that]

The upper river was clear, but about Cooma the river was somewhat discoloured with earth washed in from the banks. He suggested that in order to keep the upper river clear, ringbarking should be prohibited along the river banks. There was too much cleared land about Cooma. The matter was referred to the Lands Department.

(The Sydney Morning Herald, 13 February 1909, page 14)



Urban expansion and development have led to a greater requirement for water – one of the things that impacts fish habitat in the 'Bidgee. Photo: Charlie Carruthers.



The 'Bidgee at Bumbalong. Photo source: Luke Johnston.

Adrian Brown – Ngunnawal responsibilities



Adrian Brown was born in 1975 and grew up fishing the Queanbeyan River with his father and his brothers. As a Ngunnawal man, his responsibility for

country was learnt on days out on the river.

A lot of my time as a young fella was spent on the Queanbeyan River. Dad was real passionate about the water and always took us up there. We'd walk up and down the river and do lots of fishing. Dad was mad on trout fishing. So it was good fun. Sometimes we would be sitting around or moving from spot to spot. We'd look at things. It wasn't just looking at the water and fishing. We'd go with Dad and he would show you some place and sort of talk about it. It was really good. Yeah, so we learnt country.

Silver perch roaring up the river

Adrian's father remembers a time when silver perch were plentiful around Wee Jasper.

Dad told me a story there when he was working and went out to Wee Jasper. We used to go out there fishing a lot too. All the Yass mob. Back in the old days when they

were all still living on the missions. Dad and Uncle Alec used to go out there fishing, and at the right time the silver perch would be just roaring up the river. He said all you had to do was throw the hook in the water and bang they'd just hit the hook. They'd end up with piles and piles of silver perch on the side of the banks. Now you go there you won't get one.

Ngunnawal fishers

Ngunnawal fishers have always lived along the Murrumbidgee, chasing fish that sustained their people. Fishing trips were combined with other ways to honour the knowledge and traditions of Adrian's Ngunnawal Ancestors and elders.

Even trying to get back into practicing our culture. Like that was really important to us too. I remember getting yellow box and making coolamons. So if you walk along that river now, you'll see the scarred trees where we've been. And we used to laugh at that. Archaeologists will come along there one day and say, 'what's going on here?'. We want to throw out that perspective of Aboriginal people having lost contact with country. It shows our continuation. We believed in our country and our country looked after us all that time.

Silver perch

(*Bidyanus bidyanus* - grunter, black bream, silver bream, bidyan)



Photo: Barry Porter.

- Medium to large fish growing to 50cm and 8kg, but usually 35cm and 2kg
- Found in similar habits to Murray cod and golden perch (lowland turgid, slow flowing rivers)
- Spawning can occur without a flood, but these fish seem to benefit from a rise in water level
- Will move through fishways
- Eat aquatic plants, snails, shrimp, and aquatic insect larvae
- Potential threats include river regulation, barriers to migration, altered flow regimes, cold water pollution and interactions with carp and redfin
- Listed as 'Vulnerable' in NSW and the ACT

A pathway for bosses

The Upper Murrumbidgee also has special significance for the Wiradjuri, Yuin, Ngarigo and Walgalu people. It is a ceremony place. And the Ngunnawal have responsibility for caring for the sacred sites for all these different groups. Adrian explains the meaning of Murrumbidgee:

'Murrum' means pathway and it's a men's pathway. And 'bidgee' means boss. So it's pathway for bosses. And it starts up in the mountains and ends all the way out, going down into the Murray. All Aboriginal people, all moving up through that river to do their law. That's how it used to be.

When coastal peoples travelled from the Shoalhaven they would bring gifts for the Ngunnawal and the river became a place to trade.

We know they were bringing a lot of mussels up because of the surveys that we've done along the river. We've got fresh water mussels and you can see the salt water mussels are different. They stand out. They might have been making hooks out of them. They had their dilly bags with them and they were dipping that in the water as they travelled. Not collecting, but bringing that with them. They were keeping the food fresh in the water.

Ngunnawal

The area around the city of Canberra is Ngunnawal Country. This was a staging place for neighbouring communities who travelled from Canberra through Ngarigo land in the highland regions for ceremony.

Adrian Brown's ancestor Murren-gen-illy was a powerful man who could speak many languages. He played an important master-of-ceremony role in facilitating initiation of young men from his own and other nations. The river-camps were part of journeys from the coast and the plains. Men travelled to the high country for ceremony, while women waited together at camps in the lower reaches.^{6,12}

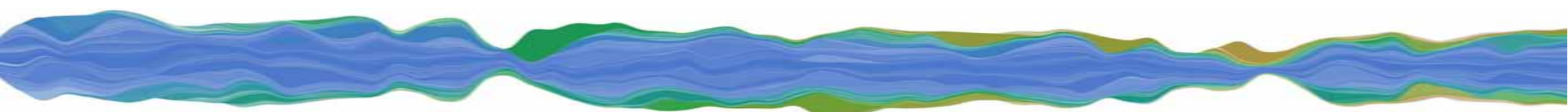
The Ngunnawal nurtured plentiful stocks of fish by monitoring feed and limiting harvest. This helped provide for these seasonal influxes of people into the river corridor. Different groups within the community were responsible for caring for the cod, yellowbelly and perch throughout the year. This bounty could then be shared amongst the locals and visitors.

Blackberries, carp and silt

Adrian has seen many different changes on the river in his lifetime: the impact of exotic fish species, sand quarrying upstream, weeds and encroaching suburban development.

Each of these changes brings challenges for the fish and their habitat in the Upper 'Bidgee.

The biggest thing is housing development. A big thing too is weeds, like the blackberry. The Murrumbidgee is getting full of weeds and you can't even get down and enjoy yourself. You can't sit down at a place because you'll be sitting on a weed that's poking in your back. You can't even get to the water because it's all covered with blackberries. Carp are a big thing too in the Murrumbidgee. You've only got to go up around Kambah Pool in the morning and you'll see hundreds of them just jumping up and down the river.





Kambah Pool has the highest diversity and number of native fish species detected in all monitoring in the Upper Murrumbidgee. Photo: Scott Nichols.

Adrian's colleague in the ACT Parks and Conservation Service, Darren Roso, also worries about the movement of silt and its effect on the fish.

We've got some very sodic soils in our catchment here and so the fine clays remain suspended for weeks, months. And that has a really bad affect on fish larvae in particular. It just coats eggs and they die, be it fish, insects, frogs or other animals.

Dick and Gay Lawler have also seen changes to the water quality in recent years.

I don't swim in the river much anymore, it's been so dirty compared to what it used to be. It used to be crystal clear. I think it's something to do with sand dredging up around Numeralla, because it's crystal clear, just north of Cooma I believe.

Queanbeyan cod

Early settlers also moved native fish from place to place, including into rivers where they would not naturally have been found (this practice is known as 'translocation'). One example of translocating native species is recounted in this story from the mid-1800s.

'....nearly twenty years ago, conveyed in ordinary water-casks, on horse-draws, a few dozens of cod and perch from the Queanbeyan at Yarralumla to the waters of Winderradeen, a distance of nearly forty miles. The perch were never seen after being deposited in their new home. But the cod thrived and multiplied, and by means of subsequent floods were carried in to Lake George, where they have thriven and increased to an innumerable extent.'

(Braidwood Independent, 14 September 1867, page 4)

Trout

Trout fishing for sport has a long European heritage, especially in Scotland, a place where many Australians claim heritage. The Campbell and MacQuaide families were amongst the first settlers in the Canberra area. Acclimatisation societies bought many different animals – including fish – to Australia over the 19th Century. Immigrants also bought technical knowledge about keeping brood stock, breeding up fingerlings and release methods. Alpine rivers, such as the Upper 'Bidgee, were thought to be comparable to upland streams in Europe.⁴

John Gale's and J F Campbell's trout releases in 1888 eventually became a government enterprise. Acclimatisation societies sold trout licenses from 1936 to 1957 to fund their own hatcheries.⁵

But not everyone was keen on trout as this newspaper article from 1907 shows:

In some parts of Monaro local people regard the trout with anything but favour. They know that the introduced fish have driven the indigenous edible fish away, and they regret the circumstance, especially as regards the capital edible perch.

(The Sydney Morning Herald, 21 December 1907, page 16)



A rainbow trout. Photo: NSW DPI.

Darren Roso – Canberra man vs Murrumbidgee wild



Darren was born in 1965 and moved to Canberra in 1988 to start a job with the ACT Parks and Conservation Service.

He is now a Senior Ranger and has spent

23 years looking after an 80 kilometre section of the Murrumbidgee corridor.

Right from the very beginning I got put into an area we call the Murrumbidgee Corridor. Although its primary function is conservation, its primary use is recreation. I have a few degrees, but find the practical experience and knowledge equally useful.

Aren't your feet wet?

When Darren started in the service, Louis Margules took him under his wing and showed him the ropes, taught him about being a ranger and shared local lore from a lifetime on the river.

There was this marvellous bloke called Louis Margules. And he lived along the river all his life. And as soon as I started he was at me a bit and was saying, 'how can you be a ranger along the river and your feet aren't bloody well wet?' You can't argue with that kind of logic. From then on I almost never wore long trousers and I had a couple of spare pairs of shoes, and I would be in the river all the time. I pretty much took on the role of the river ranger. I'll walk along the river and kill willows and swim the river and walk the river and lilo and kayak and canoe and raft and ride. I take the children down there to fish and hunt and canoe and swim.

Louis had also worked as a ranger for the service. One of the perks of the job was camping out overnight - and fishing after knock off. Job perks that Louis passed on to Darren. Louis remembers:

If you were going to stay the night on the river because you wanted to get a job finished first thing in the morning, you'd take a couple of lines.¹⁰

Darren has followed Louis' lead with gusto. He is renowned amongst his colleagues for taking off into the Murrumbidgee wild with just a kayak, a swag and a fishing rod, living off the river for days at a time.

Garden suburbs and fish habitat

Canberra is famous as a city planned for spacious homes and motor transport. It was developed from 1913, in a decade when garden suburbs were fashionable, under the supervision of Marion Mahoney and Walter Burley Griffin.

As the city grew these garden suburbs crept closer to the river until the satellite community of Tuggeranong was designed in 1969. Roads with channel and curbing changed the way water flowed. The loss of native vegetation intensified to make way for housing blocks with lawns.

Since the first suburbanites moved into Kambah in 1973, the population of Tuggeranong has grown to over 87 000.

Introduced deciduous trees, including willows, contributed to the vivid and decorative floral cityscape. But the chemicals and fertilisers used to keep these gardens leafy and flourishing added new chemicals and nutrients to the runoff that ended up the river.

The development of Canberra and its gardens changed the conditions in the river for fish. There were also more and more people using local Murrumbidgee reaches for fishing and other forms of recreation.

The trouble with sheep

The area around the Murrumbidgee is sheep country. Grazing has been a part of the region since the 1850s. When the river floods, as it did in the early 1990s, Darren has seen the damage caused by the sheep.

There's not very many backwaters in these mountain stream systems. So you don't catch certain species. Billabongs are inhabited by slightly different critters to the main stream. There aren't as many of them here, so we need to look after them so much more. And unfortunately they have taken the brunt of all the overland flow, all the soil that's come off all our sheep country. So for example, after a big storm you'll see these rafts of sheep manure on top of these little backwaters. And so even if a cod was able to get up in there and spawn, those fingerlings would be doomed. There's just too many nutrients there.

Fish and fires

On January 8, 2003 lightning from an electrical storm lit 160 small fires in the Brindabella and Namadgi Ranges. Over the following week, the fires moved through the dry tinder in the mountain forests all around the Murrumbidgee. When extreme winds whipped up and temperatures soared, the bushfire reached epic proportions, moving down the valleys and into suburban Canberra.

Darren remembers the devastating impact of the bushfires on the fish and fishing.

It did burn out a lot of the country along the Murrumbidgee and it killed a lot of fish and wildlife. It was very emotional for me because we saw it coming.



A fire damaged waterway. Reference and image source: www2.mdbc.gov.au/subs/annual_reports/NFS_Annual_implementation_report2004-05/annexes/vic/vic5.htm.

Fish and fires

The ACT bushfires in 2003 and 2009 and Victorian fires in 2003, 2006-7 and 2009 affected the catchments of the Upper Murrumbidgee, Murray, Goulburn and Ovens Rivers.

Extreme fire events rapidly remove most or all trees, shrubs and grasses from a catchment, immediately heating shallow water and adding large amounts of ash. Once a fire has passed, the lack of shady trees allows the sun to heat the water more quickly and means that ash, soil and debris are washed into the waterway whenever it rains.

Increased sediment and ash loads negatively affect fish by clogging their gills, smothering eggs and water plants and filling in deep refuge holes. Water quality also suffers because the water becomes deoxygenated as organic material decomposes.

These impacts can cause massive fish kills, such as in 2003 from Dingo Creek to Myrtleford on the Ovens River when fish were effectively wiped out for a distance of 150km.

Making Connections

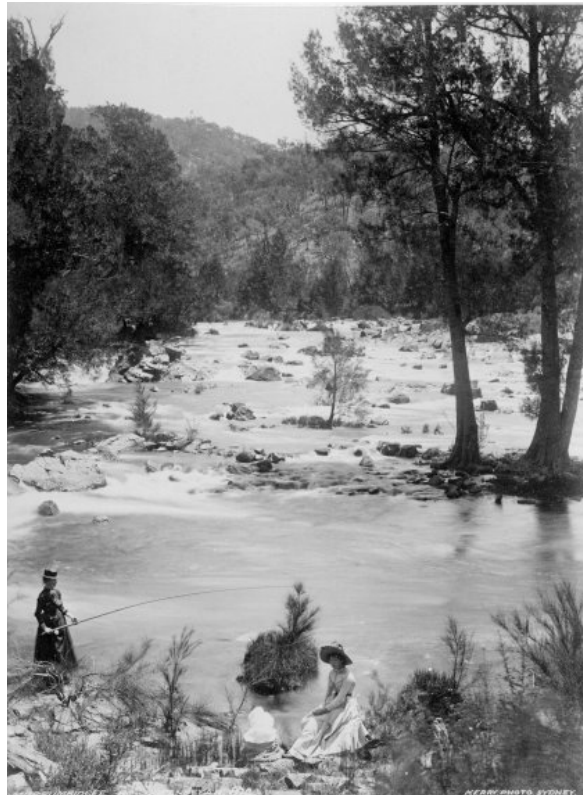
Murray cod and wild duck

In 1925 the romantic novelist Miss Louise Mack struck out of from the city in her motor-car to see the outback. She joined a list of other notable Australian women, Marion Bell, Gladys Stanford and Jean Robertson, in becoming an 'urban automobile adventurer.'⁷

Fish and fishing contribute to the sense of Australian-ness of Miss Mack's journey.

Australia has a quality all her own, and the funny thing (or is it pitiful?) is that you don't know it till you go away from Australia and see the world. Coming back, you realise that the word magnificent describes our country. England is like a pocket handkerchief in comparison. Oh, the great plains I have motored over these last 10 days – the great rivers, the Murray, the Murrumbidgee, and the Darling. Oh, the wonderful fish in these rivers – the cod, catfish, perch, lobsters – and the wonderful game that rushes past you everywhere – duck, pigeon, quail, plover, hares, rabbits, to say nothing of millions of parrots of every sort and kind, and all edible to hungry people. How glad one feels that we are not a hungry people, but how proud one feels to know that we could feed vast multitudes if necessary.

I never had better fare anywhere in Europe than at some of the little way-back pubs out on the great plains of the Murray – Murray cod and wild duck. What could one ask more?⁸



Ladies fishing in the Murrumbidgee. Photo source: National Library of Australia nla.pic-vn3995704-v.

Getting wet feet

In the heat of the summer, Gay Lawler would take to the river to cool down.

I used to float around on the river on a lilo. But, gee, you'd come face to face with snakes and goodness knows what. The black snakes used to lurk around in the water, in the reeds. The snakes and other water creatures don't seem to take any notice of you when you're in the water. But I've done some back paddling in my time.

Darren Roso likes to get his feet wet and during the floods and freshes that flow down the 'Bidgee he can feel the changes as they are approaching.

The water flow's extremely fast. When you stand on the bank and you plant your feet quite firmly, you feel this ultra low vibration coming up through your feet. And yeah, it's really beautiful actually. And powerful. It just lifts everything. And logs just become chips in no time at all. It's very rocky here. And so logs just get ground up in no time at all.

A river community

Gay and Dick Lawler appreciate that the long-term health of fish depends upon the care and responsibility for the river and the land around it and they are involved in activities that allow them to contribute to these changes.

They have found that this is a great way to be part of the river community. Some of their best friends and neighbours work alongside them to bring back the fish.

We're involved in the Upper Murrumbidgee Demonstration Reach. We also work with Landcare. The landcare groups are going to replace willows with eucalypts. Manna gums. And anything else that's native to the riverbank. So that will be a big job. But we all get together for barbeque at lunchtime. It's a very social occasion.

Adrian Brown was recently appointed as the Aboriginal Liaison Officer for the rangers of the ACT Conservation and Parks Service. He sees an opportunity in the employment of Aboriginal rangers as a way to reinvigorate the Ngunnawal tradition of welcoming people of other nations to build new relationships with the river and fishing.

One of my challenges was to get them to change their opinion on the way I felt about country. It took a long time. So I guess my work now is to try and get all our rangers employed over the next few years and forever on, to make sure that they look after country the way I feel for country. They're all going to come from different places. We're not always going to get Ngunnawal fellas. A lot of Ngunnawal fellas, they might want to go and pursue something else. The thing is now, just trying to get people to respect that you're on somebody else's country. Like that's the big thing now. Protocol will be another part of what I need to do. We need to have it set out and teach people.



Tree planting activities on the banks of the 'Bidgee as part of the Native Fish Awareness Week 2010.
Photo: Charlie Carruthers.

State of the river 'Very poor'

The Sustainable Rivers Audit (SRA) is an ongoing systematic assessment of river health of 23 major river valleys in the MDB. Environmental indicators (themes) include hydrology, fish and macroinvertebrates, which are monitored and will highlight trends over time.¹¹

The Murrumbidgee Valley was surveyed in 2007. The Murrumbidgee Valley fish community as a whole was considered in 'Extremely Poor' Condition. In the 'Upland Zone' the fish community was considered to be in 'Extremely Poor' Condition and 'Poor' in the 'Montane Zone'. Ecosystem Health was considered in 'Very Poor' Condition for both zones.

A total of 9 species were caught from the 'Upland Zone'; and 8 species from the 'Montane Zone'. The fish community in these regions comprised 17% and 60% native species respectively and alien fish biomass comprised 90% and 76% respectively.

Native fish catch in the 'Upland Zone' was dominated by mountain galaxias, with carp gudgeons the only other natives sampled. In the 'Montane Zone' mountain galaxias again dominated, with two-spined blackfish and Macquarie perch also captured.

Rainbow trout dominated the alien species in both zones.

In the 'Upland Zone' Eastern gambusia, carp and redfin perch also dominated, with oriental weatherloach, goldfish and brown trout also captured. In the 'Montane Zone' goldfish, Eastern gambusia, carp and brown trout were also caught.

Visions for the Upper Murrumbidgee

The fishing people who contributed to this project have all talked about their hopes for the future of the river. Many felt they had seen some improvements but most don't feel the river is as healthy yet as they would like to see it. Each of these fishers suggested ways to help the river and in turn help provide healthy habitats for fish.

It'll take time

Understanding the longer term cycles in the river environment has been an important way for Darren Roso to see what the fish need. The ACT Parks and Conservation Service are part of a program that will introduce one million trees into the Murrumbidgee Corridor.

Rebuilding fish habitat does not happen overnight and Darren appreciates that it will take time to change the vegetation on the banks that will eventually become home for the fish.

And you begin to be able to predict stuff too. So that for example in this million trees program now it's still not cemented in policy or anything, but we are doing it. The willow logs and all the older logs and things, that woody debris is not going to last forever.

And so as we speak we're planting a lot of trees down in the flood zone where we fully expect them to collapse into the river eventually.

Over Bryan's lifetime he has never seen catfish thrive in this part of the world. In the past he was instrumental in translocating catfish in an attempt to re-establish populations. Most of these ventures failed. He looks to research and science to contribute to the re-building of catfish numbers so that they can once again become a favoured fish for anglers.

A lot of fish are hard to translocate because they're so fragile and they die. Catfish you can wrap up in a wet newspaper and you can go several hundred kilometres with them and release them and they swim away quite happily. I suspect they can breathe through mucus membranes in the mouth. I suspect the EHN may be involved in their population control here. But having said that there's no specific evidence of that yet. And I'm fascinated by the fact that they won't survive in some of these places that would seem to be amendable locations. Somebody needs to sit down and take a long hard look at catfish.*

(*EHN refers to Epizootic Haematopoietic Necrosis virus, a serious and notifiable fish disease.)

Education is also something that Adrian Brown sees as paramount for the future – for both Aboriginal and non-Aboriginal communities. The challenges are different, but teaching and learning are key to Adrian's vision.

Educating the white fellas is the big thing, because of their ignorance. I don't want to sound bad about them but they've got a way in them where they just don't understand. But we've got to educate our own mob too. I guess that knowledge of country gives a sense of pride too. You can put your chest out and say I don't care what you say, because I have responsibility for this here. And I know that this is mine. My father taught me about this and his father and his father.



School children getting to know the basics.
Photo: Charlie Carruthers.

Namoi



Source: NSW DPI.



Source: NSW DPI.



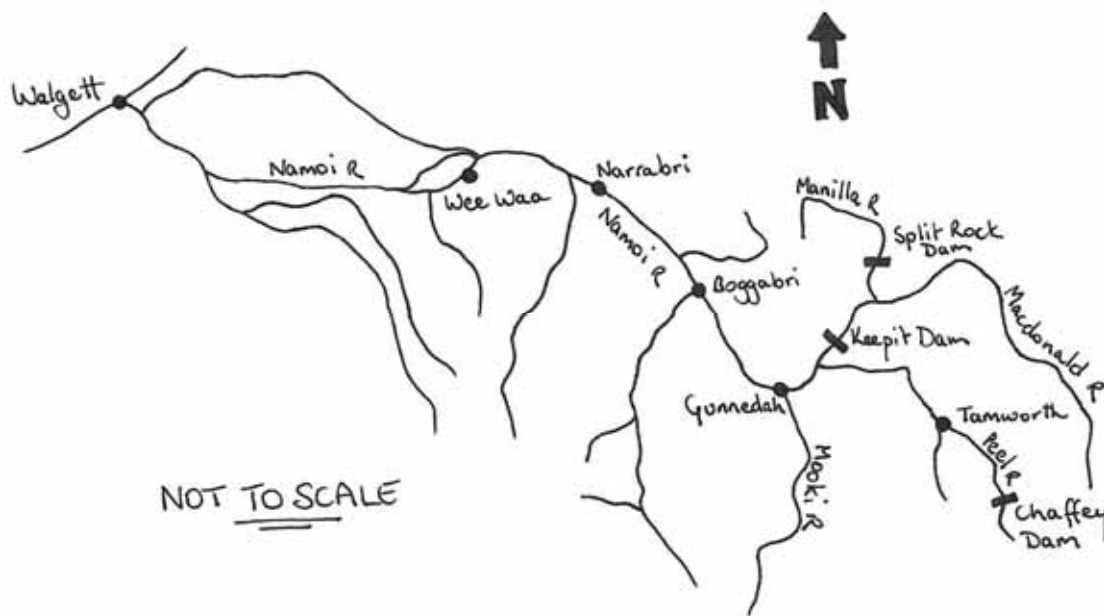
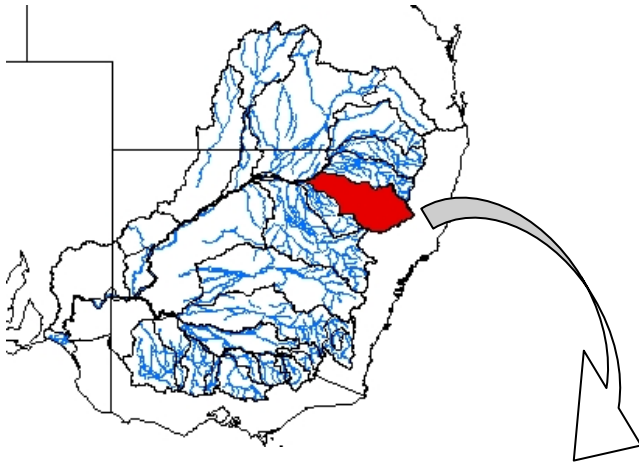
Source: Jason Simpson.



Source: NSW DPI.

Source: Milly Hobson.





Joe and Pearl Trindall (pictured with their nephew, Phil, centre) were both born in Gamilaraay country. During the fifties and sixties Joe was a drover and Pearl often travelled and camped with him, fishing for food as they went. Fishing has been a way of gathering with family, friends and community throughout their lives. Photo: Jodi Frawley.



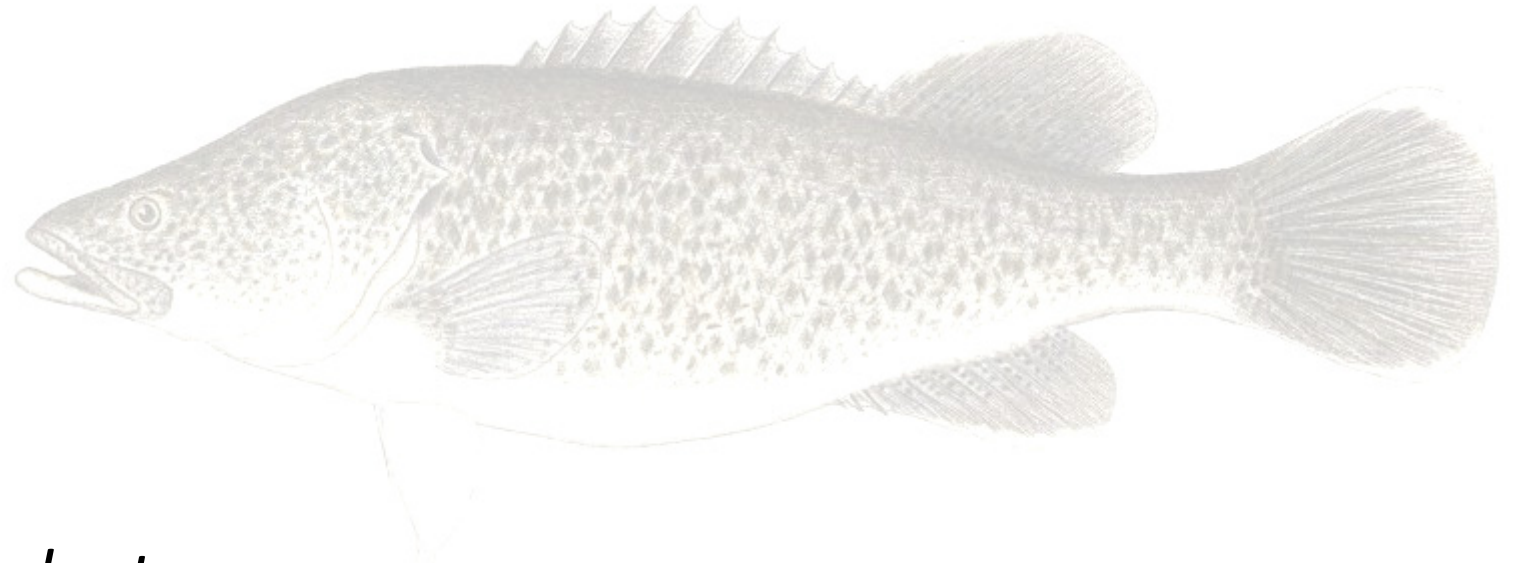
Spider Cunningham is an active member of the Narrabri Amateur Fishing Club. He is a passionate fisherman and loves kayaking the Namoi River, especially when freshes and minor floods come down. The river is a vital way for Spider to relax in his busy life. Photo: Jodi Frawley.



Carol and Eric Hannan came to live in their house on the banks of the Namoi River in the early 1970s. They raised their own and foster children, taking them fishing often. Fishing, they say, helped their children learn about and respect the ever changing river. Photo: Jodi Frawley.



Jason Simpson learnt to fish as a child on the occasional outings to the river with his family. These childhood experiences grew into an intense love of everything about fishing. Jason chases the big fish around the Namoi River and is a great advocate for catch and release. Fishers, he says, have the opportunity to care for the river and in this way to ensure that there will be fish for many generations to come. Photo: Jodi Frawley.



*Fish are in great **plenty** on the Namoi, and several excellent catches have lately been made; **Murray cod, yellow-bellies** and **bream** amply rewarding the disciple of the gentle art.*

The Maitland Mercury and Hunter River General Advertiser, 7 October 1873

Introducing the river and its people

The Namoi River winds its way through 42 000 square kilometres of blacksoil plain in the north east of New South Wales. Fed by the rivers of the western slopes of the Great Dividing Range, it contributes about one quarter of the Darling River's flow.

The river, its floodplain, wetlands, swamps and waterholes, are the traditional lands of the Gamilaraay* people. The Namoi is a very different river now to the one the Gamilaraay people once knew and fished.

In the footsteps of the Ancestors

For the Gamilaraay, Ancestor spirits created the rivers and shaped the earth. Some took the form of water serpents, battling each other or rescuing loved ones during their travels. These creative spirits were named *Garriya* in northern Gamilaraay places like Boobera Lagoon, and *Waway* in the southern areas.

The Waway in the Namoi River were first recorded by British explorers in 1832, at Borah. A Gamilaraay man told them about the continuing powers of the Waway; a source of ceremonial stories and of protection for the surrounding communities.¹³

Gamilaraay retold these epic stories of creation through the generations as they fished patiently on the riverbanks. They see more than the Namoi River itself – they see the essence, excitement and power of the ancestors.



The successful fishing by the Gamilaraay was noted by the European squatters. Image: Tamworth Historical Society.

*Gamilaraay usage note

The attempts of early European settlers to translate the names of Aboriginal nations and language groups into English led to variations in how these names were spelt. The following names are used in the Namoi: Gamilaraay, Kamilaraay, Gamilaroi, Kamilaroi and Goomeroi. 'Gamilaraay' is used generally in this booklet, but local Aboriginal people often prefer particular spellings. Where an interviewee has a preference, this is used in their profile.

The arrival of the British

Early British settlement followed the rivers. The first grazing properties were set up on the banks of the Namoi in the early 1830s. Major Thomas Mitchell surveyed this country in 1831, noting in his journal:¹⁴

One of our men caught a fish, which weighed eighteen pounds; but according to the natives, this was no uncommon size. These fishes are most erroneously called cod by the colonists, although they certainly very much resemble cod in taste....

Droughts and flooding rains

The major drought of the 1890s highlighted a river changed by 50 years of development. The lack of water, increased siltation caused by decades of land clearing and the devastation wrought by rabbits meant that the flow of the river changed.

Floods increasingly brought sand into the river. In the 1908 flood, the story made the *Sydney Morning Herald*:

The floods of a fortnight ago did great damage to fences and roads throughout the district...the floods brought down and deposited huge beds of sand.

Floods brought water into the river that was increasingly laced with a cocktail of chemicals being used to poison both native tree regrowth and the increasingly problematic prickly pear.



The river provided food as well as relief from the hard work of everyday life in the 1800s. Source: Narrabri and Districts Historical Society.

Cows and cotton

Grazing was the boom industry of the nineteenth century. There was some cropping but it was hard going in the heavy black soils. It wasn't until the 1960s that cotton boomed, taking advantage of the availability of heavy machinery and water for irrigation supplied by weirs and large dams.

Each industry changed both the landscape and how water flowed into the rivers. Today, flows are held by Split Rock, Keepit and Chaffey Dams and numerous weirs and the Namoi rises and falls as water is diverted to irrigate cotton.

Big animals on the river

Grazing remained the main industry in the Namoi area in the nineteenth century and it boomed up until the major drought and economic depression of the 1890s.

The plains were not heavily wooded when Oxley first saw them in 1818, but the graziers running both sheep and cattle believed they needed to clear the land to grow more stock feed. Stock also trampled vegetation as they accessed the river for water, altering the riverbanks.



Stock damage to riverbanks is still evident today. Photo: Milly Hobson.

This continuous clearing of native vegetation led to increased siltation of the rivers and affected the habitat of fish.

With wool prices hitting their peak in the 1950s, the size of properties continued to be reduced as closer settlement then soldier resettlement brought more small farmers into the area, often using family labour rather than larger workforces.

Working people

Grazing employed many workers - both European and Gamilaraay - particularly before fencing was widespread. After the southern gold rushes in the 1850s, many Chinese workers came into the grazing country as gardeners and 'stick pickers' or clearing gangs. On the big runs Chinese techniques were used to irrigate fresh vegetables to feed workers.



Image source: Wee Waa Historical Society.

The numbers of small townships expanded to meet the rising population and the railway had reached Narrabri by 1885.

The expanding timber mills of the Pilliga Scrub employed seasonal workers as they supplied fencing and housing supplies for development across the region. Grazing runs still needed drovers and shearers.

Local Aboriginal and Anglo-Australian workers were supplemented by newly arriving immigrants in the 1920s. This included the Greek families who often ran pubs and cafes, bringing their own particular interests in fish cooking to the way they wanted to use the river.²

Joe and Pearl Trindall - A wonderful life on the river



Joe is a Goomeroi man born in Narrabri in 1925. He lived on 'The Island' between Narrabri Creek and the river. Fishing and swimming were a part of everyday life.

Yes, the old Dad always took us fishing. We used to have an old bamboo fishing rod or any straight old stick with a bit of string tied on the end of it, and a hook. We used to catch codfish nearly as long as ourself in them big rivers, you know. You'd say you want a piece of yellow belly, we knew where the yellow belly hole was. If we wanted cod, we knew where the cod hole was. Or the jewfish or whatever piece of fish you wanted, you could go to that area. It was a wonderful life on the river.

Bobby cod

Another fish that was plentiful in the 1930s River were spangled perch, or 'bobby cod'.

Bobby fish, we used to call it, little bobbies. Sometimes you'd get two or three on the one hook. You'd no sooner throw your line in and you'd get one, throw it back, and they'd be on it again so quick.

It was a good healthy life

Pearl moved to Narrabri when she married Joe in 1946. Together they've raised seven children. During the early years of their marriage, Pearl and the children travelled with Joe when he was droving. The rivers were an important part of life on the road. Pearl remembers:

When we were droving, I think people used to feel sorry for me, but I loved it, being out in the open air ... it was a good healthy life. But it's the sort of life that's best before the children get to school age.



A clean, clear river

Knowing the right spots to catch fish was as important when they were droving as finding the right spot to water the animals. Fishing was a way to supplement their rations. Joe remembers the rivers in those days as clear and clean:

They had couch banks, you know, and you could see the reflection, you could see yourself in the river, or in the water, the reflection of yourself from the banks.

Sharing the catch

Often the Trindalls caught more fish than they needed. They would share the extra fish with family, friends and neighbours. Some family members would also give fish to the local hospital in whichever country town they happened to be near. Pearl believed that fish had a special role in healing the sick:

When anyone gets sick, we always try to get him a fish, you know. Because it seems to give them strength.

Not everyone shared Joe and Pearl's attitude about their fish. Joe recalls the way that some people wasted fish:

And what used to make me wild, you'd see people that would go down and they might catch 200 fish, and they'd leave them to rot on the banks.



Crops, water and fish

Wheat was one of the first crops grown around the Namoi. Wheat growing had an unexpected benefit for fishers: wheat bags were used extensively for carrying gear and baits, as impromptu nets, as keeper nets and as cushions for sitting on the banks.

Pearl and Joe saw big changes to the river when cotton came to the Namoi catchment in the 1960s. Pearl recalls that dams, irrigation pumps and watering for crops changed the fishing in the area:

The problem was that they took so much water out. When the flood'd be on, the rivers'd be full. But then you'd see the irrigation going, and in a matter of a few days, the water'd be low again.

Joe agrees:

It did. At times there'd be a flood here, and the water would not get down as far as Walgett. You'd have it all pumped out before it got to the graziers. We'd get no water. It's still happening.

And the changes to the Namoi River weren't just related to the amount of water. Pearl laments:

At one time you'd stop and have a drink out of the river, wouldn't you? But you wouldn't now, or even fill the billy up, boil the billy for tea. But you don't like to do that now with all the rubbish and the stuff that's in it, you know.

Some things change

Spider Cunningham remembers the impact of cotton on the Namoi River but has also seen some things change:

When cotton was introduced in 1966, they were very naughty and let their water back into the river and it was full of chemicals. It knocked the river around, with the weeds and all that sort of thing around here. But now, whatever water comes onto their property, stays on their property, so they're a bit wiser.

Mooki River cotton farmer Tim Gavin likes to fish with his three sons and their mates. His worries about using so many chemicals have been lessened with his use of genetically modified (GM) cotton. He says:

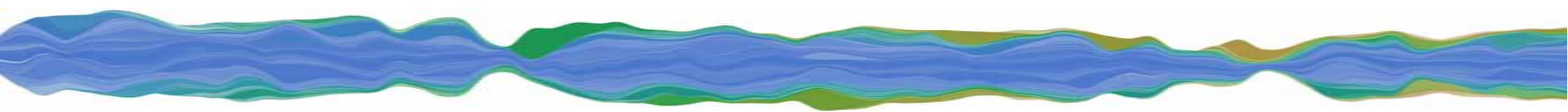
GM cotton has made a huge difference to the amount of chemicals required for cropping. The environmental benefits of these changes are so big that it is much better for everyone and better for the fish too.

When cotton was king

In 1962 two Californian families planted cotton at Wee Waa. High numbers of new workers were needed to support cotton production. Some were mechanically trained workers to run the harvesters and cotton gins. Most were unskilled workers called 'chippers', who weeded the crops.

The major floods of the 1970s revealed the damage done by cotton. The roads constructed for all rural industries had altered the flow of flood-water, causing unexpected inundations. The massive flooding ensured that residual chemicals flowed freely into the river system. The Aboriginal chippers went on strike in 1973 in protest about the conditions of the industry.¹

In an effort to retain water and chemicals within their property boundaries, cotton farmers invested heavily in reticulation and off-river storages. They also stored 'harvested' water from rain-fall. As the massive water storages blossomed, the impacts of water loss became more apparent. Reduced flows from irrigation and continuing high nutrient levels from stock had led to algal blooms in 1994 even before the beginning of a severe drought in 1995 compounded the problems.



It makes you think

Joe and Pearl Trindall are still concerned about the amount of water that irrigated cotton has needed. Joe recalls:

There was one place Wanbi Waterhole, they used to call it. It's even dried up. And there was Yarrie Lake, that was always full. Round Swamp, that's between Narrabri and Wee Waa, it's gone. And they were deep, you know what I mean, there'd be four or five foot of water in them. There's nothing there now. They all had fish in them. Yeah, you know, it makes you think.



Changes to how cotton is grown are reducing the impact on rivers and fish. Photo: Greg Kauter.



Research is continuing into the effective use of screens to minimise the impact of pumping on fish. Photo: NSW DPI.

Pumping water, not fish

Irrigation pumps and drains are a problem for fish. Up to 200 fish can potentially be extracted daily from the river through high volume irrigation pumps. These fish are removed from the natural system with little chance to return to the river, effectively being 'lost' from the main river channel. This situation has a major impact on the health of native fish communities in the Murray-Darling Basin.⁴



Photo: NSW DPI.

Some of the more resilient native fish species, such as spangled perch and bony bream, are able to live in storages, but their ability to return to the rivers and contribute to their natural community is lost.

The issue is not new – back as early as 1928 the Inland Fisheries Officer of NSW recommended:⁵

Screens should be installed at all irrigation and other pumping plants having not more than half an inch perforation to minimise the destruction of fish life.

Camps along the river

Right up till the 1940s large numbers of fettlers - the workers needed to build and then maintain the railway tracks - lived in big camps set up along the lines and needed the river for food as well as for a break from the confined and monotonous camp life.³

The cotton farm chippers, who initially had no union cover and no accommodation on the farms, were housed in rudimentary camps on the banks of rivers with no running water and no sewage or garbage services at all. Additionally students from the cities and the workers who were already part of the seasonal agricultural cycles in other areas of the state came to work the cotton. The wastes from these camps added to the river's pollution.



Camp dwellers were on very low wages and so were dependent on the river for fishing and all other resources.

Image source: National Library of Australia.

Darcy Harris remembers a 'Digger Rose' who even as late as the 1960s would camp out by the river as a relief from working life.

One old fella ... was old army man and he always had a great coat on whether it was Summer or Winter, kept him warm, and he'd sit on this log and lie on the log and fish, with his bottle of rum of course. He had a short line and just bobbed a lot.

Spider Cunningham - Tales of catfish and willows



Spider was born in Narrabri in 1957 and has lived there all his life, just like his Dad. Spider went fishing with his Dad when he was a boy, but feels like he always knew how to fish.

Narrabri - a good little spot! We didn't learn to fish in those days. It was just put a hook with a worm on your line and set 50 lines along the riverbank and then come along and pull the fish in.

They lived close to the river, so they'd set their lines, then leave them for an hour or so before they went back to check them.

Springers

Spider's family used 'springers', a light line that was set in place on the bank, usually made from whatever trees lined the banks of a fishing spot. But it was the introduced willows, with their long flexible branches, that made perfect springers. However these springers sprung to a life of their own.

But see, what happened with the willows years ago was that they'd snap a branch off,

stick it in the ground, use it as a springer and then when they leave they take their line off. But they'd never take the springers with 'em. So, that stick will grow and make another tree.

I'll take a catfish every time

When Spider was growing up he caught cod, yellowbelly and occasionally bream, but his favourite fish was catfish.

You know, a lot of people don't like eatin' catfish but you catch a cod and a catfish and you offer me a fish, I'll take the catfish every time - beautiful - beautiful fish.

Sometimes Spider went on camping trips with his mates as he was growing up. If the tent was pitched close to the river then he could hear the fish once the campsite quietened down for the night.

Years ago there was a weed growing on the side of the bank, and if you were camped out on the river you could hear this sucking noise all night. That was the catfish suckin' on the weed. So, you just chuck your line over the weed and you'd usually catch a catfish.

Knowing where the catfish were likely to feed meant that Spider often had catfish to eat when he came home.

Willow FAQs



Willows at Ironbridge Reserve. Photo: Milly Hobson.

When and why were willows introduced?

Willows were planted in south eastern Australia to control bank erosion, particularly in the 1950s – '70s. They are now widespread in permanently wet or seasonally waterlogged sites

How do willows affect fish habitat?

Native fish are used to the continuous leaf fall provided by native plants. Willows drop all of their leaves in autumn. This changes the timing and quality of organic matter entering the waterway

Aren't willows good for riverbanks?

Willows tend to grow into a waterway. They extract a lot of water⁸ and change the structure of the riverbed. Their tight root systems form obstructions and can cause water to be diverted around them into banks, causing erosion

Catfish

(*Tandanus tandanus* – eel-tailed catfish, jewie)



Photo: Gunther Schmida.

- Medium sized fish, usually 50cm or less
- Bottom dwellers that prefer slow moving waters of rivers or creeks
- Eat aquatic insects, yabbies, molluscs and small fish
- Eggs laid in a circular gravel nest which the male guards until the eggs hatch
- Listed as 'Endangered' in Victoria, 'Endangered population' in NSW and protected in SA



A catfish guarding its nest. Photo: NSW DPI.

Joe also remembers catfish

Joe Trindall also remembers them being plentiful in the 1930s when he was growing up in Narrabri:

You'd see the old jewie, the old catfish. They build a nest like of stone and you could see them through the water. You could see them there it was that clear. You could see the young ones, little things.

Jason Simpson is another local lucky enough to see the catfish as a young fisher on the Namoi River in the early 1980s.

When I was a kid and we were doing some stock mustering and I was a bit too young to help, I'd go down to another creek on the other side of the mountains, a rocky creek. You could see the catfish in there and they had nests; round circles in amongst the rocks which they picked clean. It was almost a perfect circle and you could actually see them cleaning the nests. You could throw your line in and they'd pick up the worm on the hook and drop it to the edge. It wasn't until we went away for lunch and we'd come back and all of our lines had fish on them. We worked out they must have seen us and thought it was a bit foreign, so didn't want to take the bait. But once we weren't there, they were quite happy to take it.

But catfish are no longer very common in the Namoi River. They are now on the endangered species list and must not be taken from western rivers in NSW. These days Spider is content to release any catfish that he catches.

Fishing from the kayak

More recently Spider has bought a kayak to take out on the river and he loves to ride the freshes as they come down the river and fish as he goes.

I carry a little fold-up rod, a little telescope rod in the canoe and all of my lures. So if I think there's a good stretch of water when I'm rowing along I'll pull up and have ten minutes.



Spider would like to canoe the Namoi from Boggabri to Narrabri. He thinks it'll probably take two days, but with his sleeping bag, esky and small stove, he's keen to see the river this way. Photo: Milly Hobson.

Club fishing trips

Spider joined the Narrabri Fishing Club about ten years ago and enjoys the companionship of the club's fishing trips down the river, the swapping of stories while they fish or in the pub afterwards. The club is increasingly involved in caring for the Namoi River. They've had a working bee to repair a local fishway, they hold an annual carp muster to remove carp from the river and they release cod and yellowbelly fingerlings to assist in keeping fish in the river.

If we don't start doin' somethin' what's gonna happen?

Explaining why he enjoys this part of the club as well, Spider says:

When we were teenagers we threw rubbish out the window driving along and threw stubbies at guide posts. Now the older you get, you know, the wiser you get and you think, what are we doing this for? And it's like fishing, like we used to catch a hundred fish and you'd bring 'em home. But now, we catch and release because it's getting to the point where we're old enough to know if we don't start doin' somethin' like that, what's gonna happen?'



Members of the Narrabri Amateur Fishing Club mucking in and battling with the degraded banks of the Namoi to plant river red gums and she-oaks. On this occasion 120 trees were planted from the rail bridge in Maitland Street to a position level with Regent Street. The project was part of the Namoi Aquatic Habitat Initiative. Photo: Milly Hobson.



The Narrabri Amateur Fishing Club is also involved in regular water quality testing. It might not be fishing, but these club members found they enjoyed giving something back to their river and sport.

Photo: Milly Hobson.

Revegetation

These before and after shots, taken 3 and a half years apart, show the progress being made on Doug Jamieson's property.



- Riparian vegetation helps stabilise banks, regulates water temperature and provides both food and woody debris ('snags') for fish
- Clearing riparian vegetation, as well as weed invasion, uncontrolled stock access and cropping, has led to the decline in the health of native fish populations

Photo source: Doug Jamieson.

Eric and Carol Hannan - Learning the floodplain life



Eric and Carol were in their twenties when they came to live at *Rampadelles* in 1973 with their two-year old twins. The house, nestled in the bend of the Namoi River, came with Eric's job at *Kurrumbede*, a grazing property. At first the Hannans were daunted by floodplain living, but slowly this changed as they learnt what to expect.

The dinghy was our transport

The house itself almost always stayed high and dry. But with the river on one side and Gulligal lagoon on the other, they were regularly cut off.

When the river runs into the lagoon, particularly if the lagoon's empty, it just roars round that corner. Once the lagoon fills up then it's got to drain back down to river height. Which can take weeks, sometimes as long as three months.

Even the smaller floods of the 1970s meant the dinghy became the main transport for the family so they could get to nearby Boggabri for school and provisions.

Fishing from the veranda

Fishing was something the Hannans could do with their kids as they were growing up. It also was a way to get to know their part of the river. They learnt how the Namoi River moved, where the deep spots were and what happened when the water did break the banks. When flooded in, the kids would sometimes fish off the front veranda.



Photo source: Eric & Carol Hannan.

They never caught fish, but they used to just fish out there, in the current, when the water was flowing past. And we used to tie the boat to the veranda post out there and taught the kids to row off the edge of the veranda because they couldn't get away, they just keep rowing against the current.

A time of plenty

As the children learnt to swim and became confident in the river environment, Carol let them explore with their fishing rods and bait. And as the children grew their explorations took them further away out along the banks, into the lagoons and marshy areas that the floods filled in every couple of years. They would search for the deep holes and big snags that were the best for catching the local fish. Carol remembers this as a time of plenty:

They'd go down fishing with worms, or they'd throw the shrimp trap in down there. Sometimes they would even use mussels. We used to catch a lot of fish. You know, catfish, the yellowbelly and the cod. You'd always get a feed of fish from the river, no trouble.



The river near the Hannan's house. Photo: Jodi Frawley.

Enough to share

The family never took more from the river than they needed, and on a good day's fishing they would only bring home enough to feed the family. They would share what they didn't throw back into the river.

If we caught twenty fish on the river we'd never keep twenty fish, you'd only keep five or six or whatever and bring them home. And then next week you might catch the same again if you wanted them. But if someone came here and wanted to take a fish home, we'd give them a fish, because we had extra fish.

The kids had a ball

From their veranda, the land drops away to a flat grassy area before dropping again to the bank of the river. Shaded by big river red gums it's the ideal spot for fishing. When the river was low, the hole at this spot was still fourteen foot deep.

When the kids were little there was a big bend in the river and we had a big, platform in there. And in summer time you know, they'd come home from school, we'd head down to the river. And Eric would head home that way, and he'd just strip down and go in swimming with them. The kids just had a ball down there.

Desnagging

As late as 1995, removing snags was seen as a good thing.



Image source: Doug Jamieson.

Snags were removed on a large scale from the rivers of Murray-Darling Basin to improve navigation for paddle steamers.

Snags were also removed from the rivers as it was thought they caused erosion of river banks and increased the incidence of flooding by reducing the capacity of water that the river channel could hold.

While in certain instances small-scale and short-term erosion may occur, in many cases the presence of natural loads of snags may reduce erosion by protecting the river banks. Similarly, the notion that snags increased the incidence of flooding is now known to be largely incorrect.

The removal of large woody debris (snags) is a key threatening process under the *Fisheries Management Act 1994* and is implicated in the decline of the vulnerable Murray cod and endangered trout cod.¹²

Resnagging

Now snags are being returned to the river, providing vital habitat for fish and helping to maintain the holes and gravel beds so loved by Murray cod and catfish.

Increased scientific understanding of the importance of snags to native fish and river health has led to significant efforts to reverse the loss of this vital habitat.

The most obvious way to achieve this is to put the snags back in.

A great deal of scientific and engineering analysis goes into determining the right position, size and type of snag put back into the river so that maximum environmental benefits and minimal environmental damage occurs.



The construction of a log groyne involves a lot of analysis, planning and getting appropriate permits – all before a log enters the water. It's so much easier if it happens naturally! Photo: Milly Hobson.

Jason Simpson *Take a photo and let 'em go*

Dad's 'secret spot'

Jason was born in 1976. In 1980 his family came from Tamworth to live in Narrabri. As a youngster he fished with his dad and his brother. Fishing was an occasional, rather than regular, activity. It was an outing when the weather was perfect or the busy family schedule. His father had a 'secret spot' that he liked to take his boys to fish.

I had a brother so, you know, it was us three men, I suppose, going out and thinking we were big game hunters and bringing home five or six fish. That was a good afternoon. Dad's secret spot was close to town and so when us kids got bored or whatever, it was a quick pack up and you're home in time for tea.



Jason with a nice Namoi cod. Photo source: Jason Simpson.

While as kids Jason and his brother saw this as a bit of a lark, for his dad there had to be a reason to going fishing. Jason remembers:

To go fishing there was a purpose, it was always to catch them, but it was probably more about catching a feed of fish than just about having fun.

Sharing with rellies

Jason's father also fished the Namoi River growing up. He told Jason how it was common practice for many fish to be kept by fishers' families. Everyone took lots of fish in those days. The fish were so plentiful that sometimes they were shared or bartered with other people in the community.

I remember my father telling me stories about how ... they'd be cleaning fish for three or four hours when they got home. Well, they had fairly big families back then and money was probably a bit tight too. It was probably a bit of a change from eatin' lamb and beef, but no doubt it was probably given away to all the rellies, and the next door neighbours for maybe for a carton of eggs or something like that but I'm pretty sure it wouldn't have went to waste.

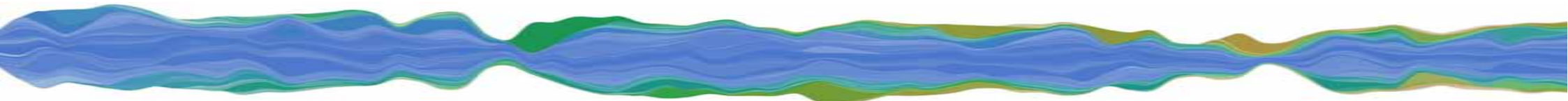


Jason with one of his trusty lures. Photo source: Jason Simpson.

Fishing with mates

As a young man in the 1990s Jason's love of fishing grew and after buying his own boat, he began to hone his fishing skills.

When we were younger we all had our names on our lines, so it was back when we had licences. They changed the rules and we didn't need licences, and then, dare I say it, I used to fish illegally - I used to have too many set lines.





Snags and gravel beds are revealed by low water levels in the Namoi River. The hollow logs are especially loved by Murray cod as ambush sites. Having snags at various levels up the bank means there is a greater variety of fish habitat at different depths – once the water level rises. Photo: Milly Hobson.



High flows conceal the wealth of snags providing vital fish habitat. Photo: Milly Hobson.

Family fishing changed into fishing with his mates. This time on the river with a boat allowed Jason and his mates to explore the river in a way that they couldn't when they were kids.

Chasing cod

Jason and his mates came to understand the patterns of shallows and holes and which bits would yield the cod they all loved to catch.

When we were young, just to go fishing was a bit of a privilege but once we got access to a boat, that sort of opened up the other side of the bank. We could go to spots we hadn't fished before, or a better spot. And that's probably improved our fishing. But with the help of electric motors it sort of makes things a lot easier. At the same time, I suppose we got better at it so it also makes fishing easier. When you get better at it, you get more enjoyment out of it when you come home with fish.

Where are all the fish?

For Jason one of the important things is a better understanding that native fish are in decline. He realised that over one generation, the numbers of fish available in the river had drastically changed. We know

from the memories of the Trindalls, Spider Cunningham and others that the river of the 1950s still had plenty of fish to catch and share amongst family and friends.

We could pull the carp out

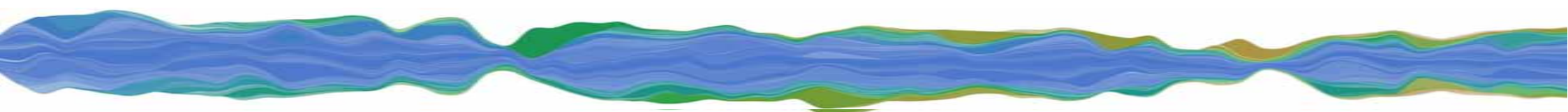
Jason also recognises the threat carp posed to native fish:

We've been down towards Wee Waa there and we've walked probably for a kilometre and we came across a big puddle three metres across, and there would have been 50-60 carp in there and there wasn't enough water to cover their backs and you could just pull 'em out one by one.

Can't catch them twice!

Jason's fishing practice changed to 'catch and release'. He now says native species need to be protected by voluntary and regulatory reduction in the number of fish that can be taken out of the river:

Times have changed and so have people's opinions of fish. What you can do and what you should do are two different things. I eventually saw keeping fish as not the best thing for them, 'cause, you know, once I caught the fish I couldn't catch them again. So, then I started using lures and I very rarely go bait fishing now. We still do dig worms



and we still catch wood grubs and yabbies and still fish like that every now and again. But we very rarely catch a feed of fish out of the river. Normally we just go to the dams, which are stocked, and take the fish out of there. In my opinion, it's a better idea than taking them out of the river. Better to take a few photos and let them go again.

Eric Hannan agrees that limiting catch is important:

You know, as for fishing, I think it's a good thing to stop people from taking piles of fish out of the river.



Jason Simpson releasing a nice sized cod.

Photo source: Jason Simpson.

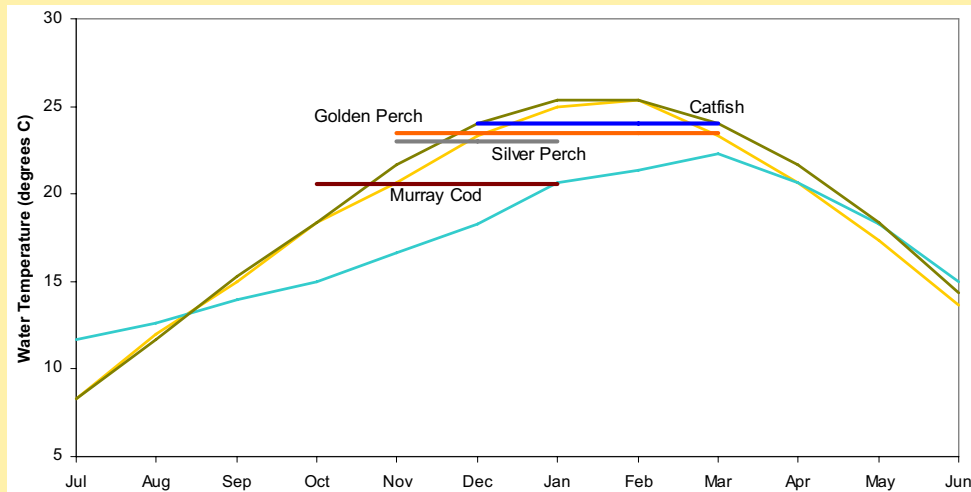
The age of engineering



Keepit Dam, first conceived in the late 1800s, started in the 1940s and completed in 1961, was the realisation of a dream to supply water for irrigation and mitigate the effects of floods. Unfortunately, its impacts on native fish were not good.^{9,10}

Dam impacts on fish

- Dams modify the pattern and seasonality of water flow. Native fish have evolved to breed when there are 'freshes'. Dams even out the flow, so fish don't get this signal to breed
- Dams and weirs also interrupt fish migration. Fish, such as Murray cod and golden perch, migrate to breed. If they are able to these fish can travel hundreds of kilometres, but a dam wall is an impassable barrier
- Fish need a temperature signal to spawn. Water released from large dams can lower the temperature of the river for hundreds of kilometres downstream. Known as 'cold water pollution' this also disrupts native fish breeding



At Keepit Dam, it takes the distance to Boggabri – approximately 115km – for the river temperature to have returned to what it was when it entered the dam. For fish, this means that the river below the dam for a distance of over 100kms is never warm enough to trigger spawning.

This graph shows the minimum water temperature needed for spawning in relation to water temperature in three areas in the Namoi. The green line shows the water temperature upstream of the dam. The blue line shows it downstream of the dam. The yellow line shows the temperature downstream at Boggabri.⁶

Making connections

Good times

Many people learnt to fish from their parents or grandparents or aunts and uncles. This tradition of teaching kids to fish also is about learning about the river and the plants and animals that live in and around it, and how it all changes from season to season.

It's also about getting together. For the Gamilaraay, this meant getting the mob together for storytelling on the river's edge. Pearl Trindall remembers:

We had some good fishing times. But in them early days, where that junction was it was this nice big place, and we'd go out there, you know, and camp on the ground. We used to make a big fire, all of us, all the families would go out there and meet. It used to be lovely.

And getting away

It wasn't always the attraction of group gatherings that was important to fishers. For Darcy Harris, who grew up on a property on the Namoi River, fishing was a chance to get away:

There was a lot of good fish caught and a lot of time spent getting bait and sometimes you'd get nothing. It's a strange game and it's very rewarding, and you can sit there and romanticise about how much money or how good your crops gonna be. Just sit and relax. Think about the good things...not the bad things.



Getting away and just being on or near the river is part of the attraction. Photo: Milly Hobson.

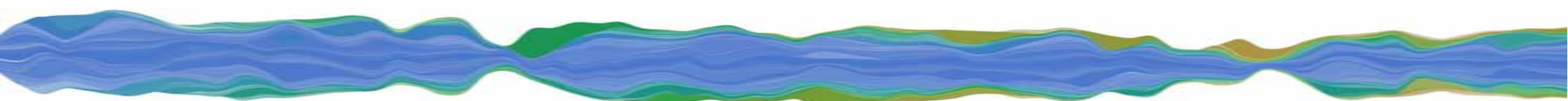
But we need to have a little bit of a look at things

Eric is concerned about bank erosion and the amount of silt and debris that end up in the river because of it.

We've got probably six kilometres of river frontage and we wouldn't have half of the holes that we used to have. The banks have caved in and the holes have filled in. Personally I'd like to see, probably grass put there, more than I would trees at present, because you can't grow trees on straight drop banks - grass yes. I think, before we go doing that, we want to have a little bit of a look at things and ask a few people that's been around for a long time. That's my motto, anyway.



Controlling erosion is an important part of rehabilitating riparian areas, like this bank of the Namoi River. Photo: Milly Hobson.



Doing our little bit

Jason Simpson and his boss Doug Jamieson have been rehabilitating the banks of the river, planting trees, grasses and shrubs where Doug's farms have frontage.

Like many people along the river, although they know that willows are introduced, they are not convinced that it is a good idea to pull them out without first establishing other plants that will hold the bank in times of high waters.

Jason says of their efforts to re-vegetate the banks:

We've been doin' it for 13-14 years that I know of and the boss Doug, is very much into his land care. We went along and did as much as we could with land care and CMA and all those sorts of affiliated companies. Mainly just planting trees and fencing off the rivers, and just limiting the areas that the cattle can come down and drink, so that stock don't degrade the banks. It lets the grass grow up and when the flow does come down, we're doing our little bit to keep it as good as what we can. We can always do better but it's an ongoing process.



An area of riverbank that Doug Jamieson has been steadily replanting. Photo: Doug Jamieson.



Replanting and fencing to manage stock access in an area of the Namoi Demonstration Reach. Photo: Milly Hobson.

State of river: 'moderate'

The Sustainable Rivers Audit (SRA) is a systematic assessment of river health for 23 major river valleys in the Murray-Darling Basin. Environmental indicators include hydrology, fish and macroinvertebrates, which are monitored and will highlight trends over time.⁷

The Namoi Valley was surveyed in 2006. The 'Slopes Zone' and Ecosystem Health were considered to be in Moderate Condition. 62% of predicted native species were caught. While these species were approximately half of the total number caught, native fish were only one fifth (20%) of the biomass.

Native fish catch in the 'Slopes Zone' was dominated by bony herring and carp gudgeons. Murray-Darling rainbowfish, Australian smelt, spangled perch and Murray cod were also common. Carp dominated the alien species. Eastern gambusia were common and goldfish were also caught.



A bank with snags, adjoining the Jamieson property: perfect habitat for cod. Photo: Scott Nichols.

Visions for the Namoi

The fishing people who contributed to this project have all talked about their hopes for the future of the river. Many felt they had seen some improvements but most don't feel the river is as healthy yet as they would like to see it. Each of these fishers suggested ways to help the river and in turn help provide healthy habitats for fish.

Give fish somewhere to live

Eric Hannan suggested that when the river is dry that this might be a time when river care could come into its own:

When the river's really low, I would like to see the holes cleaned out, and I don't mean take the big old logs out of it - there's some big logs there that have been there before I was born, they're fine. But dig the holes out so the fish have got somewhere to live when the river does come back. I don't mean dig new holes - I mean clean the old ones out that are there. The ones that have been there for generations. That's what I'd like to see.

Reinstating holes that used to exist in the river bed needs a careful understanding of how the river flows - and several permits! Knowing where the old holes were is an important piece of the puzzle.

Fencing for more fish

Darcy Harris has seen the damage that stock could do to the river bank:

Well, I know the stock were doing damage on river banks and that but... like on our place, there weren't many spots where they could go down to water because they were steep banks. So they could only go down to water where the good fishing holes were basically, and that's where there's a nice little beach you could go and sit on. And I guess they were grazing the vegetation right up to those banks, so that was denuding it to a certain extent.



Darcy Harris hopes that fencing off the river, like this area of Namoi riverbank, will continue to be a part of helping the rivers to recover, so that there will be fish for his children, grandchildren and future generations.
Photo: Milly Hobson.



Fishing is a great pastime for kids. Photo: Anthony Townsend.

I just love the river

Fishing in the Namoi River creates a special connection between fishers and places that they frequently visit. Robert Horne sums up the way that most fishers feel:

I just love the river. You know, it's so tranquil and it's great, all the bird life there, the little kingfishers and things. So I have spent a lot of time on it as a youngster, and I still do now.

These fishers can all sense what the Namoi River could be like with some care and attention. A river with snags, sand bars and deep holes, overhanging native vegetation, reeds and weed, flushed with freshes and flood rains and linked up to floodplain wetlands – just imagine the fish that would thrive in such a place!

Carp FAQs

Carp arrived in large numbers with the floods of the 1970s. These fish are now a major pest in the Namoi.



Photo: Milly Hobson.

How many eggs to carp lay?

Carp are very fecund and can lay millions of eggs per year.

Can eggs be carried by birds' feet and survive in mud and in the water to be fertilised at any time?

No, carp eggs only survive out of water for a short time and are usually attached to plants. Unfertilised eggs soon die.

Can carp stay alive in mud?

No, carp cannot live in mud.

Do carp undermine river banks?

Carp feed by sifting through mud but there is no evidence that they undermine river banks.

Do carp spread diseases to native fish?

A large number of parasites, diseases and viruses have been associated with carp but there have been no specific reports of deaths of native fish caused by carp-borne diseases in Australia.¹¹

Carp are widely thought to have arrived in the Namoi with the floods of the 1970s. But newspaper fishing reports suggest carp may have been around two decades earlier!

They have been having a record fishing season on the Barwon and Namoi Rivers, catching perch and cod by the score. One of the locals writes: "they must have come down with last year's flood. But with them is a strange fish we have never seen before. We have named it the New Australian."

(The Sydney Morning Herald 27 February 1952)



Making a difference for native fish by replanting a section of Namoi river bank. Activities like replacing lost vegetation helps native fish hold their own' against introduced species like carp. Photo: Milly Hobson.



Some would say 'a good carp'. Photo: Milly Hobson.

Upper Darling Brewarrina to Bourke



Source: Phil Sullivan - Wellbeing Project DECCW (Byrock waterhole).



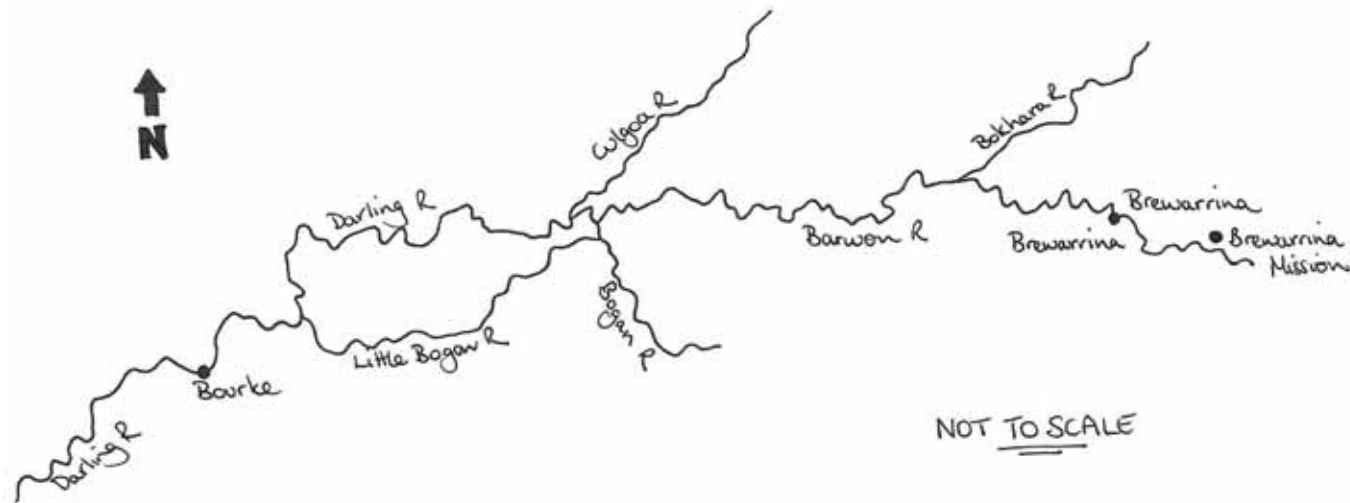
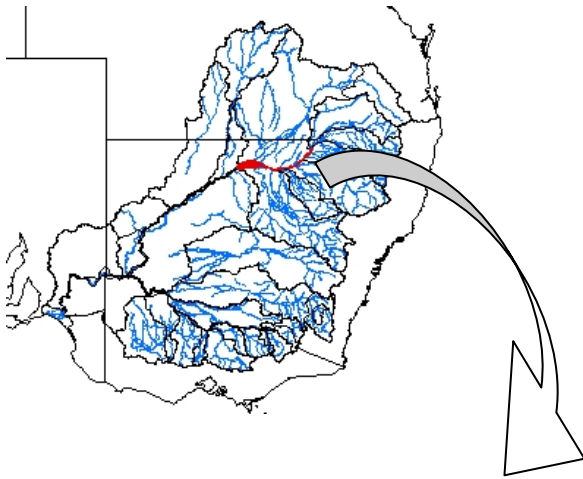
Source: Phillip Parnaby ('Bull' Milgate, Robert Parnaby, Dean Bowden, Jason Sommerville, Phillip Parnaby and Dick Oxley).



Source: Scott Nichols

Source: Scott Nichols.





Originally from Gundagai, **Gordon Brown** learnt to fish with his brothers and sisters on the family's annual holiday to Moruya Heads on the NSW coast. A chance job in Brewarrina as a young man has led to a life spent on the Darling. Photo: Cathy Simpson.



Phil Sullivan is a Murawari and Ngemba man. Fishing has always been a family and community affair and he's lived his life close to Ngunnhu, the Brewarrina fish traps. Photo: Jodi Frawley.



Phillip Parnaby was born and bred in Bourke. All of the family fished, either as part of large gatherings or on their own, like his Pop, who taught Phillip to fish. Photo: Jodi Frawley.



For as long as he can remember **Dwayne Willoughby** and his family have headed out to the river on weekends and school holidays with the tinnie, camp oven and as many kids and dogs as they can get into the cars. Photo: Jodi Frawley.

*The **water** being beautifully **transparent**, the bottom was visible at **great depths**, showing **large fishes** in shoals, floating like birds in mid-air.*

From the journal of Thomas Mitchell, while camped on the Darling River, 1st June 1835



Introducing the river and its people

To say 'Back o' Bourke' means 'miles from anywhere' to most Australians, however the Barwon and Darling Rivers that pass by the townships of Brewarrina and Bourke, respectively, are at the heart of the Murray-Darling Basin.

These are the traditional lands of the Ngiyampaa, Murawari and Yuwalaraay peoples*. They fished the river and surrounding waterways and hunted the wetlands.

In the footsteps of Baiame

Baiame, the Creator, strode across the landscape from near Cobar to the mountain at Gundabooka then on to Byrock, where the mark of his footprint was preserved in the still-soft rock. Baiame continued on to Brewarrina, and stopped at the deep waterhole called Gurrungga where a great black fish was imprisoned behind Gurrungga's rock wall. Baiame, being hungry, raised his short wooden spear, wounding the fish which broke through the rock wall, burrowing desperately into the hard ground to escape. Baiame dug after it, cutting a channel that filled behind him with the escaping water from Gurrungga.

The fish grunted with pain, then dodged and twisted away from the spear thrusts to form the tortuous bends of a now mighty river. Where the fish doubled back are the still billabongs. The hard rock barriers that cross the river are where Baiame rested in his pursuit. The chase continued until the black fish broke into a broad river in the south and made its escape. So the Callewatta was formed and can still be traced from Brewarrina to the sea.

Later during a great drought, the waters below Gurrungga dried up, the fish disappeared and the people were starving. So Baiame returned to help, bringing his two sons to help build a stone web in the shape of a huge fishing net stretched across the dry river bed. Baiame showed the old men how to dance and call the rain.

After many hours of dancing, the rains came, filling Gurrungga until its waters rose and rushed over the rock wall, covering Baiame's stone net, or Ngunnhu, and on down the dry Callewatta. Slowly the flood fell, exposing Ngunnhu, and thousands of trapped fish.

This is how the Rock Fisheries came to Brewarrina.



The fish traps today looking from downstream.
Photo source: Phil Sullivan.

The arrival of the Europeans

In 1828 Charles Sturt came to the Darling in a dry year and proclaimed it uninhabitable. Thomas Mitchell arrived during a better season and established Fort Bourke in 1835. The river was essential for the grazing runs until artesian drilling found water in 1879.

After early conflict, Aboriginal people worked seasonally in the pastoral industry, camping on their own land within the big runs, moving between station work and caring for Country.

By the 1870s Bourke was a transport hub. It had the port and Cobb & Co services. It was the end of the line for most of the paddlesteamers that made their way up the muddy Darling from as far away as Goolwa. The steamers sometimes had to wait for months before the waters became navigable. Rains that fell anywhere from the Condamine in Queensland to the western edge of the Blue Mountains, fed increasingly muddy waters into the Barwon and Darling. When the rains didn't come, the channel dried to a series of pools.

In 1885, the railway arrived. Many workers lived in temporary camps along the river, where they fished for cod, yellowbelly and catfish. By the time the weirs were built in the 1930s, rail and later road transport had replaced river trade.



A temporary camp on the Darling. Image source: Wentworth Historical Society.



River trade on a low Darling. Photo source: Wentworth Historical Society.

Despite a massive flood in 1890, a long drought saw the river dry by 1901. The overstocked land was damaged, blowing across the region as dust. Slowly the cattle market recovered and, in 1938, the Tancred Brothers meatworks opened, processing 2 000 cattle a week.

The long decline in the wool industry was reflected in the area's economy while increasing mechanisation drastically cut the number of working people in the region. The cotton industry expanded in the late 1970s and boomed in the early 1980s, reviving the local economy. The 1980s also saw a rise in outback tourism.

Floods in the mid 1970s introduced carp from the south. Both cotton and carp brought their own challenges for native fish and the Darling River.

**Aboriginal language groups*

The Darling River and its tributaries have always been important to the local Aboriginal people with a number of Aboriginal language groups found in the region.

The attempts of early European settlers to translate the names of Aboriginal nations and language groups into English led to variations in how these names were spelt.

Despite the different spellings, all Aboriginal languages have some key rules about pronunciation which are used to develop the written word so they can be pronounced the way they really sound.

Firstly the first syllable is stressed. Secondly there are only 3 vowels - 'a' as in 'cup', 'u' as in 'put' and 'i' as in 'pin'. Where the vowels are held longer they are written doubled (eg Ngiyampaa). Lastly, 'p' and 'b'; 'k' and 'g'; and 't' and 'd' can be used interchangeably as they are not distinguished in most Aboriginal languages.

The following variations for language groups are used in the Upper Darling: Baarkindji / Barkindji / Paakantyi / Paakintji (Darling up to Bourke), Ngiyampaa / Ngemba (Darling and Barwon - Bourke, Brewarrina), Murawari / Murrawari / Moruwari (lower Culgoa), Yuwalaraay / Yuwaalaraay / Euahlayi (Narran, Bokhara), Gamilaraay / Gamilaroi / Kamilaroi / Guyinbaray / Juwalarai (Barwon, Namoi, Gwydir).

In this booklet we have generally used Ngiyampaa, Murawari, Yuwalaraay, and Wangkumara (western NSW). However, where an interviewee has a spelling preference, this was used in their profile.

Gordon Brown - *It all depended on the river*



Gordon was born in 1929 in Gundagai. He learnt to fish with his brothers and sisters at Moruya Heads on the NSW coast, when once a year the family would travel to the

beach in an old Chev Ford truck – Mum and Dad in the front and all the kids in the back under the canopy.

In the early days we never had any fishing rods. We only used to use a green bottle or even a dead stick if it was stout enough. We would catch a few yabbies or dig a few worms. In those days you could set half dozen lines and no one used to take any notice of it. There was a good amount of fish in the rivers those days.

Fishing the Darling

When he was 27, Gordon was a truck driver on the interstate route. He bought a load of decking to Brewarrina to repair a bridge damaged in the 1956 floods. When the bloke who was supposed to lay the decking pulled out, Gordon got the job, and has been living near the Darling River ever since. After the bridge was repaired he and his wife (Gwen) worked at Caringle Station, Brewarrina, for seven years.

When I first got married, before any kids came along, my wife used to say, "Do you want fish for tea tonight?" We'd go out mustering on the horses and come back that afternoon or night and she'd have fish waiting for us. You'd always catch a feed of fish, easy, in those days. There was a lot of fish about.



The people of Bourke were used to dealing with floods – here an army vehicle transports people across the flooded Billabong Bridge in 1950. Photo source: Barton Collection, Bourke Public Library.

Gordon was one of many workers employed at Caringle. Fishing was not only a way to put food on the table, but the river was a place for recreation where newcomers could learn about the Darling from other station residents.

Big animals on the floodplain

From 1835, grazing runs were established around Fort Bourke, doing well in good years when water and pasture were plentiful and folding after prolonged droughts.

The saltbush plains were covered with pockets of scrub and native grasses - fodder the cattle and sheep quickly depleted.

Stock trampled vegetation and eroded river banks as they went down to drink and cool off. The ongoing damage to and loss of native vegetation on the riverbanks and floodplains led to increased siltation of the rivers.

The drought of the 1890s, along with a worldwide recession, compounded these pressures on the river.

A 1901 *Royal Commission* focused on the damage done to the land by overgrazing in the previous 30 years. River species like fish had also suffered significantly due to the impacts of the drought and recession.¹

The postwar years saw a conjunction of good seasons and high wool prices. Wool prices hit their peak in the 1950s, allowing smaller properties to be viable. Closer settlement brought more farmers into the area. However, by the late 1960s the pastoral boom had passed. Like much of inland NSW, this contributed to people moving away and a decline in population.

We used to have a lot of Aboriginal people working there. They were characters, real characters. They were all a lot older than me. They'd go fishing with you, no trouble. You just go into the big deep holes or on the edge of a deep hole. It all depended on the river, heights and all that sort of thing too. We used to have a lot of fun.

Spending time by the river Gordon learnt about all the different flows that would accompany the wet and dry seasons from upstream and how this would change the fishing conditions around Bourke. He noted fish not only lived in the river, but in all the backwaters too.

I've seen fish in all these streams. They seem to go up them all, especially in the high rivers. There was a waterhole out in the place I was working at Brewarrina. When the river reached a certain height, as soon as it was up near the top of the banks, the water ran into it, there was fish in it. As soon as it stopped, well you'd go back to the holes and you'd still get a fair few fish out.



Droughts often led to the Darling drying to a series of pools. Fish survival depended on how long the pool remained. Photo source: WJC Collection Bourke Public Library.

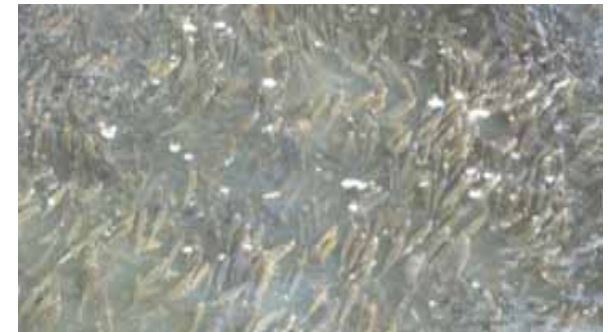
A really low river sometimes called for ingenuity about the best fishing gear to use.

There was a big deep hole and there was two great big cod in the water. They were doomed because the water was pretty stagnant. We got in with tennis court netting, you know, the big six-foot high netting? There was a guy on either side of the hole. We brought them up into the shallows and got in there and we just dragged the fish out. Oh, big, massive big fish.

A pup, pup, pup noise

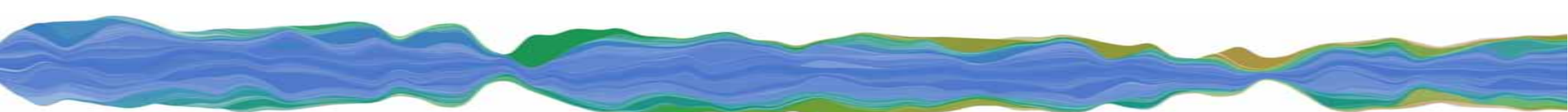
The floods of the 1970s bought plenty of water to the Darling River, but they also allowed the movement upstream of a newcomer that Gordon and other fishers had never had to contend with before – carp. Gordon recalls:

You could see them in the water. It was just covered with this pup, pup, pup, pup noise. There were millions. We didn't know what they were. But we soon found out. They destroyed the catfish who used to build a nest in the river from bits of stone, or whatever he could find. And the carp would go along and they dribble their mouth in the mud and they upset the eggs. They probably eat the eggs. They upset the catfish' nests. Hence they're gone. Oh yes, they spoil the Darling. Which is a big shame, I think.



When conditions are suitable carp can mass in their thousands. Gasping activity at the water surface is actually them feeding on zooplankton.¹⁵

Photo: Nathan Reynoldson.



History of Carp FAQs

Why were carp brought into Australia?

During the early days of settlement many different types of animals and plants were introduced into Australia in an attempt to imitate a European environment. Carp were seen as a good sport and food fish.

When did carp arrive in Australia?

The first records of carp in Australia were from Victoria in 1859 and NSW in 1865 where they were released into ponds. During the 1900s carp were released into the wild but did not become widespread.

Many early newspaper accounts in the Basin around the turn of the 20th Century refer to carp being widespread and abundant, however these reports are referring to 'golden carp' or goldfish (*Carassius auratus*).

Carp spread in the Basin after they were released into the Murray at Mildura in 1964. Their release and spread coincided with widespread flooding in the early 1970s, but their use as live bait probably also helped.

Is there just one type of carp?

There are many species of carp, and the fish is widely farmed overseas for food. In Australia there are at least three strains of the one species, *Cyprinus carpio*.

Genetic studies have shown there were two strains in Australia prior to their expansion in 1964: the 'Prospect' strain in Sydney and 'Yanco' strain in the Murrumbidgee Irrigation Area. However it is the 'Boolara' strain from a farm in Gippsland that was released at Mildura and is now the most wide-spread.¹³

Phillip Parnaby agrees with Gordon that the carp had an impact on particular fish in the river.

There was catfish, we used to catch a fair few catfish, right up until the carp came along and that sort of pretty well buggered the catfish.

Dwayne Willoughby is not old enough to remember the Darling without carp, but he too has seen the changes that they have caused.

I've seen changes with the population in fish. When I was fishing as a kid, you could go down, catch yellowbelly, take it home, have it for dinner. Now you'd catch 20 carp.



Carp move around in shoals in the shallow water of wetlands when they are looking to spawn. Often a single female is chased by a number of males.

Photo: Luke Pearce.



1974 flood levels at the Bourke Bridge. Photo source: Bourke Public Library.



2010 flood levels at the Bourke Bridge. Photo: Scott Nichols.

Phil Sullivan – the River's the essence



Phil Sullivan, a Murawari and Ngemba man, was born in 1960 in Brewarrina. In 1966 the family moved between Dodge City in town and a camp at Billy Goat Bend on the Darling.

Both places are near Ngunnhu, the Brewarrina fish traps. Phil remembers fishing there as a youngster.

There was good fishing there. Once the water got up to a certain height the fish just swam in. If the river got up too high over the fish traps, it was too strong then. They couldn't catch them with their hands any more, so they had to chuck the line in to catch them. They're still catching them in the fish traps right now.

Ngunnhu have always been at the centre of Aboriginal economic and social life. Its abundant fish provided resources for the Ngiyampaa, their neighbours, the Murawari and Yuwalaraay, and for large ceremonial gatherings when many Aboriginal people could camp over for events such as the initiation of young men.²

Aboriginal fisheries

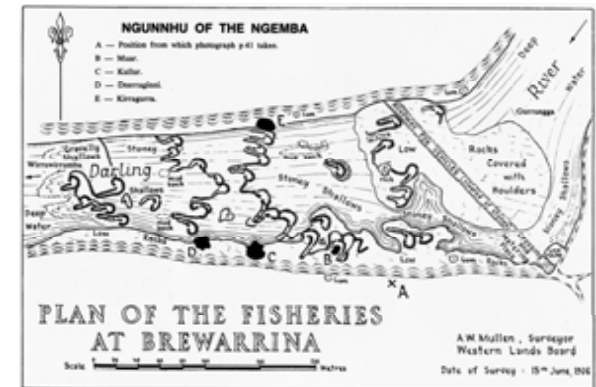
Ngunnhu, the Brewarrina Fisheries, are built over a length of the river where the bed falls steeply, so that the traps lie on different levels, with some underwater - even in dry conditions - ensuring harvests in all but the worst droughts.

In 1842 Aboriginal ownership was recognised in the gazettal of one of the earliest reserves in the state, covering Ngunnhu and a square mile of adjacent land. The gazettal prohibited non-Aboriginal people from fishing there. The local Aboriginal people and the police enforced this law until, at least, 1906.^{4, 16}

Damage to Ngunnhu occurred in the mid 1800s when stones were removed to build a road across the river. A weir was then built on top of Gurrungga (the waterhole) itself in 1972.

At the time an attempt was also made to install a fishway over the weir by dynamiting a section of Ngunnhu. Both Aboriginal people and local white fishers were critical of this ineffective fish passage.

The weir is enjoyed as a swimming pool and picnic site, repeating the role that the perennial water hole Gurrungga had filled for centuries.



Local Aboriginal people knew their fisheries so well they explained the names of each of the stone pens to Surveyor A.W. Mullen who documented them in 1906.³ Photo source: Goodall 1996.⁴



The Darling River. Photo source: Wellbeing Project DECCW.



Ngunnhu, the fish traps, are still used today to catch fish. Aboriginal people today continue to use the same technologies of stone pens to store fish for short periods after they have caught them in the main traps. Here some modern adjustments (above) ensure a golden perch (below) doesn't escape.

Photos source: Phil Sullivan.



The sweet things

Fishing was always a family affair.

All the family used to go. There's Mum and myself, the second youngest, my sister's the youngest one and my brother was the eldest. It was always us four, and all the other family would come along. Extended family would come and we'd just sit down on the bank all day fishing.

This was always a time of learning for the younger generation. Not just about fish and fishing, but also about the river, the plants that grew around it and the other sorts of animals that also depended on the water.

We would all go and fish. But there was a lot of other things that happened. If it was too hot, we'd just jump in the river and have a swim. We would go looking for other little stuff. Maybe some quandong trees if they were in fruit. I remember one day the old fellas must have been checking the weather, checking the time of the year and they came across a native beehive. They just ripped the bark off and there was all this honey. All the kids were there doing a bit of fishing and getting some native bee honey. It was just awesome that day. That happened right back in the early '60s when I was a little fella.

Highs and lows

Over the years Phil has seen how the state of the river affects everyone who lives in Bourke and Brewarrina. The highs and lows of the river are also the highs and lows of the town.

In the drought the crime rate in Bourke was way up, and the moment the rain came, and the river rose, the crime rate went down, because everybody had that connection to the river. When we get a big rain after a drought everyone went straight to the river. You're not just seeing blackfellas sitting on the river, you see kids sitting on the river bank, whitefellas, police officers, DOCS officers, everybody: fishing. It's the essence of our physical life, particularly to Aboriginal people. Without it, we're done. We're dead. So it just draws us.

Another local, Phillip Parnaby, also remembers how freshes and small floods would turn the weir into the social hub of the town.

We used to go down the Bourke weir when the river was rising and we'd all fish down there. Before the river got too high the yellowbelly were all hanging around below the weir waiting for the wall to go under so that they could move upstream. You could catch 15 or 20 in a day. There would be 100 people down there doing the same thing.



Alma-Jean Sullivan ready to fish at the Bourke Weir.
Photo source: Wellbeing Project DECCW.

A little fish...

In the 1960s and '70s, Phil Sullivan remembers the Darling for its abundance of fish.

Catfish. Black Bream. Cod. Yellow belly, they are the main four. There was this little fish, a blackfish, it used to be in the bulrushes along beside the river.

Phil thinks that the floods in the 1970s – particularly the 1974 flood – completely changed the river.

It was after the 1974 flood that the river started to change. When I came back from school, the little black fish was not there anymore. The bulrushes were their habitat. It had gone. It was a good little eating fish. Catfish, not there anymore. Black bream: very rare.

Phil's cousin, Alma-Jean Sullivan, is renowned as one of the best fishers on the Darling River. She also noticed that the 1970s brought changes to the district.

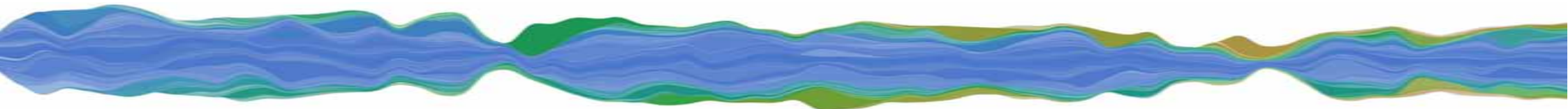
It was 1976, '77 I think they got cotton in Bourke. When they put all the cotton in and all the pumps in, they took all our water out of the river. So that was a big change for the river because every time we got a rise from up-river, they used to pump that water out before it got here. And then all our yellow-bellies were gone. There were hardly any fish biting in the river because all of the fish were being sucked into the pumps.



Large scale developments like this one in Qld and NSW are often blamed for taking too much water.
Photo: Scott Nichols.



Fish and other animals benefit from availability of new habitats during floods like those of 2010, especially when it gets out onto the floodplain (above). Birds like ibis take advantage of submerged lignum bushes to make their nests safe from predators (below). Photos source: Phil Sullivan.



Phillip Parnaby – Grandfather, father and father-in-law



Phillip, now 53, was born and bred in Bourke, growing up with his seven brothers and sisters a couple of blocks from the river. Phillip went to high school in Bourke, then straight to work at the

local meat works before becoming the milkman 30 years ago.

Shoosh!

Although he thinks it was his Dad that taught him to fish, it was his Pop who he remembers as the family fisherman.

My first memories of fishing are when I was probably four or five year old. My grandfather, who was a World War One veteran, used to go fishing but he wouldn't take us because we were too noisy. He'd come back with some of the biggest cod that I've seen. Mum would tell us stories about Pop. He'd drop Mum and Nanna off and then he'd go up the river and fish because they'd be too noisy.

A different Anzac tradition

In the 1960s and 1970s, Anzac Day was a special day of celebration for the war veterans that lived in Bourke. Like most Australian towns the dawn service was followed by a parade and then two-up at the RSL or the pub. Aboriginal returned servicemen were invited to march in the Anzac Day parade, but were excluded from entering the RSL: then, or at any other time of the year.⁵ Phillip's Pop did not march.

He had a brother who was a First World War veteran too. Pop was Aborigine. And in the beginning he didn't go to Anzac Day. He used to go fishing instead. He'd go away on his own the whole day, probably just because of the memories. He used to fish off the bank and also he'd row and use spinners too. He'd row up and down the river all day.



Phillip teaching his son William about the river.
Photo source: Phillip Parnaby.

The grass is always greener

As young kids in a country town, Phillip and his mates had to make their own fun.

We had a pretty good life. When I was ten or twelve, there was plenty to do. The grass is always greener on the other side of fence. We would see people with new pushbikes and that sort of thing. There was eight of us in the family so there wasn't a lot of money to go around. But we had the river and there was heaps of entertainment.

Other members of the family also fished – but usually not on their own like Phillip's Pop. Instead Phillip remembers that they fished in big family groups.

We used to go with Dad. He'd go and set a few lines and we'd catch a few cod. My brother, Robert, who's ten years older than me, he's a big fisherman too. Later I married Ann Marie and her father was a keen fisherman. We used to do a lot of fishing together. When the kids were little, we'd pack up and all go out fishing, camping for the weekend. It could be anything up to 10 or 12 of us.



Camping and fishing trips on the Darling gave Phillip a chance to spend time with his extended family.

Photo source: Phillip Parnaby.

Changes

Phillip's seen the river in all different kinds of conditions. In the 1990s drought started to dry out the river. The effects of the water storages and irrigation upstream started to show up in the Darling around Bourke.

Well, you could see it in the water, it goes clear, right? And then it'll get stagnant and the algae came in. You could see the greens and the brown coming in, you'd know then it wasn't healthy.

Seeing the changes in the river over his lifetime makes Phillip wonder about the longer term dry and wet cycles of the river.

In 1938 the river was dry here. The Bourke weir pool went dry and they had to dig a trench from up river to get the water back down to the Bourke weir pool to replenish it. Mum lived between Bourke and the weir. It got that dry there they had their goats over the other side of the river looking for food. They must have had massive rain up north somewhere and it came down like a big wall of water. She said they could hear it coming. They had to go across and get the 20 goats back. In the last 50 years the river has never been dry like that between Bourke and the weir. Must've been a massive drought in '38.



Unloading cargo at Bourke during a low Darling.

Photo source: Wentworth Public School via Wentworth Historical Society.

Importance of variability

Flows in the Barwon-Darling are highly variable, with 90% of all flows retained in the river channel, and only 10% reaching the floodplain.

Fish and other aquatic plants and animals have adapted to this variability and rely on it to survive.

Native fish use increases in flow as cues to undertake spawning migrations and to access different habitats, such as floodplain channels and wetlands.

The flow in a river controls the movement of materials like sediment, nutrients and organic matter and creates characteristics such as deep holes, sand bars, undercuts, and benches (flat sections of the river edge). These all provide habitat for different plants and animals.

The link between the floodplain and river is almost entirely dependent on variations in flow.

In muddy rivers like the Darling, light can't enter the water column to great depths, meaning the growth of water plants is limited. Here snags provide much of the structural habitat for fish.

In this type of system organic material from the floodplain becomes an important source of nutrients to the plants and animals living in the river itself.

River regulation (dams and weirs) and diversion of water (irrigation) decreases the variability of flows and therefore limits opportunities for different floodplain habitats to be accessible and materials exchanged.¹⁴

Dwayne Willoughby – A Beemery shack for family and fishing



Dwayne was born in Bourke in 1976 and has lived there all his life. Family has always been central to Dwayne's fishing, since the very first day that he learnt to thread a worm onto a hook and cast out into the Darling River.

My first memories were sitting there with my Nan and Pop and them saying to leave the worm on the hook, and leave it in the river. I kept pulling it out to see if I had a fish on the end of the line. That was a time when I always got to sit with my Nan and Pop and have a good old yarn to them, bit of a talk. I used to ask a thousand questions.

He and his family have a fishing shack at Beemery – about half way between Bourke and Brewarrina. They head out on weekends and school holidays with the tinnie and the camp oven and as many kids and dogs as they can get into the cars.

It's really great snags up that way. It's where the Bogan runs into the Darling. We're pretty lucky up there - it's what we call virgin territory. It hasn't been over fished, which is why we're really lucky. We don't tend to overfish it either.

We're not out there every week and we catch and release everything, anyway. We're pretty lucky to be fishing in these sort of areas.



A yellow sheep tag attached to the tail allows this cod to be recognised if it gets caught again. Photo: Dwayne Willoughby.

Sheep tags and fish

Dwayne and his family have always preferred to catch cod and yellowbelly. They normally take one or two smaller fish to eat and let the big ones go back to the river. They photograph most of the big ones and in the past five years have marked 47 fish with sheep tags. That way they can tell for themselves which fish live in the reaches around the shack.

It also allows them to see what the changes in the river are doing to the fish.

Sometimes you'll get a cod that will have a few little sores, they're like a little mite, from what we can find out about them. We think that they are just a parasite.



An anchor worm (*Lernaea* spp.) is just one of the parasites found on fish.

Photo source: <http://www.heems.nl/arob0409.htm>.

Changing colours

The Darling River is famous for the changing colours of its waters – from milky tea colour in steady flow, to clear and green as the water slows, to muddy and dark when upstream floods bring raging waters.

The colours depend on which upstream river is in flood and carrying the silt down, whether it's the black soil from the eastern plains or the red soil from the west. Phil Sullivan explains some of the differences:



Fish parasites

A number of parasites and diseases affect native and introduced fish. One of the more visible is an 'anchor worm' (*Lernaea* spp). Anchor worms are actually an ectoparasitic copepod, which means they are a parasite living on the outside of the fish and are actually a type of tiny crustacean (like a crab or shrimp).

Lernaea spp. progress through 3 free swimming life stages before entering a fish through its gills. When sexually mature, the females are fertilised and move to the fish's skin where they secure themselves by burying their now anchor-shaped head into the skin. Where the female detaches from the fish, an infection can occur, leading to ulcerations.¹¹

Like all parasites, their abundance is often a sign of stress for the host. A long term study of fish communities in the Lower Darling noted an increase in proportion of fish affected by anchor worm between 1994 and 2009,¹¹ but lower levels in 2010.¹²



A big cod with what are probably ulcerations from parasitic *Lernaea*. Photo: Dwayne Willoughby.

When it rained in Bourke. Nice and clear. Beautiful. Drinkable water. You could actually put your head down there and drink it. Not murky and muddy. If it was water from the top end coming down, then it was the dirty coloured water.



Clear water at the Bourke Weir. Photo source: Wellbeing Project DECCW.

Dwayne has noticed that the colour of the water changes the colour of the fish.

When it was dry a couple of years ago the cod were not a very dark colour. I know in the last 12 months, because of the flows in the water, they now have a real dark appearance. They have changed. I don't know why but they are a different colour to when there's a fresh in the water. We sometimes go to a place called Black Rocks and there's some very deep water around there. I don't know if they get down into the rocks, into the deep water and just sit there. But the cod there are nearly black.

Sharing

Although they mostly release fish back into the river, the Willoughby family still like to take some fish to eat.

All the time we go fishin, we've only taken four or five fish out of the water there. One year, two were donated to the local golf club for a pro-am. We also do try to give a fish to the Rivergum Lodge, the old people's home once a year.

Phil Sullivan also remembers sharing his catch around.

It was about us. It was about not just the family – my immediate family – but it was about all of us.



Snags are an important of the river, providing protection and breeding sites for native fish like golden perch and Murray cod. Photo: David Cordina.

Dwayne and his family stick to the main river channel – even when the water fills all the lagoons, wetlands and creeks that run into the Darling. He explains why they don't fish in the backwaters:

We leave that, because that's where they're breeding, up in the shallow lagoons. That's not for me, you know. It's always been the river. We don't touch the lagoons. That's been passed down that the lagoons are the fish's breeding ground. That's your bread and butter for future fishing.



Darling River in flow at Brewarrina Weir, submerging Ngunnhu. Dwayne likes to fish up the river closer to Brewarrina too. Photo: Scott Nichols.

Fish and chips

Fish tagging programs are widely used in scientific studies as a means of keeping track of fish movements.

There are several types of tags in use – external, internal microchips (passive integrated transponder or 'PIT') tags and radio transmitters.

Both external tags and microchips (PIT tags) need the fish to be caught or pass in close proximity to an automatic PIT tag reader in order for it to be identified.

Radio transmitters allow fish movements to be recorded without human interference (other than the initial capture and transmitter insertion). As the name suggests, fish fitted with radio transmitters emit a signal that can be picked up at permanent or mobile monitoring stations and downloaded to a researcher's computer.

Fish are being externally tagged as part of the Brewarrina to Bourke Demonstration Reach project to determine what habitats they prefer and where they move. If you catch a tagged fish, please let NSW DPI know by visiting our website to enter the tag details at: www.dpi.nsw.gov.au/research/fishing-aquaculture.



Golden perch with a yellow external tag near its dorsal fin (circled) which will have a unique number and contact details for you to get in touch with researchers.

Photo: NSW DPI.



Like Dwayne's sheep tags, external tags (being inserted – top right hand corner and circled above) allow fishers and scientists to identify individual fish. Care must be taken when tagging all fish as the wound can easily become infected. Photos: NSW DPI.



Anti-clockwise from top right: Internal microchips, shown being inserted into the fish's body cavity under anaesthetic, can also be used to identify fish using handheld scanners (bottom right) or as fish pass scanning stations located in fishways. Photos: NSW DPI.

Making connections

Feli McHughes is a Ngemba man on a mission. He wants to continue to rehabilitate the Old Brewarrina Mission Wetland with the Ngemba Billabong Restoration and Landcare Group and integrate it into other activities for the local Aboriginal people.⁶

About 15 years ago one of the government agencies decided to pump water into a billabong that was two kilometres long, just to see what would happen. We had no science or anything. We just allowed the billabong to demonstrate it's natural forces. It was awakened and nature seemed to understand that something was happening there. So birds and fish and all the appropriate wildlife around billabongs started to get involved again. It dawned on me that billabongs were very important part of the river system. I'm saying that it actually develops antibiotics for the rivers' immune system. Should the billabongs be activated, then the river's immune system will have a chance to develop and get stronger and then we have a healthier river.

Circle that never stops

Phil Sullivan explained the special Ngemba - Murawari relationship that his family have with the yellowbelly.

His example shows how the stories are about places and people at the same time. He talks about places as having brothers and sisters in the network of connections through the stories - and also about living people, whose family responsibilities link them to places and to other living creatures.

I think traditionally, everyone would have had a responsibility. My family's totem was the yellowbelly, and so our responsibility towards the Yellowbelly was in the water, in the river and everything about the river. That would entail looking after the river, but also looking after the sister who's totem was the little lily on the river. There was a circle that never stopped. The reeds might have been important, or maybe, there was a responsibility to look after the Brolga. The river has always been important because it holds the essence of life, which is the water.

Through his job with Bourke Shire Council Dwayne Willoughby has been able to help with some of the programs going on in the area including the Bourke to Brewarrina Demonstration Reach project. He says:

We had a big program doing a re-snagging project in Bourke. It was great for the river.

Golden perch

(*Macquaria ambigua* - callop, yellowbelly, Murray perch, white perch)

- Grows to 76cm and 23kg, but usually less than 40cm
- Likes warmer, slow moving waterways, floodplain lakes
- Found around fallen timber, undercut banks, rocky ledges
- Occupy a territory of about 100m for several months before moving to a new home range
- Known to migrate over 1 000km in spring and summer
- Migration cued by warmer water and rising water levels
- Eggs drift downstream on floodwaters
- Eat shrimp, yabbies, small fish and aquatic insect larvae



Yellowbelly caught at Bourke. Source: Wellbeing Project DECCW.

We need to protect fish

Mick Davis lives on a family farm on the Darling River about 40 minutes out to the west of Bourke. They have farm stay accommodation that attracts fishers from all over Australia.

We need to protect the fish that are there. And protect the banks and the water. The water is needed for household purposes, stock and domestic use. I believe once the river comes down well, the flow can run, fill up quicker. What Dave Cordina's trying to do now is to get good fishways all the way through. I think that's very important.

Aboriginal community organizations have successfully undertaken rebuilding programs with young people working to restore the remaining fish traps. Today the Aboriginal Museum in Brewarrina retells the story of Ngunnahu's creation and its ongoing importance to the Ngiyampaa and to everyone of the region. Aboriginal people today take an active role in the annual Brewarrina Festival of the Fisheries, with celebrated Murawari elder, the late Essie Coffey, saying in 2000 about their participation in this event:

The Kuris themselves wanted to do something because this is our fisheries, our fish traps.⁷



This installation at Brewarrina Information Centre shows how important the fish and fish traps are to the local community. Photo: Scott Nichols.

If you catch a fish it's a bonus

Dwayne explains what it is that he loves about fishing with his family.

I just like the wide open spaces and you can forget about things. It's a good time to relieve stress, I suppose. When I was a kid it was a bit different, it was the thrill of catching a fish, thrill of just being out in the outback. You could pick up a rock, throw it in the water, or get a stick and light a fire. But now it's changed. It's great just to get away and relax and lay on the banks, listen to the birdlife, a couple of cold beers and good mates. We always seem to have good mates when we go out. I like being with my family. If you catch a fish it's a bonus.



Feli McHughes sees the rehabilitation of Ngemba Billabong as part of the process in developing a healthier river. Photo: Feli McHughes.



Just being on the banks of the river relaxes you. Photo: Jodi Frawley.

Visions for the Upper Darling

The fishing people who contributed to this project have all talked about their hopes for the future of the river. Many felt they had seen some improvements but most don't feel the river is as healthy yet as they would like to see it. Each of these fishers suggested ways to help the river and in turn help provide healthy habitats for fish.

Water is the essence

Phil Sullivan is a delegate on the Northern Basin Aboriginal Nation group that are working with the Murray-Darling Basin Authority.

For Aboriginal people, water is the essence. We argue and fight not because there's an economic base for us, we argue and fight because we have a responsibility. We want to look after the water, look after the river, and look after everything around it. We get obstreperous and row and argue because we see it being destroyed, we do see it being abused. We do see it in a sad way, you know. Not good way.

The Bourke and Brewarrina areas do not have too many fishing inspectors. Dwayne Willoughby thinks that one way to ensure that people do the right thing of their own accord is through education.

It's hard because the rules don't get enforced a lot out here due to our locality. We should continue to educate the people about catch and release fishing. I think a lot of people just take it on board and say, "oh, ok, we're in the same boat, we've got to release the fish because we want to be able to come back here in another five years and catch one."

It's a big thing to us

Phillip Parnaby owns one of the motels in North Bourke and understands that a healthy river will mean that many different sorts of people can stay in the Darling River area.

I say we have got to look after the river because it's a big thing for us. It's a big thing for our future. Two of my sons are heavy vehicle mechanics on cotton farms. So, it's given them a future. And my other son, one runs a milk run, and one has his own truck. So, it all creates an industry of Bourke. I believe that when the fishing people come to fish, they come to see the outback. And it's all got to be sustainable or we won't have Bourke.

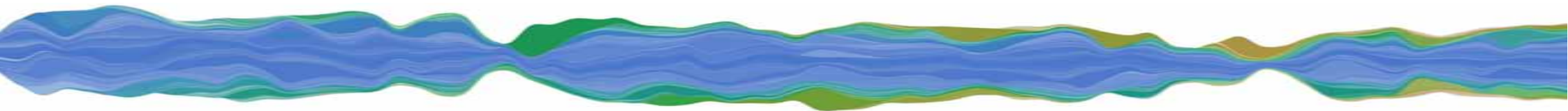
Dancing the billabong's tune

Feli McHughes sees the interconnectedness of the animals in the river as a vital link.

I think that fish will have their natural role in the future of the billabong. We're still to define what that is, but like anything, the swallows, the rainbow birds, frogs, the trees and the weeds, and the grasses, well fish fits in with that whole process. They're an integral part. If one little bit's missing, then the billabong isn't complete. So we need to make sure that everyone is dancing to the billabong's tune.



Everything is interconnected – fish are an important food source for many creatures including the elusive water rat, whose tracks in the mud are the only thing to give its presence away. Photo: Scott Nichols.



The people's river

Alma-Jean Sullivan is a Wangkumara woman who has a reputation across the whole of the Western plains for her prowess as a fisher. A calendar with her fishing tips has been reprinted three times and the 'Paroo Queen' has won the local fishing competition for a number of years, beating other recreational fishers from far and wide.

When asked in 1997 how the river might be fixed, she replied:

Well, I would stop the cotton for a start. I'd just stop them taking so much water out. Let them take the water out when the rise gets down properly. When the rise is getting to the Darling River, they start pumping the water out. And it takes so much water, millions and millions of gallons of water out of the river, into the channels and I don't think that is right. I'd like to see them stop the pumping, let the water come down, give the fish a bit of a break, get used to it and let the town people get back what is ours! It's for everyone, not just for Aboriginal people, but for white people too. It's a lovely river when it's running... so the people should have a fair go.



The 'people's river'. Photos: Wellbeing Project DECCW, sourced from Phil Sullivan.

State of the river 'moderate - poor'

The Sustainable Rivers Audit (SRA) is an ongoing systematic assessment of river health of 23 major river valleys in the Murray-Darling Basin. Environmental indicators (themes) include hydrology, fish and macroinvertebrates, which are monitored and will highlight trends over time.⁸ The Darling Valley was surveyed in 2005. The Darling Valley fish community in the 'Upper Zone' was considered to be in Poor Condition and Ecosystem Health overall in Moderate Condition within this zone.

A little under half the native species predicted for this zone were collected during surveying (47%) with alien fish comprising just over one third the fish biomass (35%).

Bony herring dominated the fish catch during sampling, with Australian smelt, carp gudgeon and spangled perch also numerous. Golden perch and Murray-Darling rainbowfish were also common. Three alien species, Eastern gambusia, goldfish, and carp were captured frequently.



Eastern gambusia (circled) are a pest fish now found throughout the Basin. They were introduced to control mosquitoes, a job actually done much better by native gudgeons. Photo: Charlie Carruthers.

Paroo



Source: Colin Leigo.



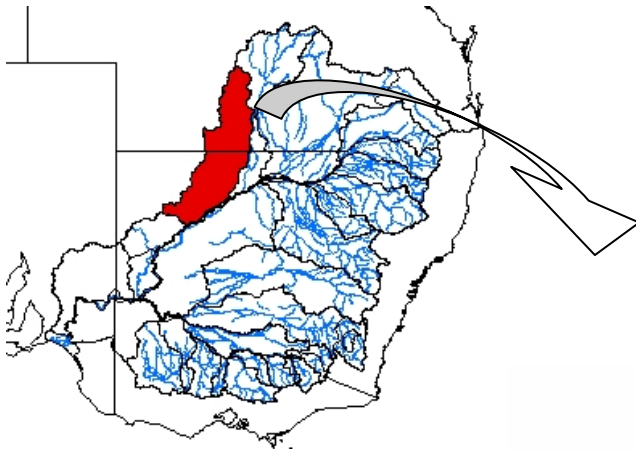
Source: Ron Heinemann.



Source: Greg Ringwood.

Source: Greg Ringwood





Beryl and Colin Leigo. Colin has lived all his life along the Paroo River, as did his parents. He remembers the house he grew up in being right on the banks of the Paroo River for easy access to water and the fish. Photo: Greg Ringwood.



Douglas - Dougie - MacGregor has lived in Cunnamulla for 82 years. Being in the transportation business gave him the ability to go to the river and fish regularly. Photo: Greg Ringwood.



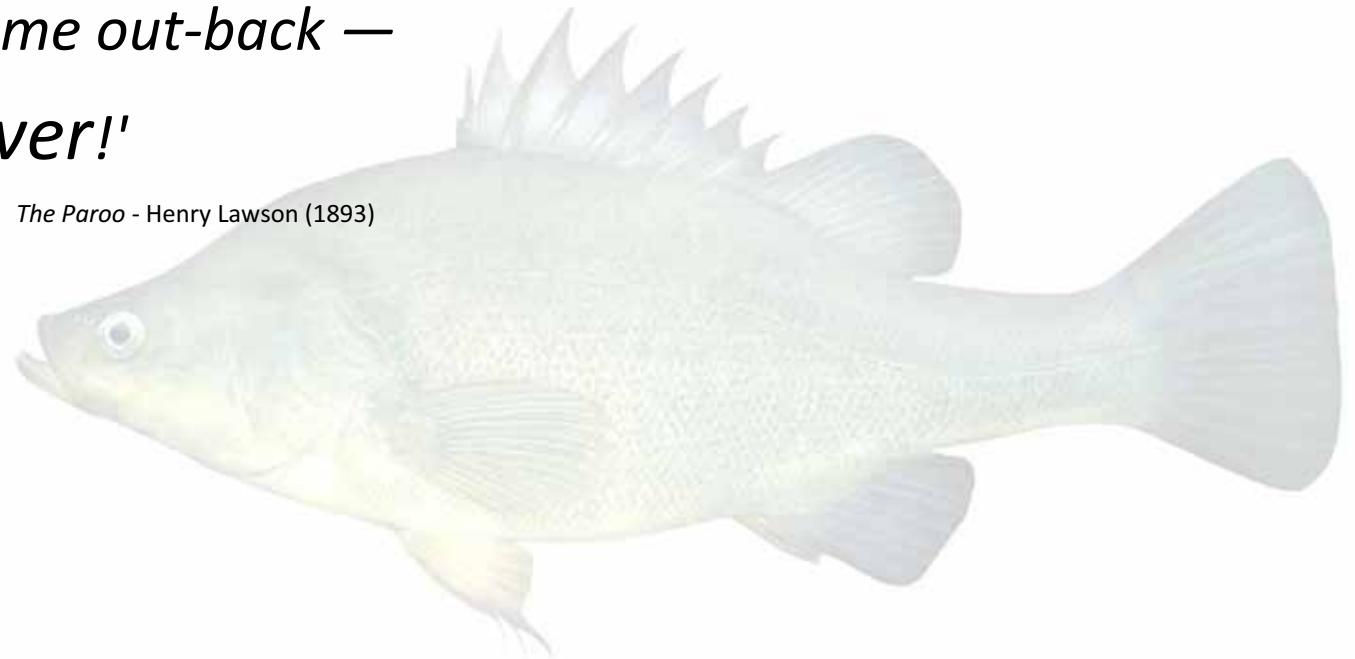
Ron Heinemann's first memories associated with Paroo include lots of large floods. They used to be cut off for a week or so at a time due to flood. Photo source: Ron Heinemann.



Ron Gardiner's (seated, right) first memory of the Paroo is being taught to swim by being thrown in by one of his teachers. Fortunately memories of being taught to fish by his grandmother are less traumatic and led to a life-long passion for fishing. Pictured here with his wife Bridget (standing), and Ron and Hazel Heinemann (both seated). Photo: Hamish Sewell.

*'But where,' said I, ' 's the blooming stream?'
And he replied, 'We're at it!'
I stood awhile, as in a dream,
'Great Scott!' I cried, 'is that it?'
'Why, that is some old bridle-track!'
He chuckled, 'Well, I never!
'It's nearly time you came out-back —
'This is the **Paroo River!***

The Paroo - Henry Lawson (1893)



Introducing the river and its people

The Paroo River is the last remaining free flowing tributary of the Murray-Darling Basin. Its 76 000 square kilometre catchment is located in the north-western corner of the Murray-Darling Basin, half in Queensland and half in New South Wales. The Paroo starts in the gorges of the Warrego Range in western Queensland. After crossing the border into New South Wales it spreads over the vast floodplains near Wanaaring, helping to sustain many significant wetlands. About 600km later it reaches its overflow lakes between Tilpa and Wilcannia. Although one of the major tributaries of the Darling River, the Paroo rarely flows into it because its waters dissipate before they reach it.

Over 20 000 years ago, the Maranganji, Kalali, Badjiri, Parundji and Kunggari people knew a very different Paroo River. A cooler climate, markedly different plants and animals and, probably, a river that flowed constantly.¹ Since then, a hotter climate and other changes meant the Paroo has become an ephemeral river.

The river has always been very significant to the Aboriginal people. The region has a dry climate and the river is a lifeline. The river remains a water supply for the people living in the catchment, but it is also a channel that binds the communities together. It provides water, food and hope for the creation of a comfortable life. People gather along the river banks and water holes to relax in the shade, maybe going home with a meal obtained from the river: yellowbelly, cod or yabbies.

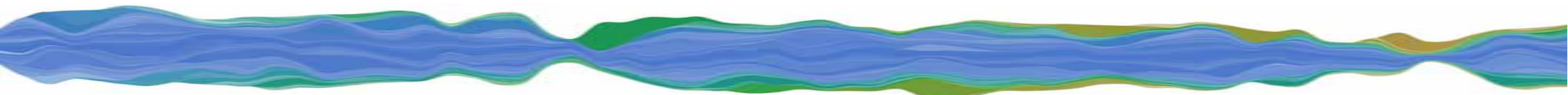


The Paroo River. Photo: Greg Ringwood.

Created by a spirit

In the ancient dreaming, the Moonagutta was a water spirit with unknown shape and size. He lived deep in the waterholes along the river. In fact the river was made by the Moonagutta. The Moonagutta became the only spirit and soul left, wiggling in the silt left next to the receding water, after swallowing all the other Moonagutta. He started to shape the first rivers of life through the tracts he created when he tried to escape from the floodwaters. When he came to a sandy stretch, he was able to bury down deeper and created the waterholes.¹

The Maranganji, Kalali, Badjiri, Parundji and Kunggari people established themselves in the Paroo and the surrounding catchments approximately 20 000 years ago. The Paroo River gets its name from a variation on the name of an Aboriginal Paakantji group, the Parundji.



The arrival of the Europeans

The Paroo-Warrego catchments weren't explored by Europeans until 1845. Thomas Mitchell passed through the region in 1846. By 1862, there were already some established pastoral stations in the area.

One settlement arose beside a reliable waterhole at the intersection of two major stock routes. This settlement became Cunnumulla in the late 19th century.

Until the end of the Second World War, the area had a small number of large pastoral stations and a small population. After the war, with the increase in wool prices, the area experienced significant economic and population growth.

Beef cattle grazing and sheep for wool production are still the two predominant industries in the catchment. There are very few, small-scale irrigated crop operations. Due to the small irrigation industry and the sparse population, demand on freshwater has stayed low. As a result the Paroo River is the least regulated river in the Murray-Darling Basin.



Transporting sheep across the Paroo for shearing in Willara in 1935. Photo source: Colin Leigo.

Fishing has been very important activity for the local community. For the Aboriginal people and early settlers fishing was a daily activity providing a stable diet.

In later times, wetting a line has become a significant leisure activity. People living along the river have unforgettable and intimate memories of the river, the fish they caught and 'the ones that got away'.

An unregulated river



The free-flowing Paroo River. Photo: Greg Ringwood.

The Paroo River is the last remaining free-flowing and unregulated river in the northern Murray-Darling Basin and is likely to stay that way. In 2001 the Queensland Government applied a moratorium on new structures that could capture overland flow. In 2003, the Queensland and NSW Governments signed an intergovernmental agreement to manage the Paroo's water resources in a sustainable and culturally sensitive manner, recognising the cross-border nature of the catchment and its links with the sub-artesian waters.⁵

Fish need to be able to move up and down rivers to access food and habitat suitable for spawning and to avoid poor water quality or other unfavourable conditions. Many of the fish species found in the Paroo migrate as part of their life cycle, including Murray cod, silver perch, spangled and golden perch. The Paroo and Ovens (in the southern Basin) are the only rivers in the Basin where fish are not faced with barriers, such as weirs and dams, when migrating.

Colin Leigo – The Paroo River means life



Colin Leigo is a 60 year old farmer who lives at Mooreland Downs, about halfway between Wanaaring and Hungerford on the Queensland-NSW border.

He's lived here all his life. The river has always had a significant influence on the way Colin and his family live and work on their property.

A river runs free

It seems the Paroo is a lucky river - most of its ecology and biodiversity are in good condition compared to other rivers.

You've got all your vertebrates, all your frogs in this ecosystem – everything is still all intact with this river, that's one thing with it. When you talk to people on other rivers and they just haven't got those things. I think it's tremendous.



A little fresh down the river – a vital feature for native fish. Photo: Greg Ringwood.

Colin sees the little rises in water level as being a good part of being on the Paroo.

The smaller floods are always terrific. It's always great to see the little rivers come down because it's terrific just to see the river run. When you've been here and you go through drought years and you see what doesn't happen with the river. When you've got no water at all or very little water, and you always look and say, 'Well, it's terrific just to see it running'. Even though it might only be a little run (and there are a lot of those come through, over the year), they're a terrific thing just to see and to have. I think a lot of the other rivers, now that they're all regulated rivers, probably get very little of those at all. They probably don't even see them whereas this river being a free flowing river, we get all those little rises that come down.

Fishing – part of life on the river

When the river runs, Colin catches fish using a drum net – a technique he learnt from his father. When he was a child, Colin also used lines to catch fish.

Fishing? Oh, well, fishing, it's been part of my life on the river. Probably I would have done it ever since I was a kid. We've fished on the river and probably in all forms and all sorts of fishing. We are there just to catch ourselves a meal of fresh fish because we don't live on the coast, so we can't go and buy fresh fish every day or anything like that. So we just catch a few fish when the river runs.

There were plenty of good size fish back when Colin was a child, particularly yellowbelly, he remembers. Colin also remembers many catfish in the past, with some being three pounds in size.

There used to be catfish in the river, but I think since the carp have got in, they must have eaten all of the catfish eggs, because there's just no catfish in the river any more.

Colin also remembers catching moonfish for the first time during the 1980s. Initially they thought the freshwater catfish was back. Moonfish look like catfish, but they are four or five inches long and seem to die out regularly and came back again.

There are plenty of these moonfish in the river and another Paroo fisher, Ron Heinemann, reckons they're good bait for cod. Across the Basin, these fish are commonly known as Hyrtl's catfish, Hyrtl's tandan, yellow-finned catfish or moonfish.

They always caught a feed when they went to the river. These days it seems it is the luck of the draw whether you will catch a fish or not.

You could catch 8 to 10 in no time – good yellowbellies. Sometimes you'd catch small ones and you'd throw them back in. When I was a kid, you could nearly always catch your feed of fish.

The river is also full of shrimp and yabbies. There also used to be a lot of mussels.

There's mussels in the river, if you want to walk around or feel around in the mud with your hands. Mussels are about four or five centimetres. They are a blacky dark colour. And when you open them up they are white inside the shell. Very muddy but I've seen people eat them, but I've tried it, but they are just full of mud to me.



Yabbies are a favourite across the Murray-Darling Basin. These two were caught in the Paroo River.

Photo: Greg Ringwood.

Moonfish

(*Neosilurus hyrtlii* – Hyrtl's catfish, yellow-finned catfish)



Photo: Gunther Schmida.

- Medium sized fish, usually less than 28cm, with smooth skin without scales
- Likes a variety of habitats from flowing water to still lagoons
- Eats aquatic insects, microcrustaceans, molluscs and detritus
- Spawning in north Australia occurs in Summer, possibly stimulated by rising water levels and temperature

Catfish

(*Tandanus tandanus* – eel-tailed catfish, jewie)



Photo: Gunther Schmida.

- Medium sized fish, usually 50cm or less
- Prefer slow moving waters of rivers or creeks
- Eat aquatic insects, yabbies, molluscs and small fish
- Eggs laid in a circular gravel nest which the male guards until the eggs hatch
- Now presumed extinct in the Paroo

When the floods come

The Paroo rarely flows into the Darling River. It did in 1974 and Colin remembers it happening in 1976, 1990 and 2010 too. Being flooded in was a regular thing for the family in the 1950s, '70s, '90s. Because the shearing shed and quarters are close to the river, they get cut off even during the medium floods. The farm trucks and motorbikes are left outside the flood line just in case. Around Colin's place, the Paroo flood can spread a kilometre or a bit more. Further south it can spread over 30km according to Colin.

The river is the same

Colin doesn't think the river has changed very much. He collects data on the river and its flows, just like his father did all his life. From this he knows how far the river will rise and what he needs to do to safeguard his farm and stock.

When the river flows it fills the waterholes as it journeys downstream: if the waterholes are dry or low, the amount of flood downstream gets smaller. Colin saw this at his place during the 2010 flood. It normally takes about a week for flows from Eulo to reach Colin's property, but if the river is dry it may take 10 to 12 days.

The Paroo flood of December 1942



1942 flood - The Flat and Tanks. Photo source: Colin Leigo.

... We are all well and safe and I think most of our personal belongings are safe, but there won't be too much left of Willara On Sunday morning the river was just coming out of the channels and it was rising fast About 3 the bank broke.... It started as a gentle stream and in a few moments was a torrent I don't dare think any further ahead than a few weeks, all our garden that we have put so much work into and my heart just aches for poor old Ivan with his trees. He was so proud of them and they were growing so beautifully. I don't think more than 3 or 4 will survive, at the most and as the water will be right over the top of them. Oh well I suppose we are really lucky as we are safe and the menfolk seem to have saved all our personal belongings. They must have worked [hard] to get all the things out that they have done.

Extract from the Letter of Isobel Doyle



Prior to 1928, a punt transported people and their chattels across the Paroo. Photo source: Ron Heinemann.



The amount of water already in the waterholes has changes the time it takes for flood waters to make their way downstream. Photo: Colin Leigo.

Dougie MacGregor – a lifetime on the Paroo



Dougie is 82 years old and throughout his life has seen many changes in Cunnamulla and in the Paroo River.

Driving, not droving

Dougie remembers the river as always having water and plenty of fish. He remembers the droughts as well. When the drought started in 1957, Dougie went into the livestock transportation business. Most drovers had gone to war and not come back. Dougie remembers most of the younger generation not being interested in droving. Livestock transportation filled the gap.

The floods had significant impact on the roads. After a big wet in 1950, one of two main roads were replaced with a new one on the western side of the Paroo to, as Dougie puts it, *get way back off the river*.

The road and a good vehicle were important ways to get access to the river for fishing. In the 1950s and '60s, not many people had cars, so people would car-pool to get to the river to fish and camp.



Flooded in. Photo source: Gordon Warner.

Dougie was too busy to go fishing during the early days of his business. But later, when the business was well established, he had more time to go fishing for a couple of days at a time.



An ant-bed floored house. During the Depression no one had much, so if fish were caught they were shared. Photo source: Gordon Warner.

The boom years

Towns around the Paroo have experienced cycles of boom and bust that mirror the cycles of flood and drought in the river itself.

The postwar years saw a conjunction of good seasons and high wool prices and the town experienced unprecedented prosperity. Dougie remembers the 1950s:

They were the boom years just after the war, and wool was big money. There was plenty of work around here.

The government had subdivided some of the big properties for soldier resettlement. They went up in a ballot in 1951 and many returned servicemen moved on to the newly subdivided land.

For Dougie and others, this meant work:

There were new homesteads to be built, and shearing sheds, and fencing, so there was plenty of work around and plenty of money. And the population of the town went up to 4 000.

By the late 1960s the pastoral boom had passed. These days Dougie sees a consolidation trend: large companies are buying small properties and joining them up. People are moving away and the population in the area is declining.

Sleepy cod and spotted cod

Dougie and his friends caught big cod in the hidey-holes of Caiwarro and Currawinya, as well as yellowbelly, jewfish and big black bream (silver perch). The cod Dougie and his friends caught were anything up to 110 pounds, but they averaged 15 to 30 pounds.

He thinks there were two distinct types of cod. One he says is a very short, stubby cod fish, and the other one is a long, leaner one. He and his friends called them sleepy cod and spotted cod. The big ones were always the stubby cod.

During the war, when food and petrol were rationed, the Aboriginal people living close by used to ask Dougie to take them out fishing. Dougie only had 40 gallons of petrol to do his town carrying job. But on a quiet day he used to take his Aboriginal friends out fishing.

In the afternoon of a quiet day, I'd pick them up and I'd say, 'Which hole do you want to go to?' and they'd say, 'Oh, the Eight Mile,' which is up the river. They'd only have a corn bag with them. When one of them got off and put his nose up in the air, and took a sniff around, and he'd say, 'Not today, mate.' We'll go up to the Ten Mile or up to the Fourteen Mile. We'd park up there, and they have another sniff around, 'Oh, yeah, this will do, mate.'

Two of them would just tip into the water, they would hardly make a splash or anything, they'd just go in, and they'd be under the water for that long you'd think they'd drowned. And the next thing, up they come and they'd have a cod fish each in their arms. Just like that.

When Dougie asked them how they did it, an old Aboriginal man told him that the fish is called sleepy cod - all you had to do is rub underneath the belly and they'd go back to sleep again.

The Aboriginal fishers took only enough fish for a meal then they would go back to town. And they always shared their catch with Dougie, for taking them to the waterhole.



Dougie MacGregor and his friends caught big cod in the hidey-holes of Caiwarro. The river at Caiwarro (pictured) has snags, reeds and overhanging trees - ideal fish habitat. Photo: Greg Ringwood.

Murray cod

(*Maccullochella peelii* – Cod, Codfish, Guduu, Pondee, Pondi)



Photo: Gunther Schmida.

- Largest Australian native freshwater fish, growing to 1.8m and 113kg (average 40cm)
- Found around deep holes, woody debris ('snags') and overhanging vegetation or rocks
- Ambush predator eating other fish, crustaceans, molluscs and frogs
- Migrate in Spring – often 100s of kilometres upstream with water level rises
- Males guard the eggs which are laid on logs or rocks
- Last recorded in any numbers in the 1980s
- Cod may have moved back into the Paroo River from the Warrego and Darling Rivers during the 2011 floods while the waterways were connected
- Listed as 'Vulnerable' in Victoria and by the Commonwealth

It's all about the bait you use

Dougie and his friends used all sort of bait to catch fish in the waterholes.

You go out to some of those holes, and pick in them, and you can't get a fish out of them, but the fish are in there. It depends on what feed is in the rivers. We normally caught them on worms, shrimps, crayfish and mussels. We've caught them on bits of saveloy skin, we've caught them on grasshoppers, on centipedes, on frogs, and they tell me further down the Murray, they catch them on a grub.

Dougie and his friends also used to look in the fish stomachs to see what they'd been eating.

What we used to do when we got two or three catfish, we'd open them up to see what they were feeding on. It's a funny thing with the catfish I opened up at different times, sometimes their belly would be full of little mussels about the size of your thumbnail. And they were still whole.

So Dougie used to dig for mussels along the banks of the river, mainly in the areas with black dirt and silt. When he was a kid he used to get mussels about 10cm long. They used to throw them on hot coals and when the mussels were opened they were ready for eating.

But Dougie has not seen mussels that big in the Paroo since he was 15 years old.

I reckon down through the years it's come about that the poisons that they've used for dip for the sheep and the cattle, and the stuff they sprayed with. Especially after the war, they had all these new modern sheep dips and sprays and I reckon that's what's poisoned the river holes.

Keeping the catch fresh

Some people Dougie knew were very good fishers and always used lines but never nets. Dougie mainly used bobbing rods and hand lines. And it was successful as there was plenty of fish in the river.

If you took a boat out and you put drop lines in, you were nearly always sure to get two or three cod. In those days you'd catch as many as 20 or 30 fish a day. We would only have to go out for a day. But when we went right out, we had to stay out two days to make it worthwhile.

If people were camping, they had to keep the fish until they went home. He remembers:

They used to make a big hole along the river and they'd catch their fish and turn them loose in this big hole to hold them there alive.

Mussels

(*Velesunio ambiguus* - river mussel,
Alathyria jacksoni - floodplain mussel)



Photo: www.environment.nsw.gov.au

- Definitely two species, potentially three
- Was a primary food source for Aboriginal people
- One species prefers wetland environments, the other, cooler riverine environments
- Floodplain mussel – grows to 10cm, and can live for 10 - 15 years
- Found in creeks, billabongs, backwaters, lakes and weir pools but not in fast-flowing water
- Probably extended its range with river regulation, and changes to water regimes
- Tolerant of drought, low dissolved oxygen
- River mussel – grows to 15cm and may live for more than 30 years
- Grows in main channel habitat, often below weirs with turbulent water
- Prefers high oxygen levels, and not tolerant of drought

Dougie and his friends used to take plenty of coarse salt.

There was no esky, there was no ice, so you couldn't stay out too long, the fish would have gone off. We used to take plenty of coarse salt and we'd clean the fish and fillet them. We'd put a layer of coarse salt in a container or tucker box, then put a layer of fillets in, and then another layer of salt, and that would keep it pretty cool. It would preserve them. And in the cooler weather it would almost form ice.

Silting up

In the 1960s, Dougie started to notice that the holes were silting up.

Being a carrier and getting around the country I would see the way the soil was getting pounded up from the sheep and the cattle. The graziers were cutting scrub down – in the dry times trees were dead, the roots were gone, and the grass was gone, it was dusting up the soil. When it rained the soil would get washed down into the river. You could see where the silt was building up, out like a promontory, out into the river. The rivers had big still water holes - if it haven't run for 18 months or more, there were still deep holes. Then we started to notice that they were getting shallower and shallower after a shorter time without a flood.

Dougie reckons the graziers are overgrazing the land along the Paroo.

There used to be reserves all along the rivers. In the early days the drovers had to have somewhere to let their horses and their working bullocks go. And the reserve is where the seed grows. The country is not flogged out like the grazing properties. They weren't satisfied with the beautiful country they had. They wanted the stock route reserves too. But they won't let the grass come up and shed a head of seed. They are over-grazing.



Both wildflowers and native grasses benefit from rain and periods of rest from being grazed. Photo: Greg Ringwood.

Carp – it got out of hand

The river these days has a variety of weeds and animal pests. Dougie first noticed carp in the Paroo about 30 years ago.

Well, we were catching an odd one or two of these strange sort of fish, and they were nice looking fish, too. But you couldn't eat the bastards, they were full of bones. We tried. Then I found out that they were imported into Australia to clean the irrigation channels out. And the politicians that have allowed them to be brought into this country ought to be caught and shot. That was criminal. Exactly the same thing as the cane toad. And of course, any river or stream or creek that's connected to the Murray have got carp in it.

According to Ron Heinemann, there were goldfish in the river ever since he can remember. When the carp came they affected the native fish community and changed the river.

They came on very quickly. I think it's a rare curse. And naturally, it got out of hand. You hear of the odd catfish being caught now, because they nest in the bed of the river and they protect it. And naturally, the carp clean them out. And they eat their young as well. Also, the gold fish and the carp eat the cod fish eggs, which they lay inside big hollow logs of trees that have fallen in the river.

Ron Heinemann - what I know of the Paroo is what I've learnt myself



Ron Heinemann is a grazier who has lived along the Paroo all his life. His parents came to live at the sheep station 'Springvale', about 10 kilometres west of Eulo, around 1920.

They lived in tents for several years until they built sheds with a cane grass roof. Ron was born in 1922.



The remains of Ron's parents' house. Photo source: Ron Heinemann.

Fishing: as simple as A, B, C

Ron was taught to fish by his mother, who came from a family of fisherwomen.

I've been fishing in the river since I could almost walk. Mostly my mother taught me how to fish.

My father wasn't a fisherman, but my mother and her relatives, the Gardiner family, they were all fisher women. In those days, we used to have a rod with a short line on it, with a cork. Three foot off the bottom there was the hook, and you put a shrimp or a worm on it, and you just bobbed away, and the fish take it and you just pull them out on the bank – it's as simple as A, B, C.

Ron's passion for fishing continued as he grew older.

I was a mad fisherman all my life. I like fishing because you never know what you are going to pull out.

Remembering cod

Ron recalls his mother's memory of catching cod in the Paroo:

My mother remembers, when she was a little girl, catching cod up on the banks of the Paroo. As fast as they took one off the line there'd be another one on. They must have been there in plentiful supply in those days.

Ron remembers catching cod at Caiwarro waterhole and recalls the fishing exploits of a good friend:

He told me he caught two 20 pounders on the one line one day. He did not know what

was coming up because they were probably both pulling different ways. Another cod he caught was 73 pound. But I saw an 84 pound cod at the Station's butcher shop, it was a big fish. The biggest I heard caught there was up to 102 pounds.

But Ron recalls that cod were once more plentiful in this waterhole.

Down at Caiwarro there were so many cod fish. In 1950s they put a road across the bottom end of the river there, and so many cod fish died at the crossing, that they used to take them away in a truck to get rid of them. The station was only a few hundred yards away, and the smell was terrific. Every kind of fish. Cod fish, yellowbelly, catfish.



Although not common since the 1980s, the floods of 2011 allowed the Paroo to connect with the Darling and Warrego Rivers for a relatively long time, possibly allowing cod access back into the Paroo. Photo: Luke Pearce.

The black flood

Ron remembers fish as plentiful, but reckons drought and rain have big impacts on the life of the river:

In those days there was any God's amount of fish. You could go down to the Five Mile water hole years ago, and you'd catch at least two meals in an hour without any trouble at all. But in 1935, the black flood came down and killed almost every fish in the waterholes.

When the river flows the first time after a drought it moves slowly; an almost black, ink-like water. Colin Leigo says the colour of the water changes: if there are storms in the upper part of the catchment, the colour of the water turns yellowish, then red.

Dougie has also seen the river flowing black after a big storm, particularly when the waterholes go black due to the fallen leaves. It does not last long, but can kill the fish. He has seen fish starving for oxygen during the black flood, dead and dying against the banks of the river. There would be, he says:

There were more there than what the bloody birds can eat.



A 'tide line' of dead fish is not a pretty sight, but blackwater events are part of the cycle of drought and flood in the floodplains of the Basin. Photo: David Ward.

But Ron has seen something odd happen after the black water has cleared:

Another thing I noticed in 1935, nature has it that those fish spawn before they die. And a few weeks after the flood, the waters tended to clear gradually, six or eight feet from the bank of the river you could see umpteen million of tiny fish moving – just a mass of fish. I have seen this only four or five times in my life.

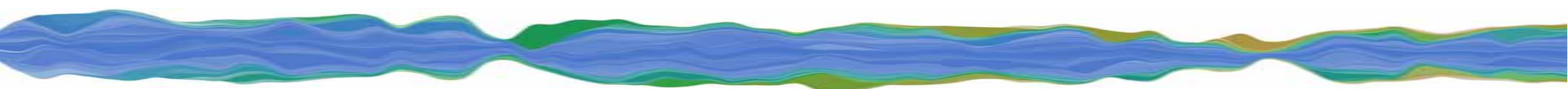
They're beautiful to eat!

For Ron, fishing is not the end of the activity – eating the fish is definitely part of the enjoyment!

If you stayed overnight, you'd eat them on the spot. Cook them in a camp oven. A 20 pound cod fish – you wouldn't get much better to eat. Cut it into steaks, roughly an inch thick – and put it between two pieces of wire netting and cook over gidgee coals. You wouldn't get better anywhere. Because cooked that way, all the fat runs out, they get very fat. And they are beautiful to eat.

Colin Leigo often used to cook yellowbelly on charcoal along the banks of the river.

We used to use wet brown paper and wrap it up, you wrap the fish up whole like that, and just put it in some coals on the fire for about 20 minutes. Cover it on top as well with the coals, and when you pull the wet brown paper off, the skin would peel off stuck to the paper. We didn't have to scale it or anything. Then you'd just eat it with a fork.



The disappearing water

The Paroo River is unusual in comparison to others in the Murray-Darling Basin. Most of its water disappears underground and it very seldom flows in to the Darling River.

The artesian is important for our survival here. I think trying to drill into the artesian basin to get gas is a problem. If they happen to destroy the artesian basin, it will be the end of Australia. I can tell you one thing. We had a big flood at Springvale once. I was out walking on an island there, and I thought I could hear horses trotting through the water in the distance. I got over a bit further, and I found that I could stand on top of this noise. It was water running over rocks. That flood had been up two foot six and fallen away two foot six in about a week, and it would have been a hell of a lot of water going down underneath. The water was disappearing into the earth. You could hear it running over the rocks. And yet it might have been 100 feet or so below me. So you could hear the water percolating down.



Paroo wetlands artesian spring. Photo source: NSW DEC.



The river at Caiwarro where waterholes are fed by artesian water. Photo: Greg Ringwood

Great Artesian Basin

The Great Artesian Basin is the world's largest underground aquifer, storing 65 000 million megalitres of water. Although usually associated with central Australia, it stretches from 2 400km from Cape York to the Lake Eyre Basin, and east to Toowoomba and Dubbo. The basin's vast water supply is recharged from rainwater that penetrates from the surface. Natural artesian springs bubble to the surface as a result of the water being held under pressure.

These springs have always been vital sources of water for Aboriginal people and are also significant elements in stories associated with Ancestors, who often live in the deep pools of mound springs.

The artesian springs enabled the first pastoralists to move into the Queensland interior and provided important watering points. In 1886, JS Loughhead drilled the first bores in the area at Thurulgoonia Station near Cunnamulla. Drilling produced 80 000 gallons of water per day and although very expensive, it did attract more people and stock.

Once a bore was in place watering facilities included tanks, dams and bore drains. Artesian water was also used on stock routes, for woolscouring and as a supply for steam driven railway engines. Towns in the Paroo district use bore water for urban supply. Artesian baths and spas were once common.

The extraction of water from the Great Artesian Basin has changed the ecologies of many places in the basin area. Many natural and mound springs now have reduced flow or have stopped altogether. The Paroo River waterholes at Curriwinya and Caiwarro are fed by artesian water.³

Ron Gardiner – Riding the river



Ron Gardiner was born in 1918 in Cunnamulla. He had to go to school in Eulo, initially boarding at the Eulo Queen Motel as there was no bridge across the Paroo River.

But after the bridge was built, Ron started to commute to the school on horseback. That was in 1928.

He remembers his first contact with the river as it was rather challenging:

The first year I went to school in Eulo, the teacher there was a Mr Skinner. He took us all down to the river, to a big water hole, which was a quarter of a mile away. He said, 'We are going over to the other side.' And I said, 'I can't swim, Sir.' And he said, 'Well, hop on my back.' We got half way over, and he pushed me off, and said, 'Now, swim.' So that was a good early lesson.

Fishing tricks

Fishing the Paroo was a common activity. Ron has fond memories of fishing with his grandmother who showed him a trick or two.

I used to go to the river when I probably would have been around about 10 or so with old grandmother Gardiner, my father's mother. And she used to go down to the Paroo with a bamboo rod, and do bobbing. Every now and again she'd get a handful of sand and she'd throw it across the cork, and she'd say to me, I'm just putting a bit of pepper and salt on whatever I catch later. And she always caught a fish or two.

Ron had his share of funny things happen when fishing too.

The Caiwarro hole, it was at least three miles long, never dry, 20 or 30 foot deep. At one stage when I was down there with a cousin of mine – when I was about 18 years of age – and we were fishing at night in the middle of the river. I said, 'Fred, I don't think we're moving.' And he was a good rower, and he said, 'Of course we are moving.' So after a while we had a lantern with us, and we found we weren't moving. Apparently a big old tree had washed into the river, and we were sitting on a limb, and there was great big heaps of grass growing, I'd say in about ten feet on either side, and I said to Fred, 'Oh, for goodness sake, don't have an accident here, I don't think I could get through that grass.' But I believe it's all gone since the carp came.

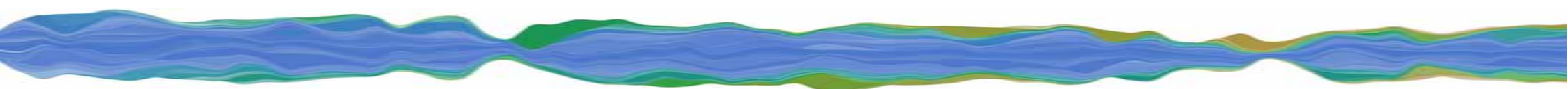


The Caiwarro hole. Photo: Greg Ringwood.

Yellowbelly is a favourite

Ron sometimes caught large numbers of fish. He'd keep them in the fridge and eat them over the following days. It was always the good old yellowbelly.

It was the easiest one to catch. We didn't catch many cod in those days. I think I only ever caught one cod fish. Once, when I was going to school, I went down to Five Mile. I caught a five pound cod. Then one day I went to Five Mile hole and there was a black flood. The fish was getting closer to the top until they started jumping out of the water. And I got enough yellowbelly to fill the back of a ute – the floor, just flat. And they were beautiful. And the biggest fish I know that was caught there that day was a 25 pound cod.



When the fish weren't around, Ron would catch crayfish – or 'yabbies' as they're known in other parts of the Basin.

My son Andrew told me about ten years ago that the flood killed all the fish. The locals said, 'It's no good going fishing, because there aren't any fish in the river.' After that a fellow named Charlie Mackenzie and Andrew went out to the river, put a tin in, and came home with a bucketful of crayfish. It was much easier to catch crayfish, because there are no fish there to keep the crayfish down.

Riding the river

Eulo was and still is grazing country. Sheep often get access the river and regularly get caught in it during floods. The best way of finding sheep caught in the river is to wander up and down in the river on a back of a horse. Ron called this 'riding the river':

Well, whenever there is a flood in those days, you got on your horse and you rode the river, to make sure if there were any sheep caught, you'd swim across the river. As soon as there would be a river, we'd ride. We had two good horses that swam and they'd swim across any river. Marvellous. We'd get sheep and cattle out of the river by swimming them across.

Ron Heinemann had similar experiences. In 1964, he bought a boat and a motor so that during the flood he could look for stranded sheep.

We used to cruise the Paroo, looking for sheep on islands. If you found five sheep on an island, they'd go five different ways in the mid-stream, and you had to go and pull them out of the river onto the boat, which was hard work, I can tell you.



Moving sheep by boat. Photo source: Colin Leigo.

Goldfish

(*Carassius auratus* – golden carp, carp, common carp, crucian carp)



Photo: Gunther Schmida.

- Small deep bodied fish up to 40cm but more commonly 20cm
- A native to eastern Asia, first introduced in 1860s as an ornamental fish, now present in all waterways of the Basin
- Although ornamental fish have various bright colours, wild goldfish quickly revert to a bronze colour
- Usually associated with warm, slow-flowing waters, weedbeds and is known from slower flowing areas of upland rivers
- Spawn when water temps are 17-23°C, eggs are laid amongst submerged vegetation
- Feeds on small crustaceans, insect larvae, plant material and detritus
- Generally considered benign (not harmful, low impact on native species)

Making connections

Survival from the river

Early settlers and Aboriginal people relied on the River to supplement their protein intake. They caught yellowbelly, Murray cod, catfish, yabbies as well as freshwater mussels, all for eating.

They fished almost every day and took what they needed for the day. Those who lived far from the river took larger quantities of fish home.

Until the first half of the 20th Century, there were plenty of fish in the River, as Dougie MacGregor recalls:

Those days if you got on a boat and dropped a line, it was sure that you would get 2 or 3 cod. Most holes in Paroo were known for holding plenty of cod.

Over the years, overfishing, introduction of carp and pollution resulted in the decline in the number of fish. Colin Leigo sums up the situation:

Now it is very hard to catch a Murray cod. These days it seems it is the luck of the draw whether you will catch a fish or not.



It was important to catch your own fish as there were no fish shops. Photo source: Gordon Warner.

Knowing the fish

People who fish the Paroo know their fish well. Ron Heinemann gives some examples:

No eels out here. But tonnes of yabbies. There is another small fish out there we call the moon fish. ... Oh, there are also tiny fish – oh, grunters and bony bream – that sort of thing which are used for cod bait too. Also, black bream, which you get a lot of them out in the Currawinya Lake, and they come up into the Paroo, and they grow to three and four pounds and are good eating, too.

The river provided plenty of fish: but you do have to catch them! Understanding the river and the fish is important. As far as Tud Murphy is concerned, the local aboriginal people do it the best way.

One bloke put his hand into the log and he'd come up with a big yellowbelly in his hand, every bloomin' time. He used to tell us, all you had to do was rub them on the belly and suddenly they'd just lay there, and you just slip your fingers over the gills and bring them up.

Dealing with 'dry floods'

Sometimes living along the river brought unwelcome surprises – like floods. The coming of the telephone helped locals deal with some of the difficulties of living near the Paroo. Donald Cooney remembers how the coming of the telephone lines to the Eulo area changed the way that people were warned about the floods.

You get what you call dry floods – it'd rain heavily up the river and you'd have nothing, you'd have dust blowing. You wouldn't see a cloud in the sky, and you didn't know the water was coming because it was raining 200 miles up the river, then down she'd

come. They decided that this was no good. So when they first got the telephone down there everybody got busy and built the party lines. Four or five properties would get attached to just one wire that ran into Eulo. It was the start of the modern era.

The children of the river

According to Colin Leigo, during his childhood life, was a lot easier for the people along Paroo. The lives of his parents and grandparents revolved around the river. They'd fish the river and socialised by organising picnics and other events on the banks of the river.

My father always enjoyed the river, enjoyed the fishing and the social days on the river bank. Everything seemed to revolve around the river; they had their picnics and what have you, they were always held on the river.

Kids spent the summer days cooling off in the river. The river closest to the house was about 1.8 metres deep allowing kids to dive and jump into the water. Colin and his brother learnt to swim by tying a gallon-tin around their back and dog-paddling. The brothers spent most of their spare time swimming, catching fish and yabbing in the river. They created games, built swing ropes and diving platforms.

His childhood relationship with the river continued into the next generation with Colin's daughters.

Even though our house has since shifted about a kilometre off the river, they've done the same thing as I did over the years, swam and fished and yabbied and everything in the river. They've both had their twenty-firsts on the river.

It's a big (fishing) adventure

Fishing can be exciting but Ron Heinemann believes before, during and after catching fish is all part of a big adventure.

It is all a big adventure I used to swim in the river as well. Sometimes four or five of us used to go fishing together. We sometimes spent the night out there. Just a swag and gidgee coals. The fishing was just the thrill of catching a cod on a line. I've seen them get on a line at times and you'd think a bullock had fallen into the water. They really go to town when they hit. One of the first 25 pounders I ever caught was down below Springvale. I looked over the bank, and it came right over the water, a 25 pounder. I can tell you, it's a nasty job trying to carry them back on a motorbike – on your lap!

Picnics along the river

The river also created a good atmosphere for socialising. Gatherings of families and friends along the river banks for fishing and having picnics were a common event as Ron's daughter Bridget remembers:

Mum used to invite the nuns out quite often for picnics along the river. They'd come out and they must have stayed overnight. It was quite amusing, because our governess took her clothes off in front of the nuns to go and get the bull out of the river. We thought that was very naughty. We used to go on these picnics along the river and go fishing and swimming. I remember us going fishing quite a lot. Dad would take us. We'd get into trouble, because you weren't allowed to make noise while you fished.



Fishing was often a family, as well as a social, event.
Photo source: Gordon Warner.

Visions for the Paroo

The fishing people who contributed to this project have all talked about their hopes for the future of the river. Many felt they had seen some improvements but most don't feel the river is as healthy yet as they would like to see it. Each of these fishers suggested ways to help the river and in turn help provide healthy habitats for fish.

Stock management

Donald Cooney was born in the 1930s and grew up on 'Turn Turn' with his eight brothers and sisters. He and his wife Faye lived in the Paroo River district most of their lives, raising their three children, Alan, Donna and Stacy and running sheep at Wittenburra, an hour west of Eulo. They fished the Paroo and the Warrego rivers and saw how it changed over their lifetimes. Donald remembers:

We lived on it for a long time. And it was in the early days – it was useful mainly from a stock point of view, for the water. You had to have water during drought. The stock route ran along the river. In those days we had no trucks to move the stock away from the drought. Mobs of drovers took mobs of stock along the river, they walked along the river.

They just absolutely devastated along the

edge of the river. That was one negative – the fact that the stock route was right on the water. It was detrimental to the river's health because of the huge movement of stock up and down the stock route. The best thing that ever happened to the river, of course, was the fact that trucks finally took over and there was no need to travel stock along the route.

Ron Heinemann lived not far from the Cooneys on his family property, Springvale. He remembers the impact of stock on the river differently:

The banks of the river have not changed either. I wouldn't say so, no. A lot of people say that stock watering is damaging in the water holes, but I think the floods clean that out and take care of that.

Colin Leigo has seen how the riparian vegetation has changed with changes in agriculture. He noted that after dairy farming declined, lignum vegetation along the riverbanks increased because it was not being eaten by the cows. Colin has worked with the Western Catchment Management Authority to fence about 12km of the river on one bank on his property.

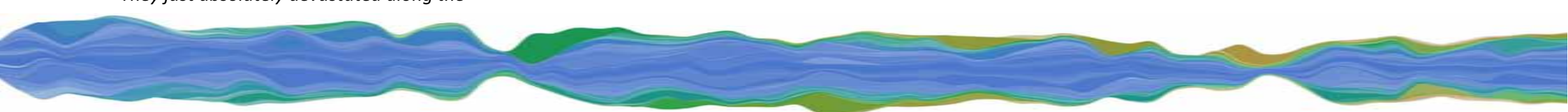
State of river: 'moderate - good'

The Sustainable Rivers Audit (SRA) is an ongoing systematic assessment of river health of 23 major river valleys in the Murray-Darling Basin. Environmental indicators (themes) include hydrology, fish and macroinvertebrates, which are monitored and will highlight trends over time.⁴

The Paroo Valley was surveyed in 2006. The Paroo Valley fish community was considered in Moderate Condition, and Ecosystem Health in Good Condition. 58% of predicted native species were caught, comprising most of the total catch (97%), and 78% of the total biomass.

Catch was dominated by bony herring, with golden perch, Murray-Darling rainbowfish and Spangled perch also common. Carp dominated the alien species captured, with goldfish also captured.

He uses the fence line to manage the herd for grazing rotation rather than preventing access to the river and riparian vegetation.



Dry times

For Colin, managing stock in the arid zone meant keeping a close eye on their water and observing its permanency in the river.

Colin noted some water holes would go dry after 20 years or so for a short period but then fill up again. The longest he recalls the water holes going dry was during the 2003-2004 drought when he had to cart water for about three months. Prior to this Colin carted water for the stock for about six weeks in 1965 and remembers helping his parents to cart water for a while in 1958 – illustrating the long dry periods that can be experienced in the Paroo.

Benefits of floods

Ron Heinemann remembers how crucial the floods were to maintaining the lakes and off channel areas of the Paroo:

Lake Wyara is a fairly big fresh water lake which the Paroo will run into it during any big flood. It's five miles across. The river will go up to the other lake on the western side, which is a salt lake. I have camped there. And the birdlife that comes in after dark, the noise, the swish of their wings coming in from the salt lake to the freshwater lake to feed - that's something to hear. We're talking about a very wide range of birds.

Pelicans, swans, ibis, you name it. I've flown over twice and the bird life there is colossal. They are obviously coming in to feed on the fish and other things. There'd be a lot of fingerlings.

Floods changed the whole landscape and as the water subsided, Ron knew where to find the fish:

Well, you go along a certain distance and it would be quite a fair water hole. Then there's nothing for miles, only just channels and small water holes that dry up fairly quickly. Right along the Paroo there's a series of larger water holes that are permanent. And it's in those holes that you go fishing that the fish congregate in.

Being a keen fisherman, Ron joined the local fishing club. He recalls restocking native fish into the Warrego River:

In 1985 I joined the fishing association in Cunnamulla. We did put 2 000 Murray cod fingerlings, about three to four inches long in the Warrego River below Cunnamulla. When we let them go, they just dispersed in a flash into the water, out of their plastic bags. And some ten years or so later you'd hear of a 20 to 30 pound cod being caught.

Declaration of Ramsar sites'

Three major wetlands within the Paroo catchment have been protected under the International Ramsar convention, protecting the ecological integrity (flora and fauna diversity, including native fish populations).

One of the wetlands, Currawinya National Park, was included within the International Ramsar Convention in September 1995, and the Nocolche Nature Reserve (approximately 180km west of Bourke) and part of the Paroo - Darling National Park (240km south west of Bourke) were included in September 2007. Their total area within the Paroo catchment covers over 280 000ha.

For more information go to <http://www.environment.gov.au/water/publications/environmental/wetlands/paroo-river-factsheet.html>.



Detail from the interpretive sign at King Charlie's Waterhole, within the Nocolche Nature Reserve. Utilised by Aboriginal people for tens of thousands of years, this waterhole also played an important part in the development of Nocolche Station in the 1880s.

Photo: Greg Ringwood.



Culgoa - Balonne



Source: Pop Peterson.



Source: Robert Worboys. Bob Worboys and wife with cod caught from the 'Garden Hole' in 1951.

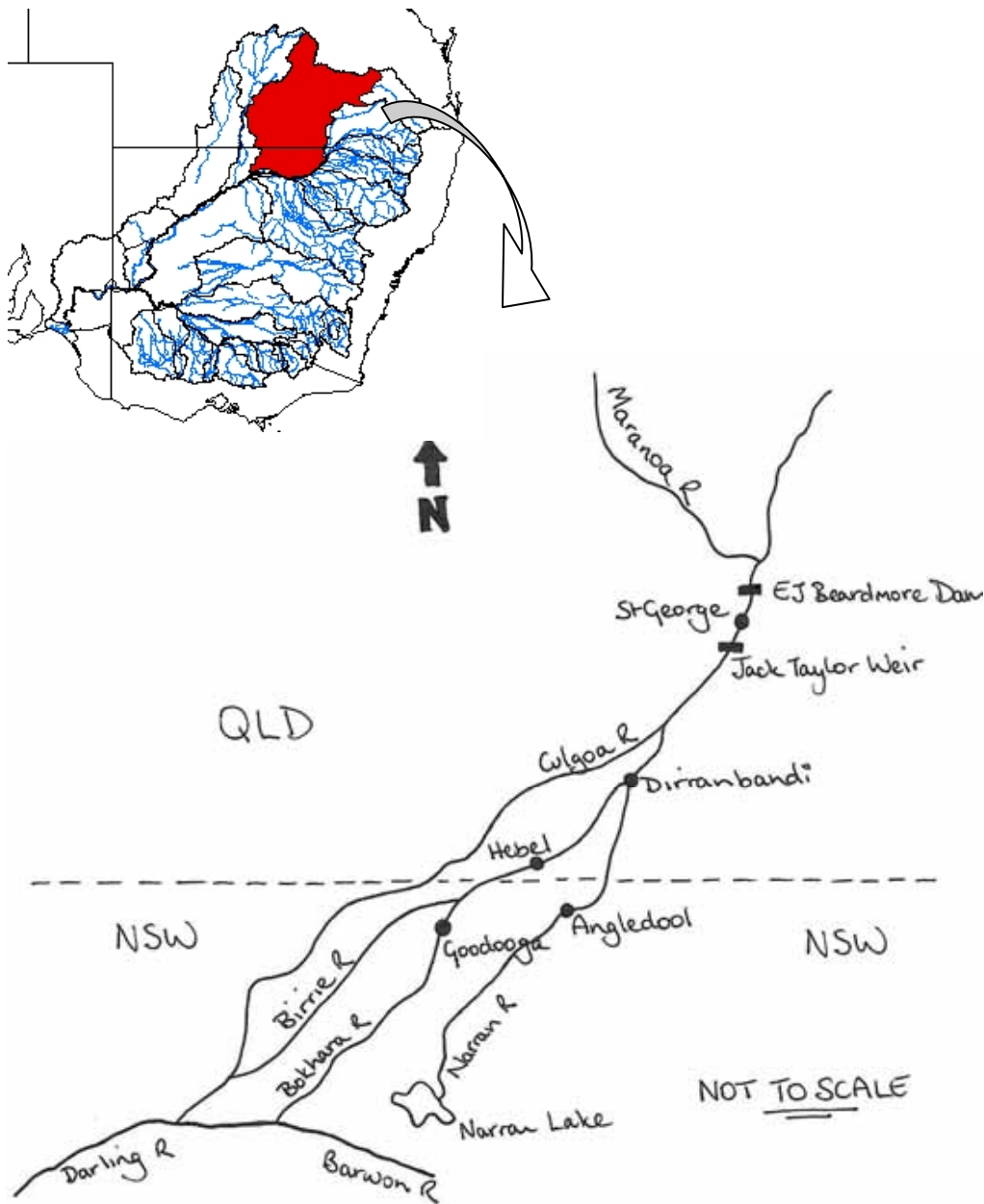


Source: Pop Peterson.



Source: Pat Cross. Children after swimming.





Ned and Lynette Underwood live beside the Balonne River, calling it their “little piece of paradise”. Photos: Greg Ringwood.



Roy and June Barker now live at Lightning Ridge, but both call themselves river people. Photo: Jenni Brammall.

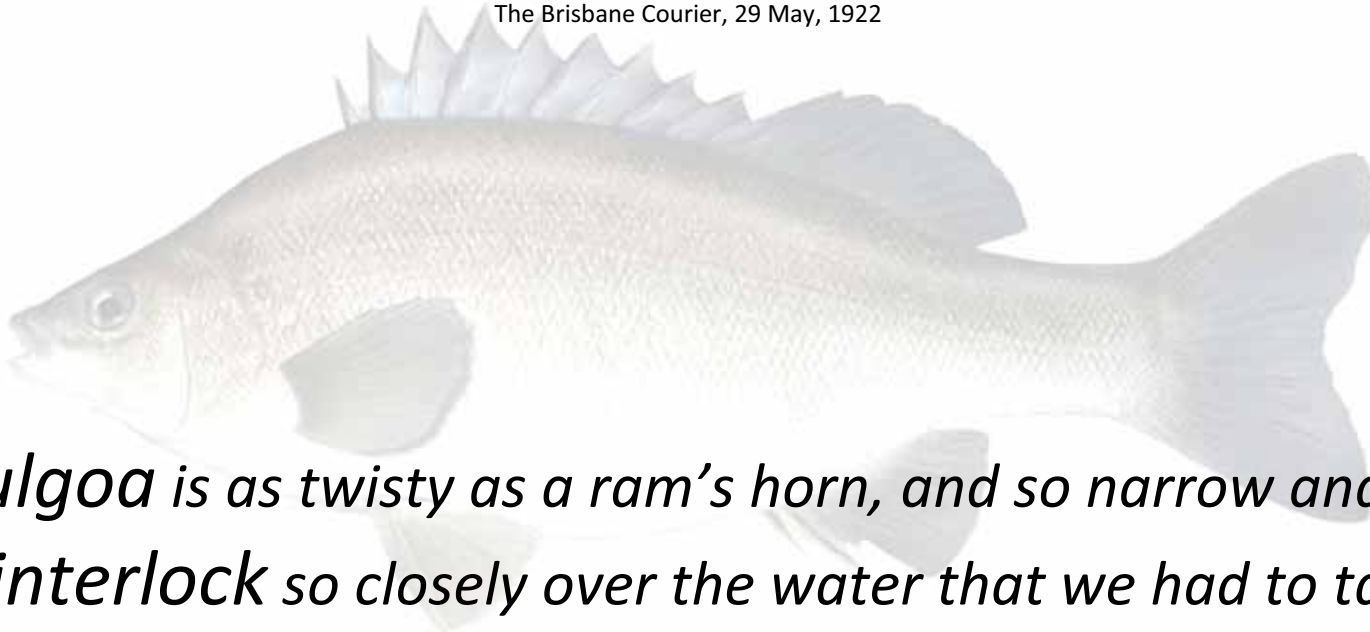


Robert Worboys (left, pictured, in 1957), **Keith Codrington** and **George Thomas** are some of St George’s fishermen. They have fished the Culgoa-Balonne catchment for over 50 years. Photo source: Bob Worboys.

Rory Treweek (right) likes to observe the floods and the way the floodplains get inundated. Photo: Greg Ringwood.

'The Balonne River is well known as the home of the big Murray cod, and this excellent fresh river fish has been biting freely at different periods this year.'

The Brisbane Courier, 29 May, 1922



'The Culgoa is as twisty as a ram's horn, and so narrow and the trees interlock so closely over the water that we had to take down the mast to get along.'

R.C.Minter and R.H. Webster, The Advertiser, 26 May, 1934

Introducing the river and its people

The 123 000 km² catchment of the Culgoa – Balonne Rivers is semi-arid with a highly variable rainfall. The rainfall is reflected in the rivers' flows which often cease for long periods of time, sometimes for up to a few years. During such prolonged droughts only very large waterholes continue to hold water. When the rains are good, the whole floodplain may turn into a slow flowing river around a metre deep.

Geographically the Balonne is an extension of the Condamine River and starts near Glenmorgan. It flows through gently undulating country before reaching an expansive flat plain where it splits and forms several smaller rivers including the Culgoa.

The Culgoa River twists and turns across the floodplain and through coolabah woodlands before flowing into the Darling River between the towns of Brewarrina and Bourke.

These rivers are significant to the Bigambul, Kooma, Muruwari, Gungarri, Mandandanjii and Gamilaroi people who have traditionally lived, fished and told stories about these rivers and the life they support.



The reach of the Culgoa, and its floodplain, adjacent to *Brenda* homestead. Photo source: Pop Petersen.

Shared landscape-shared stories

Several Aboriginal language groups shared the inland delta system created by the branching of the Balonne River. The Bigambul, Kooma, Muruwari, Gungarri, Mandandanjii and Gamilaroi people^{1,2} relied on the rivers' rich resources of fish, mussels, yabbies, birds, aquatic plants and grass seeds to survive³.

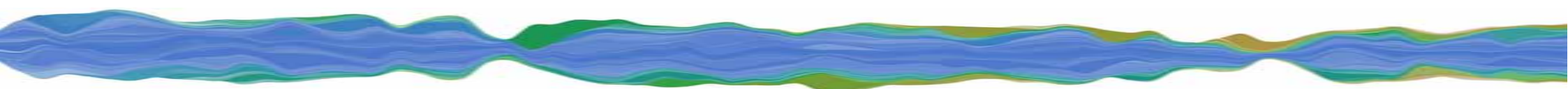
These groups found a way to share this area equally between each other, especially during times of drought when clans would need to move between river systems in order to find water.

This strong connection to the rivers and land meant the rivers have a deep spiritual significance as pathways for important creation stories – variations of which were shared between the groups.

Some of the Aboriginal relationships with the river can still be heard in some of the local town names. For example, Dirranbandi means 'frogs croaking in a swamp at night' and Mungindi was named from a word meaning 'digging for water place' in the local dialect².



A child 'running the flood', celebrating the arrival of the flood's leading edge down the Culgoa River at Weilmoringle. Image source: Merri Gill 1996.¹⁴



The arrival of the Europeans

After the area was first crossed by Major Thomas Mitchell in 1846², the rich alluvial soils drew a steady stream of settlers toward the Culgoa – Balonne.

The first two grazing licences were issued in 1848. The Balonne River floodplain's heavy, sticky, black soils created excellent conditions for pasture growth and forming rich grazing land.

The area soon developed a reputation for its sheep and wool production, and runs of over a million sheep were requested⁴. As the need for workers increased, Aboriginal people gained work as stockmen, allowing them to maintain their connection to Country.

In the early days properties were very large, the smallest being around 10 000 acres to help survive the long droughts. Slow flowing, large floods were seen as a blessing rather than a curse as the floodplains soaked up the water and grew lush nutritious pastures¹.

Water security remained an issue in the early 20th Century. The relatively undisturbed Culgoa – Balonne prior to the 1950s underwent major changes from the 1950s and 1970s and through to the 1990s. Major water storage works were constructed and increased capacity.^{1,2}



'Boating' in washtubs on the river. Photo source: Pat Cross.

As well as private landholder investment, the Queensland Government also constructed the first large dam at St George as a pilot to supply water for irrigation. When the project proved successful, a weir ten times larger than its predecessor was built.¹

The area became a major irrigation area, although, like elsewhere in the Basin, this has come at the cost of problems associated with high native salt loads⁵.

Today the locals continue to use the river for recreational activities including fishing – the residents of St George say it's the fishing capital of inland Queensland⁶.

Weilmoringle waterhole



The Weilmoringle waterhole. Image source: Merri Gill 1996.¹⁵

The Weilmoringle waterhole on the Culgoa River was an important place for the Muruwari people. Its spiritual significance was connected to their rainbow Serpent creation stories.

European settlers were attached to the waterhole's relative reliability and by the 1850s it was being used to water stock. Weirs followed in the 1880s and the first artesian bores were sunk in the 1890s. The pastoral camp grew into a self-contained homestead, with its own butchery and telegraph office.

By the 1970s there were more demands on water than could be met, despite ongoing development of weirs and bores.¹⁵

By 2004, Weilmoringle Station had been purchased by the Aboriginal Lands Trust for the Muruwari People.¹⁶

Ned and Lynette Underwood – belonging to the Balonne



Ned and Lynette Underwood live at Warroo, a sheep and cattle station that Ned's grandfather bought in 1890 after the flood of the same year.

Ned was born on the station, Lynette came to live there after they were married.



Fishing from an early age

Ned was born in 1932 and has fished since he was

about nine years old.

You set your lines, which always had a cork on. You'd see your cork bobbing and hope it disappears then it'd give you a thrill.

Back then Ned used cord line, not the clear nylon used today. Ned doesn't think it matters much.

We'd still catch them on the cord line. I don't think the fish looked at the line. They only looked at the bait.

Ned caught mainly yellowbelly, jewfish and the occasional silver perch, which he calls black bream.

He never caught many cod – the biggest one being 20 pounds. Ned recalls the ease at which he caught a feed:

You'd go down and in a couple of hours you might catch half a dozen fish. A couple of good meals. I used to go every week, sometimes twice a week. You see, it was a good pastime. You know, you made your own pastime in the bush.

Ned soon got to know the best way to prepare and cook his catch:

I'd just fry yellowbelly. Didn't skin them, just scale them. Skinned the jewfish [catfish]. We didn't even bother using the black bream - we usually threw them back into the river. I never tried bony bream. Never caught a bony bream or never heard of anyone catching a bony bream on a line.



Ned at home beside the Balonne. Photo: Greg Ringwood.

Bony bream

(*Nematolosa erebi* – bony herring, pyberry, hairback herring, melon fish, thukari)



Photo: Gunther Schmida.

- Medium sized fish to 47cm, but commonly 12-20cm
- Widespread and abundant throughout the Basin, mostly in lowland rivers
- Hardy fish tolerating high temperatures, high turbidity, high salinity and low dissolved oxygen, but don't like cold water temperatures
- Spawn from October-February in shallow, sandy bays
- Migrates upstream when as small as 2.2cm
- Eats algae, detritus, microalgae and microcrustaceans
- Important food source for large fish (cod, golden perch) as well as birds (pelicans and cormorants)
- Threats include cold water pollution and barriers to fish passage

A little piece of paradise

The river was Ned's little piece of paradise. It always had water, rain or drought. When he was a kid Ned and his family used to go to the river to swim.

We'd have picnics occasionally and we'd all go swimming. We've got about 12 mile of river frontage. There was plenty of water, even in a drought. In the biggest drought you'd never go more than a quarter of a mile without water. The amazing thing was these water holes got down to a certain level in drought and they never went down much further. I think there must have been underground springs keeping them full. We learnt to swim there.

Ned also spent a lot of time in the river with his brother Dick whenever he had the chance.

When we got a bit older, nine or 10, Dick and I would go ourselves every afternoon. We were taught early, be responsible and not to go near the riverbed when the floodwaters were running. So keep back from it. I'd go down there and paddle in, playing in the sand and – it was a wonderful life.

Water baby

Lynette was born in 1931 and, as she says, is one year older and one year wiser than Ned.

Lynette recalls family life on a changing river:

Ned and I lived over the river, at Yarran Downs, when we were first married. When I took my second baby home we had to be boated over the flooded river.

Ned came to learn the easiest – and safest – ways to cross a flooded river:

There are two ways of rowing across the river in a flood. If you angle the boat, the nose of the boat upstream in the water just right, you can go virtually straight across, but you're rowing all the time. If you turn side on the stream will just take you. The other way is to take off and pick a spot down about 50 yards on the other side that's open and just go with the stream.

Shrimp, mussels and middens

Ned recalls that the river had plenty of mussels:

Mussels were fair bait but not as good as shrimp. You used to get them in the river. They're still there, mussels. I don't know if they're in the same quantity.

He used them as bait but prefers to use shrimp as he thinks they are better.

Shrimp

(*Macrobrachium australiense*, *Paratya australiensis* – glass shrimp, *Caridina mccullochi*)



Paratya australiensis. Photo: NSW DPI.

- Three species common in the Murray-Darling Basin, often forming a large proportion of the invertebrate biomass¹²
- *Paratya* and *Macrobrachium* also known from coastal drainage systems and estuaries¹³
- All widely distributed within the Murray-Darling Basin but numbers and species proportions vary between catchments¹²
- Found in different habitats including main river channels, backwaters – associated with submerged vegetation, silt/muddy bottoms and snags¹²
- Feed on decomposing plant material and algae
- Females brood eggs under their tails like yabbies
- Fast growing and breed in Spring/Summer¹³
- *Paratya* and *Caridina* live for 12 months, *Macrobrachium* for 2 years¹³
- Loss of backwaters, floodplains and billabongs are likely to be their biggest threat

I can remember the shrimp bucket, a bit of meat here, down to the river, put your shrimp bucket in. You only had to wait a few minutes and you had a few shrimps.

Mussel middens are also common in the area according to Ned, a reminder of the importance of the river to Aboriginal people.

There are a lot of middens around here too. That was heaps of mussel shell. The Aborigines used to eat the mussels, and where they had their feeds they'd throw them in a pile and they were known as middens.

Straight from the river

Ned and Lynette remember in the early 1900s the water was considered so clean the locals got their drinking water directly from the river ... although you had to be careful. Lynette says:

You had to have a good look first to see there wasn't a dead beast a bit further up.

Ned replies:

It's never killed anyone that I've heard. You'd go down to the river and get a bucket of water. Before about 1940 we had big log over the water hole and we had one of those little hand pumps.

Middens



Midden at Lake Mungo.
Photo: National Archives of Australia
A6135/1.

Mussels were an important part of the aboriginal diet of this area as is evident by the large numbers of shell middens found along the rivers and floodplains. Numerous artefacts, including clay ovens, quarries and scar trees, are also found near the shell middens.

There is evidence of the mussel species within the shell middens changing over time, from a flowing water species towards lake species. Bones found within the middens also show a shift from aquatic foods towards terrestrial animals in more recent times.¹⁴.

Water storages

To improve water security many properties including Warroo, built large dams to catch floodwaters. This allowed for irrigated crops, but as Ned explains, it led to other changes:

In those days there weren't many kangaroos out there and they didn't congregate because there wasn't any permanent water. It wasn't until 1939 that the ring tank was put down in Warroo and there's been a big difference – it's built up the kangaroos. I used to do a lot of kangaroo shooting when I was young and seven or eight kangaroos in a day was good.

Now you'd get seven or eight before breakfast.

It was a beautiful river

The push for improved water storage wasn't just on individual holdings. Beardmore Dam was constructed from 1968-1972 in an effort to open the area to irrigation. The scheme proved very successful but the changes weren't always for the better. Ned recalls:

The river was just a beautiful river. One of the prettiest rivers you'd find anywhere. All up here in Warroo, you'd be seeing sandy reaches and waterholes and plenty of gum trees and tea trees. It's still a nice river. It gets better as you go up. Right here, you might have noticed a lot of dead gum trees and dead tea trees. Soon after the weir came in they started to die. They like to be near water, but they don't like their root system under permanent water.



Drowned trees on the Balonne. Photo: Greg Ringwood.

Roy and June Barker – continuing the traditions



Roy Barker was born on the old Brewarrina Mission in the late 1920s and he lived there until the early 1940s. He is from the Murrawari people on his father's side and the Bogan Wiradjuri people on his mother's side. June was born in 1935 on the Cumragunja Mission on the Tongala (Murray) River. Her father was a Wiradjuri man and her mother was a Yorta Yorta woman.

River people

Both Roy and June call themselves river people. Roy started fishing when he was about 6 or 7 years old. June learned the language, customs, legends and stories of the Ngemba people while she was at the Brewarrina Mission on the Barwon. They spent most of their time near the river.

The beautiful river. Always beautiful clear water, and we'd be fishing every day and swimming. The girls had their special place to swim, and the boys had their place to swim. We weren't allowed to swim together.

And all along the river, the women would be fishing, nearly every day. That was our means of surviving, too.

Hooks like gold

Roy says Aboriginal fishing with line has a long history. Before European contact, he says, the lines were made of spun and waxed possum fur. Hooks were made of shaped bone. By the time he started fishing they were using introduced fish hooks and, as Roy tells it, these were valued possessions:

They were like gold. In the cold winter months some of the old women would throw in and get their line snagged on a log seven or eight feet down under the water. They'd sing out to us, 'Come on, you boys, go and get in there now and try and get our line off'. They'd have a big fire going there for us and we'd strip off, right to our shorts, dive right down and follow the line and unhook the hook off the snag. And we'd come out and warm up by the big fire.

Home made fishing gear was common amongst the non-Aboriginal fishers too in the 1930s and 1940s. Not only hooks made of wire but also the line they used, as Keith Codrington explains:

Those days there was no such thing as nylon line. You bought what they called Irish Linen. It had a two hundred pound breaking-strain.



Roy makes fishing spears, continuing a tradition thousands of years old. Photo source: Roy Barker.

Knowing the fish

By fishing from such an early age Roy got to know the names of the fish and the ways to catch them.

Cod was the Goodoo. Catfish was the Mungulla. Yellowbelly, that's Gulidah.

There are many ways of catching fish and knowing the behaviour of the fish you want to catch helps.

Roy explains how they would catch 'Mulgu':

'Mulgu', he's a small, spotted native fish, something similar to a cod. He never grew any more than about 10 inches long. He used to always be in the weeds. He'd never venture out into the deep water because other fish would grab him. When the bigger fish went off biting in the cool weather we used to cut a big forked stick about 8 feet long, with a fork on the end of it. We'd plunge it down into these weeds, twist the weeds around and it would all gather around the forked stick. We pull the weeds up and get the shrimp and two or three of these Mulgus.

A nibble isn't a nibble

A good fisher knows what fish is biting at the end of the line before it is landed. Roy can tell from the way the fish nibbles the bait.

If he was a cod, he'd just touch the bait for half a second and he was gone with it straight out. A yellowbelly'd nibble at it for a while before he'd take it out slowly. The catfish had another bite, and the black bream, he was a little, quick nibbler. You'd pull the line two, three times, next minute you'd hook him. You'd know exactly when to pull the line and you'd get him nearly every time.

Shrimp were caught by hand. When June was young catching and eating shrimp was part of being by the river.

Mulgu?

(*Mogurnda adspersa* – purple spotted gudgeon)



Photo: Gunther Schmida.

- Other names – Southern purple spotted gudgeon
- Attractive, small robust fish, maximum size 15cm, commonly 6-12cm
- Usually associated with good cover such as rocks and cobble in Qld part of its range, and aquatic vegetation in the southern part
- Found in slow moving or still waters of creeks, rivers, wetlands and billabongs, prefers slower flowing, deeper habitats
- Undergone significant decline in the Basin
- Current distribution limited with records after 1980 from upper catchment in Qld, Macquarie and lower Murray (near Mildura, Vic/NSW, and Murray Bridge, SA – where it was thought extinct)
- Spawn when water temperature is greater than 20C, laid on a rock, log or plants
- Male guards and fans the eggs
- Threats include interactions with alien species (redfin and gambusia) and fluctuating water levels associated with river regulation are thought to be part of the reason for their decline

We'd go with the old aunties and us girls'd sit on a log. You'd dangle your feet in the clear water and feel the shrimps biting you. You go down really slow and grab him. If he was a nice shrimp, you'd just break his head off, peel him and eat him raw. He's sweet - sort of a salty sweet. When you tell the kids this they go 'Yuck'. But that's how it used to be.

Mussels were also common in the river and used as bait as well as food. June remembers:

The old women would say, 'Go and find some bait now, you girls.' You'd go along on the edge of the water, feeling with your feet. You felt a mussel and your toes just rib around him, pull him up.

Roy explains how to cook them – as long they'd been caught when the river was clear, because when the river was muddy they'd have a muddy taste.

They used to cook them on firesticks. You'd get a firestick that was blazing then you'd open your mussels up and you'd put them all along on the firestick.

Subsidising rations

The river has always been an important source of food for Aboriginal people. It became even more important when food on the missions was rationed and agricultural development changed the landscape and the

river. People on the missions struggled to feed themselves properly. Roy says the river provided an alternative.

When the land was taken our people had nowhere to forage for food, they had to depend on government handouts. The introduced animals were much easier to come by than the native animals. We became much skilled at dressing the sheep up in the darkest of nights and be gone with it. So we had to subsidise, if you like, through other means of living besides our rations. The river was one of the main sources of food there at the time, with the fish in abundance, fresh water yabbies, big blue yabbies, shrimp, and things like that.

Some fish are better than others

Catfish was one of Roy's favourites and in the past there were plenty of them to catch.

We used to catch 15 - 20 pound catfish. When the water came down muddy, if there was a big rise in the system upstream, this would stir the catfish up. You'd only catch catfish and no other fish. But they were beautiful eating.

But catfish come with spines. Roy reckons the smaller ones were either more poisonous or the spines were sharper.

They've got three fins, one on the top of the fish's body and two on the side. If it stuck

into you, it would ache all day. You'd cry with the pain. The bigger ones weren't too bad, but the smaller ones seemed to have smaller fins on them or smaller spikes. They were much sharper than a hypodermic needle and went further into you.

For Roy, any fish is good eating except bony bream - that was the one fish they wouldn't eat. Roy explains:

He was full of bones. You could eat him, if you were careful. You had to be very careful or you'd get blooming chocked with bones!

You don't see them anymore

Roy and June remember a river full of plants, insects and birds. Although some are still around, others are either rare or have disappeared completely. Roy remembers water weed, dragonflies, water spiders and some birds, like sand pipers, that they don't see anymore. Of the dragonflies Roy says:

You know, there must be a half a dozen species. We had a little red one, you've got a blue one, which is a bigger fellow. Then you've got another one in between who was a different colour. But that's how they used to breed, down in these weeds under the water, and they'd come up on top then, with the other weeds that were floating, and that's where they'd hatch out, those dragonflies. We don't see them anymore.

A complex system

Rory Treweek, Narran floodplain landholder and fisher, explains the channels that form the Culgoa-Balonne system:

The Culgoa heads down and joins the Barwon Darling between Walgett and Brewarrina.

The Narran then takes off just south of Dirranbandi, and forms the eastern most stream, which terminates in the Narran Lakes, again, between Walgett and Brewarrina.

The Bokhara and the Birrie are the two middle streams. The Bokhara runs into the Barwon River, just downstream from Brewarrina, and the Birrie actually rejoins the Culgoa just before it enters the Barwon.

At the point at which the Culgoa enters the Barwon is actually where that river changes its name from the Barwon to the Darling.



Culgoa River at Brenda Station near Goodooga. The expansive floodplain of the Culgoa-Balonne and its rivers are all interconnected. Photo source: Pop Peterson.

Keith Codrington, George Thomas and Robert Worboys - St George fishermen



Bob with cod caught from the 'Garden Hole' in 1951.
Photo source: Bob Worboys.

St George fishermen Keith Codrington, George Thomas and Robert (Bob) Worboys have been fishing in the Culgoa-Balonne catchment for over 50 years. They have seen many changes in the river and have had a lot of great fishing experiences.

Catching cod

Like a lot of fishermen, cod are one of Keith, George and Bob's favourites. Keith and George remember a story of one particularly crafty cod:

Keith: George Ward used to go fishing and he kept getting his line broken. So he set a hook on the end of a clothes line. Rope. And it broke that. You could see the fish swimming along and dragging this cord behind it.

George: I think eventually they did catch it. I don't know how much it weighed but it was breaking all their lines. Actually broke a clothes line, broke.

Bob says back before nylon line was invented, you had to use all sorts of different materials.

In those days there was no such thing as nylon line. You bought what they called Irish Linen which was braided and had a two hundred pound breaking strain.

And what you did with the fish when there was no refrigeration.

The biggest fish I caught was up at the junction. Took me about an hour get him and I had him tethered two days. He dressed over seventy pounds.

Clear water

When he was young Keith remembers how the river would clear over spring and into summer. Clear water meant spinners could be used at a popular fishing spot called the 'Garden Hole' - a large hole in the river south of Beardmore Dam.

The water probably started clearing about September, then you could spin through until

about January. You'd catch cod, anything, any size at all, catch 'em up to fifty pounds, sixty pounds.

Spinners have long been a popular way of catching fish - the flashing of the blades attracting the fish. But, as Keith says, the fish have to be able to see the flash:

You gotta have clear water. Olden days you could see down 6 or 8 foot. You could see the cod laying down on the log sometimes if you were lucky enough.

Bob also remembers having no trouble catching a feed or being able to see great sights underwater at times but laments these times may have passed.

Years ago you could go down to the river and if you had a tin of worms you'd have no trouble catching a bag of jewfish or black bream. When the river was clear, you'd go down and you'd see shoals of them. 300 fish, maybe more not no more.

Rory Treweeke, another local fisherman and keen observer, has noted a certain order to the way the rivers cleared:

Certainly in my lifetime the Culgoa seemed to be the river that became clear enough for spinning first. On occasions some of the big waterholes in the Narran would be the same.

Muddy water

While Keith, George and Bob remember the river as having clear water, over the years turbidity has become a problem. George thinks that is due to introduction of carp.

If we didn't have a lot of rain for 2 to 3 months, it'd get that clear you could see the bottom of the river. Now since the carp have come up this far I have never seen the water clear like that ever. And how long since that? About 1950s the carp came.

Bob also believes there is a link between the arrival of carp and the loss of water clarity.

Before the carp came I've seen this river run to 39 feet deep. Not once, but a few times. Once the flow settled down, then after a couple of months it'd clear. Never cleared since the carp've been here.

But for Keith, the problem is a bit more complicated. Other things contribute to the problem of silting and turbidity he says.

It could be the carp. They probably have a big bearing on it. The other thing is we've got the structures across the river length. Before building of the weirs, there used to be little flows that came through, like a little brook and it sort of cleared and was kept cleared. But with the structures, when it comes down and if the turbidity is still there, it doesn't really matter. You know I'm still at a loss to

say whether its nutrients in the water, it's the carp, or the actual flow of the river itself.

Shifting sands

Changes in the river are sometimes evident over a long time frame – others happen quite quickly. One of the changes observed by George was associated with construction of the Jack Taylor Weir in about 1953 and its impact on water flows. George saw an immediate change in the river below their house:

In the middle of the river below our house was a sand island with two trees, probably eight or nine inches through. We could see the tops of the trees and used to gauge how high a flood was by the trees. I remember the first flood after the Jack Taylor Weir was built. We were waiting for the trees to show up and they didn't. The whole island and all the trees and everything were completely washed away. After that first flood that island vanished. It's never been there since.

Keith has seen some of waterholes completely filled with sand, which he thinks is also probably due to the Jack Taylor Weir.

Mainly you'll find that in the lower reaches, at the bottom of the dam, especially at the Jack Taylor Weir, the sand has just shifted and it's only from the weight and current.

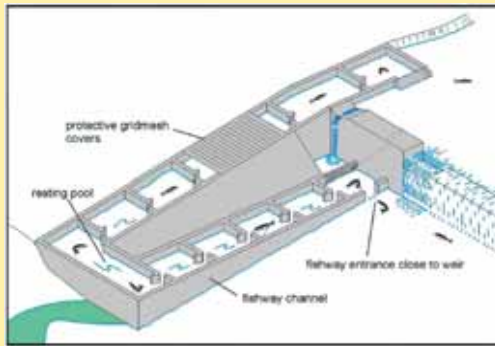
Dam impacts on fish



Beardmore Dam (pictured) and Jack Taylor Weir have both changed the Balonne. Photo: Hamish Sewell.

- Native fish have evolved to breed when there are 'freshes' (flows)
- Dams modify the pattern and seasonality of water flows and even out the flows, so fish don't get the signals to breed
- Fish, such as Murray cod and golden perch, migrate to breed - if they are able to, these fish can travel hundreds of kilometres
- Dams and weirs interrupt fish migration
- A dam wall and height difference created in water levels up and downstream mean dams are impassable barriers to our native fish
- Fish need a temperature signal to spawn
- Water released from large dams can lower the temperature of the river for hundreds of kilometres downstream. Known as 'cold water pollution' this also disrupts native fish breeding

Fishways (fish ladders)



Vertical slot fishway. Image: NSW DPI.

- Fishways allow upstream fish passage past low level weirs that are less than 6m high
- Fishways act to overcome the height difference in water levels up and downstream of a dam by providing a gentle gradient using a series of small rises and resting pools, allowing fish to “step” their way up and over the barrier
- There are various fishway designs, the most common in the Murray-Darling is the vertical slot. Vertical slot fishways comprise of a series of concrete boxes – each slightly higher than the previous - that hold water to create pools
- A slot at either end of each box controls the amount of water passing through and water height difference between successive boxes
- Fish must swim fast as water falls through each slot, being able to rest after reaching the next pool
- Fishways can be designed to suit the swimming ability of particular fish species present

The sediment is just picked up and moved and it might almost envelop or fill in a hole that was once twenty or thirty foot deep. After the flood, it absolutely changed the whole face of that hole. There may not even be a hole there. And when I’m talking holes, they could be anything from fifty to a hundred yards long. But they’ve filled up with sand.

Bob notes that some of the damage downstream of Jack Taylor Weir may have been due to the way the water was managed in the early days:

Down below the weir, when they used to manipulate the water and dropped it from 100 thousand down to 40 thousand megalitres, that’d let everything just drop underneath: fall. The big trees would drop. And the next thing you knew the holes were getting clogged up with sand.

Carp

Although not willing to completely blame carp for the water quality issues, Keith thinks carp is the major culprit for the loss of the aquatic weeds.

Where there used to be weeds up the river – they’re not there no more. The carp must’ve chewed them out. The problem with the carp is that they’re bottom feeders. So if you’ve got a bank with a straight drop off, I’ve seen

them there by the hundreds and they’re just nosing at the bank and sucking at the bank.

Roy Barker also believes the river at Brewarrina has changed over the years, particularly due to the introduction of carp.

Whenever we go down there now to Brewarrina, the river looks dead to us. There’s no life in it. And the weeds are all gone. We believe this is so through the introduction of the European carp. In my view, carp have done more damage than the rabbits. They’ve undermined the big gum trees, and once these trees fall in, they take a quarter of an acre of bank with them, which is clogging the system up.

Roy believes that carp not only impact the river by creating erosion but also by affecting the native fish.

They’ve cleaned all the native fish eggs up and the fingerlings of the small fish that used to exist there in the thousands. We’d see thousands of these native fingerlings in a school of fish coming up the river. But, I think, they no longer exist. The native fish must be very good fish to exist or to go through that dark period of time and still be around today. Perhaps not so many, but they had a resistance, especially the cod and our yellowbelly.

Like Roy, George Thomas thinks the effects of carp aren't limited to turbidity and recalls noticing an immediate change in the sandfly population just after carp were noticed in the area:

After a big flood when the river went down and left the banks all muddy we used to get plagues of sandflies. This particular year, just after the carp were known to be in the river, I can remember the river went down and we didn't have any sandflies. I went down in front of our place and in amongst the grass and all amongst the banks it used to be a sheet of mud. This time it was just completely taken up with little craters. I think it was the European carp burrowing down in the mud, sifting through it, and taking out the sandfly eggs because we didn't have any sandflies that year. That's the only reason I can see for it. The whole bank was just a mass of these little craters.



Mick Collier with cod caught in 1939. Photo source: Bob Worboys.

Carp - FAQs

(*Cyprinus carpio* - European carp, koi carp)

In the 1960s the strain of carp, 'Boolarra', was introduced illegally to Victoria and spread rapidly to all waterways of the Basin.



Can carp survive in mud or salt water?

No, carp cannot live in mud. They can tolerate a wide range of extremes conditions, including very low dissolved oxygen levels and half seawater salinity.

Are carp eggs carried by bird's feet and able to survive to be fertilised at any time?

No. Carp eggs only survive out of water for a short time and are usually attached to plants. Unfertilised eggs soon die.

Do carp undermine river banks and cause trees to fall into rivers?

Carp feed by sucking sediment into mouth, removing food (eg, insect larvae, crustaceans and some plant material), and expelling sediment out through gills. There is no evidence that they undermine banks.

Do carp eat native fish and eggs?

Carp may eat small numbers of eggs or larvae but these are likely to be taken incidentally. Carp are thought to increase turbidity and to compete with native fish for space and food.⁷

History of Carp FAQ

Why were carp brought into Australia?

During the early days of settlement many different types of animals and plants were introduced into Australia in an attempt to imitate a European environment. Carp were seen as a good sport and food fish.

When did carp arrive in Australia?

The first records of carp in Australia were from Victoria in 1859 and NSW in 1865 where they were released into ponds. During the 1900s carp were released into the wild but did not become widespread.

Many early newspaper accounts in the Basin around the turn of the 20th Century refer to carp being widespread and abundant, however these reports are referring to 'golden carp' or goldfish (*Carassius auratus*).

Carp spread in the Basin after they were released into the Murray at Mildura in 1964. Their release and spread coincided with widespread flooding in the early 1970s, but their use as live bait probably also helped.

Is there just one type of carp?

There are many species of carp, and the fish is widely farmed overseas for food. In Australia there are at least three strains of the one species, *Cyprinus carpio*.

Genetic studies have shown there were two strains in Australia prior to their expansion in 1964: the 'Prospect' strain in Sydney and 'Yanco' strain in the Murrumbidgee Irrigation Area. However it is the 'Boolarra' strain from a farm in Gippsland that was released at Mildura and is now the most wide spread⁷.

Rory Treweek – river observer



Rory was born in the early 1940s and from the mid-1940s has lived on the Narran floodplains just north of the Queensland – New South Wales border. He owns *Angledool*, a large property in the area. When Rory was young he loved the river and

the fish. He completed part of his education through correspondence which meant he was able to go to the river and fish regularly.

When I was a kid living at home doing correspondence I used to do quite a bit of fishing. Nothing sophisticated in terms of equipment. Just a hand line, with a hook and a sinker and probably a worm as bait. Yellowbelly and catfish were the main two that we were after and they seemed to be readily available, from memory, at the time.

Rory found excuses to go fishing in the intermittently flowing river or in one of the permanent water holes. He was rarely short of other willing fishers to go with.

I remember frequenting the river a lot when the shearing team was at home because the wool presser and a couple of other shearers thoroughly enjoyed fishing and I used to go with them.

They only took what was needed for a meal. It was a mile walk from the house to the nearest waterhole, so they'd carry the fish home in a sugarbag – being careful to avoid catfish spines poking through!

The elusive ones

A probable reason yellowbelly and catfish were favoured was discovered after talking with other fishermen.

Cod have always been the elusive one to catch and from talking to fisherman who love going after cod, there are only certain years when they seem to be able to get them, generally in winter time, after a series of pretty hard frosts. Now what the connection is, I don't know, but that seems to be the case.

Sweet water

Although the Narran can have a lot of sediment, it is, according to Rory, good to drink. Rory knows how to use 'kopai soil' - a local soil that has a particular chemical in it which settles out the suspended sediments. Rory recounts how Aboriginal people would also use ash to settle the sediment, clearing the water for drinking:

The Aboriginals used to sometimes burn gidgee down to ash, then use the ash to settle the water. They'd put it in a container and use the water for drinking.

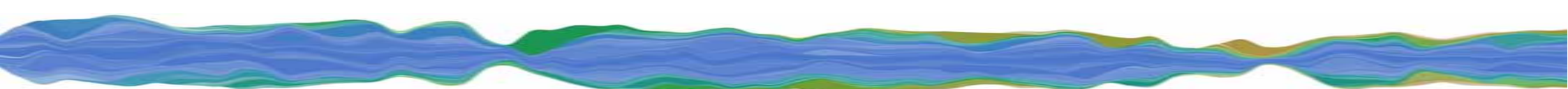
Rory thinks the water is drinkable as it is:

I'm quite happy to drink river water. No problem. River water has a very pleasant, very sweet flavour. We don't have salinity issues in this river system. As far as I'm aware, chemical residues are virtually non-existent. So it very sweet water to drink.

A different system

One of Rory's interests is observing the way rivers flow and floodplains get inundated with water.

It's interesting that one of the productive and environmental strengths of this system is that once these rivers get out onto the flood plain, they tend to vary very much in the size of the main channel. The majority of rivers, as they go further towards the ocean, generally tend to get a bigger main bed of the river. These don't. These fluctuate. Sometimes they actually contract as they go further down the system, which means that the water spills out over onto the adjacent floodplain at much lower levels than they otherwise would.



Cleansing

The years Rory has spent observing the floodplain and its rivers has given him an appreciation of the good times and the bad.

Droughts are a necessity in our environment. They actually can have a cleansing, cathartic impact on the environment. In a commercial sense it's very difficult to manage through them. But they are part of what we have to live with and the sooner people realise that drought is likely to dominate one's life in these areas; the easier you will find to manage the country.

... Rebirth

Although in many parts of the country flooding is considered to be potentially disastrous, regular flooding is considered necessary in this part of the country.

I know that in the southern part of the Murray-Darling Basin, it's highly regulated and people probably do not want floods on their country. We look forward to floods here. They are the regeneration, the rebirth of the countryside. They replenish the moisture stores in our grazing land and in the floodplain areas that we crop. Floods in the public's mind are very often associated with damage and mayhem. Not out here.

Rory notes the link between the rivers and floodplain:

Our rivers are intimately connected to the floodplain. They need the floodplain to draw nutrients from. The floodplain is a place where a lot of the fish and other creatures do their breeding. So if you deny flooding to the floodplain, you will impact negatively on the health of the river.



The Cross family at the Angledool Weir on the Narran River. Photo source: Pat Cross.

Changes in flow

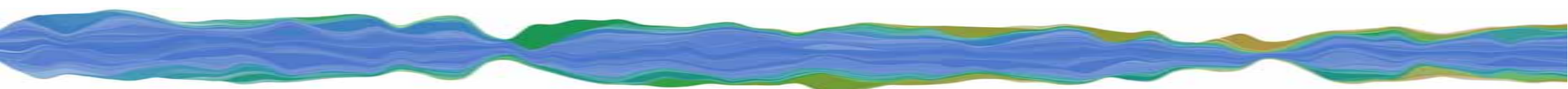
Rory has observed some major changes in the flow behaviour of the Narran River over the years. Some of the changes are associated with the development of upstream irrigation, which means the extraction of water from flows that would otherwise have come through unimpeded.

That has had a drastic impact – particularly the small and medium floods that we used to get. 2004 was the starkest example of that. A flow came through St George that, prior to development, we would have expected probably 4 to 5000 acres of flooded country. On that particular occasion, the water was flat out half filling the main channel. So it didn't get anywhere near spilling out onto the floodplain.

A long river to travel

It's not only the flow that has changed while Rory has lived on the Narran. Rory has observed newcomers to the area and the impacts on the native fish.

It's interesting that the European carp came into our system in the 1974 flood. They made a gigantic leap from somewhere down the bottom end of the Darling, right up to Dirranbandi-St George area and then came back down our system. The immediate effect was what appeared to be the total demise of catfish. There was a period for 15 – 20 years when they virtually seemed to have disappeared. But, over the last decade, catfish have certainly made a recovery. It's interesting that – and I'm no expert on fish – it would appear that the native fish have made some adjustment to the presence of the European carp.



Weeds, weeds and weeds

Other newcomers Rory has observed arriving in the area include plants called knotweed, parkinsonia and lippia.

We've got one thing called knotweed at the moment. It's built up over the last 10 or 15 years. It grows along the banks but spreads out into the water, is vigorous growing, covers the surface and is a pain in the neck. We know that there have been outbreaks of lippia here. I haven't seen any since this last flood, so I'll be interested to see whether it comes again. We saw it back in the mid-2000s, but with the drought here since, it hasn't poked its head up. We keep an eye out for it. We do have some parkinsonia. They're a very prickly bush and look a little bit like prickly acacia. We're bringing that under control by repeated poisoning of any new outbreaks. Unfortunately, the seeds remain viable for decades, so it's going to be a constant watching job probably for the next 20 or 30 years.

The love of the river

Even with the changes he has seen, Rory still counts his blessings, although his appreciation of the river is different to when he was boy.

As a kid, I think you're interested in the results of your fishing. Like most kids, I was impatient to catch something. I suspect that the contemplative value probably come as you get older. There is nothing more pleasant than just lying down on the bank of a river and listening – even if the river's not running. Just listening to the wind through the trees, listening to the birds. Watching some of the cranes, the herons, and everything else going about their business of picking up whatever it is they're interested in at the time.

Here on Angledool we're lucky: we have an ephemeral lake and it's a superb piece of country. It filled for the first time for 16 years in the floods earlier this year. We've had swans and pelicans nesting there, we've had waders, ducks, egrets, terns, even the odd seagulls. It's a lovely area to visit.



A sea of slender knotweed in flower on the Murray floodplain. Photo: Murray-Darling Freshwater Research Centre.

Weeds, weeds and weeds

(*Parkinsonia aculeate* – parkinsonia, *Phyla canescens* – lippia and *Persicaria* spp. - knotweed)



Parkinsonia (left) and lippia (right). Photos: http://www.dpi.qld.gov.au/4790_7332.htm and Milly Hobson.

Parkinsonia is a Class 2 pest plant in Qld, a Weed of National Significance and one of northern Australia's worst weeds. It is a flowering thorny shrub or small tree (to 10m) that forms dense thickets along and in waterways. Can be confused with species like native prickly acacia. Prevention of its spread is difficult as seeds are dispersed by water. Sightings should be reported and control is required by landholders.⁸

Lippia is a flowering groundcover, well adapted to floodplains and is extremely difficult to control. Lippia prevents the growth of other species by outcompeting them and quickly forming dense mats.⁹

Knotweed is the collective name for a number of species in the genus *Persicaria* that are native to Australia and other countries around the world. Several species are found in the Murray-Darling Basin and grow in wetlands and along river channels where they can grow into the water, forming dense mats and causing issues for irrigation infrastructure.¹⁰

Making connections

Legends protecting the young

To Aboriginal people the river hasn't only been a source of food and water – it was a social gathering place. But, as Roy Barker explains, the river has always been used according to the customs.

Some of the mythical stories told by the old people kept the kids in order. One story goes that we've got a place, a deep waterhole there in the Barwon, they call it the Mirriguna. Now Mirri means dog, in the Ngemba, and guna means hole, the water hole, big waterhole. At the moment this Mirriooligun comes out of the Mirriguna, he's the size of a domestic cat. As he goes up the bank he grows in size to a shetland pony. He was known because there's a mythical time to go home, that existed there, with the Mirrioola, there, at the time. And the voice sung out, "Time to go home." Of course, we never, ever heard that voice. Just before the sun got to tree top level, or perhaps the tree top level, late in the afternoons, someone would get a premonition, and sing out, "Time to go home." And we'd be gone.

Roy believes there is a more practical reason behind the legend. It is to protect children from unnecessary danger.

Even though it was a mythical story, the idea was to keep the kids out of danger before nightfall. When the whites first come into those areas there were cases of non-Aboriginal children being lost and drowned in that river system. But in all the years that we lived there, there was never any kids lost in the bush country, or any kids drowned. Even though it was a mythical dreamtime story, it was a good one.

Making a bark canoe

Trees scarred from making bark canoes are all along the river, but not always where you'd expect as Roy explains:

But wherever you go in the bush country, even miles and miles from any river country, any river, you'll see these scarred trees, these canoe trees, that are cut. They must have got torrential rains at that period of time and the country became flooded, miles from any river, so they cut them down on the spur of the moment and crossed the flooded country this way to another sandhill where there was wildlife. I couldn't see them carrying their bark canoes 10 or 12 feet long, 20 to 30 miles to any river.

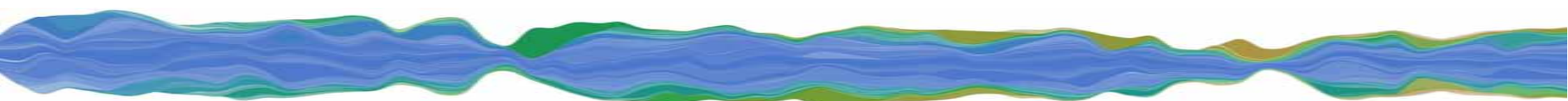
Roy is one of those who still know how to make the bark canoes.

Two years ago, my two boys and I cut two big bark canoes, one for the National Museum in Canberra, and one for the Australian Museum in Sydney. That's the first time a canoe had been cut on the river country for 70 years. Our people cut the canoes from the straight river gums. There's only a certain time of the year when the sap is running that you can get that bark off. The moment you cut around there and break what we call the seal, that's the seal right around, and put a few wedges in, you can lift the bark off real easy. In the hot summer months is virtually impossible to get the bark off without breaking the bark up.

The whole town is fishing

According to Rory Treweek, fishing and the river has always been a very important part of the social wellbeing at Angledool and Goodooga – a way of teaching children about the river.

The shearers knew where the waterhole was. I remember talking to one of the shearers from Goodooga who was saying that the relaxation for the town when the shearers came back from wherever they'd been working, would be to go down onto the Culgoa and spend the weekend fishing.



The majority of those people were Aboriginal. That was their way of continuing their connection with the country. Fishing was not only a good food source for them, but a way of being able to impart their knowledge onto their kids and just also spend a very pleasant weekend on the riverbank, enjoying the fishing.

Margaret (Pop) and Peter Peterson, who managed *Brenda Station* at Goodooga on the Culgoa for 27 years saw that the river was also vital to wildlife as well.

We used to notice wallabies on the other bank from the house, in a drought, would pull the duckweed in. And when they had a pile they'd sit there and eat it then they'd pull another pile in. Because we were on the other side of the river we could see that this was happening. It was a little swamp wallaby that used to do it fairly regularly.

As irrigation development blossomed around them, they also noticed the changes in the river, especially during flood times. Pop explains:

You still get the water flood at the same time. But the duration of the flood being on the country was dramatically limited because the water upstream was being taken into storage all the time. The water had to reach a certain height before irrigators were allowed to take water, but once it got above

a certain height it was just free for all. That's when you just didn't have that peak for very long any more which was a shame because it would be on the country and off again and it didn't really have much time to soak in. Especially on the extremities.

Rory Treweek believes some of the floodplain vegetation is suffering as a result, whereas others are okay for now:

The vegetation, depending on where it is on the floodplain and what the return interval is, has adapted to that regime. Where the small floods have been denied because of water extraction upstream, there has been a lot of coolabah killed, simply because of the lack of water. In the intermediate areas, there are signs of it dying, but some are holding on. Out on the areas that only get a flood once every 10 or 15 years, the vegetation, including the coolababs, is still quite healthy.

Rory reflects that, for the Narran, it's lucky the river was not as desirable to the early boating industry.

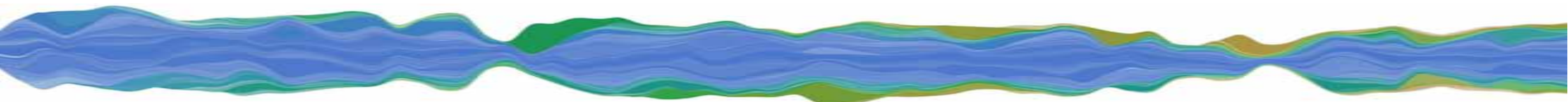
It's never been a navigable river. So what snags were there, have stayed there. And, from that point of view, very good fish habitat, particularly in the large waterholes that are a natural refuge during the drought



Culgoa River at *Brenda Station*, Goodooga, during a dry spell. Photo source: Pop Peterson.



Culgoa River at *Brenda Station*, Goodooga, during flood. Photo source: Pop Peterson.



Visions for the Culgoa-Balonne

The people who contributed to this project have all talked about their hopes for the future of the river. Many felt they had seen some improvements but most don't feel the river is as healthy yet as they would like to see it. Each of these people suggested ways to help the river and in turn help provide healthy habitats for fish.

Managing the flows

Like other landholders in the area Rory Treweek is concerned about the amount of water being extracted for irrigation. Rory believes the finger of blame often gets pointed at particular industries like rice in the south or cotton in the north, but thinks there is a better way to look at water allocation:

Our water gets extracted by private irrigators who put it into large on-farm storages, which they irrigate from. Our main concern is that the Queensland Government has permitted far too much extraction on this system. I don't think it's a matter of a particular industry, it's a matter of understanding how much water can be extracted from a river system before you damage its ecological functioning.



Floodplain vegetation on the Balonne at Warroo Station. Photo: Greg Ringwood.

Rory also realises that better river management can also start at home.

What I would ultimately like to do would be to fence the river off from stock drinking on it, because stock don't have a good impact on the river banks and areas there. Cattle in particular tend to wander into the waterholes and defecate and urinate in it and puddle them up, which is not good. We have a pretty extensive frontage, so it's not a cheap exercise to do, but ultimately, I would like to fence off the river and provide water for stock so that the banks of the river and the riparian zone don't get impacted.

As part of a study on the economic and social impacts of reduced irrigation water in the Balonne Shire in 2010, one Aboriginal resident said it's important to find a balance:

We've got to look after it. It's our life, so we shouldn't be greedy about how much we take out. We need jobs but we need the river to be healthy, too.⁶

State of river: 'moderate'

The Sustainable Rivers Audit (SRA) is an ongoing and systematic assessment of river health for 23 major river valleys in the MDB. Environmental indicators include hydrology, fish and macroinvertebrates, which are monitored and will highlight trends over time.¹¹

The Culgoa – Balonne was surveyed as part of the Condamine Valley survey in 2005.

In the 'Lowland Zone' of the Condamine Valley fish community and Ecosystem Health were considered to be in Moderate Condition. 50% of predicted native species were caught, alien fish were widespread and comprised just over half fish biomass (56%).

Bony herring, Australian smelt, golden perch, Murray-Darling rainbowfish were numerous. Carp gudgeon and spangled perch were also common. Three alien species, eastern gambusia, carp, and goldfish, were captured.



Upper Condamine



Source: Dessie Obst.



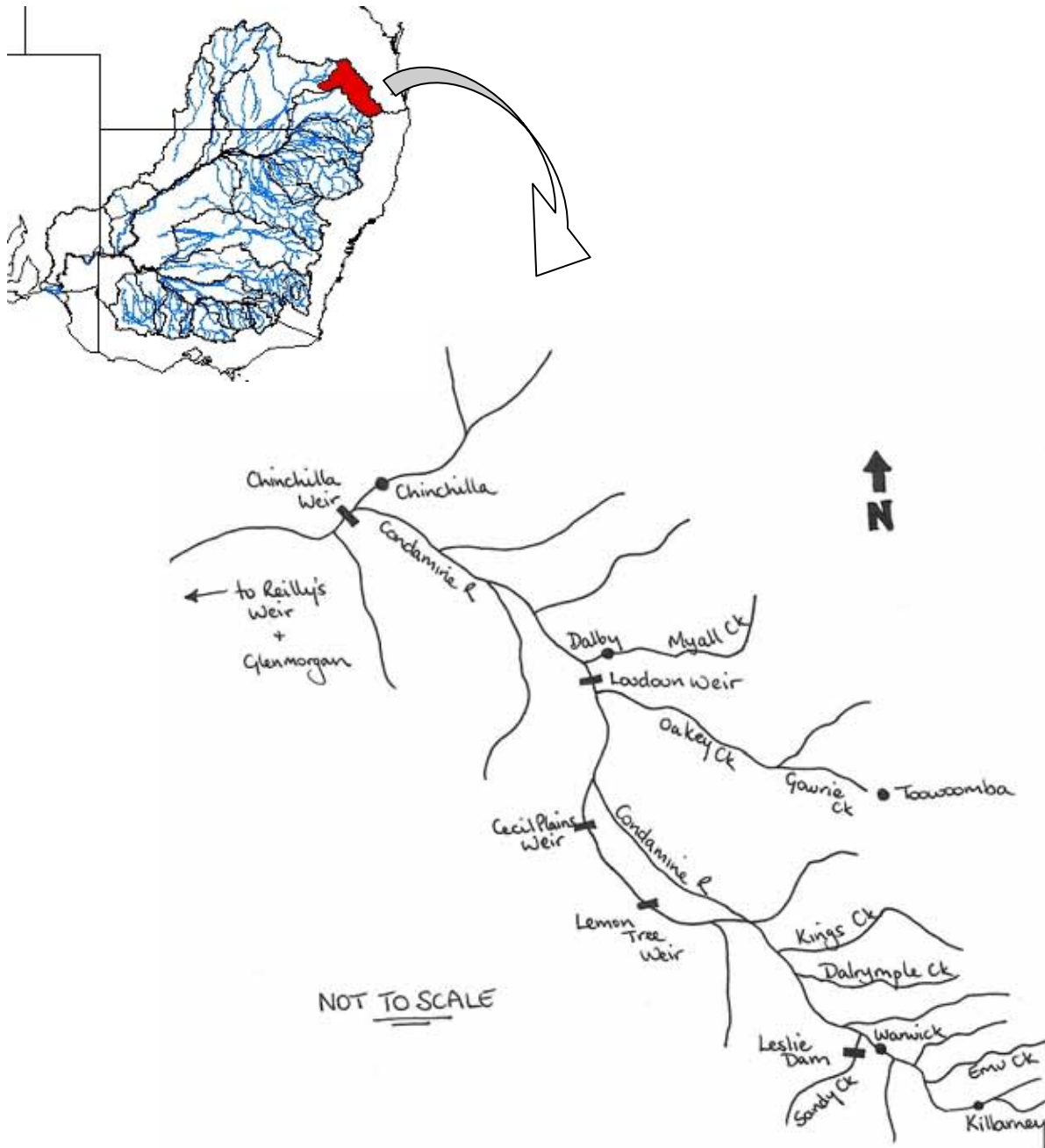
Source: Geoff Reilly.



Source: Greg Ringwood.

Source: Greg Ringwood.





Brian Kuhn has been a resident, fisherman, fish stocking club member and Fishcare volunteer. More recently Brian has been involved in river restoration projects. Photo: Greg Ringwood.



Olive and Ray Shooter have lived on Dalrymple Creek for 48 and over 77 years respectively. In their younger years their lives revolved around the creek. Photo: Greg Ringwood.

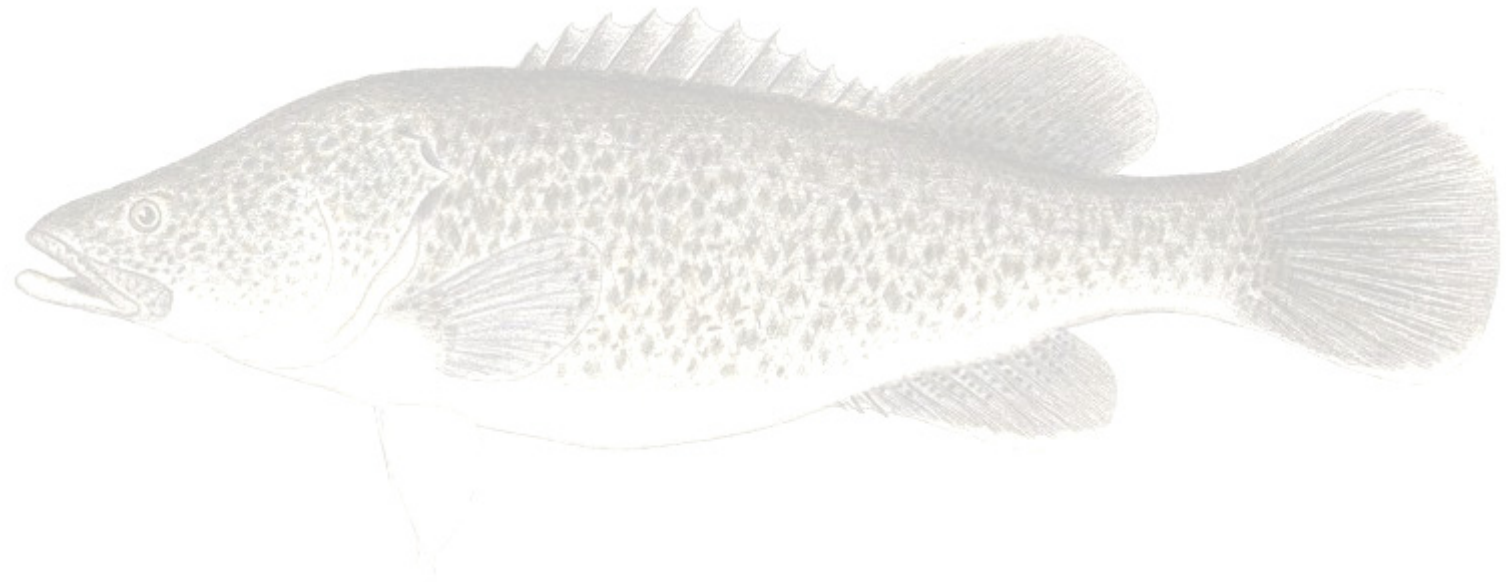


Sam Bonner, Githabul Elder, is passionate about the Condamine. Sam is keen to pass on his traditional and environmental knowledge on to the children, to show them what the river means to him and his people. Photo: Greg Ringwood.



Noal Kuhl is a keen fisherman and fishing journalist. He is involved in the local fish stocking club and has undertaken local historical research to guide many river restoration projects in his area. Photo: Greg Ringwood.

The Condamine- a river system not just a channel, much of its water is underground you only see its power after a sudden downpour reinvigorates it.³



Introducing the river and its people

The Condamine River rises in the Border Ranges then makes its way along the eastern part of the Darling Downs region in Southern Queensland, becoming the Balonne River near Glenmorgan. The 13 000km² catchment is one of the major tributaries of the Darling River System.

Twenty thousand years ago, the Barunggam, Bigambul, Giabal, Kambuwal, Githabul and Jarowair people knew a very different Condamine River: a cooler climate, different plants and animals and, most importantly, a river that flowed year round. With much of the water in the Condamine River flowing underground, spring fed creeks and waterholes were permanent water sources utilised by fish and people alike.

Once upon a time

Prior to the European settlement there were at least eight Aboriginal clans in the Upper-Condamine catchment. These Aboriginal clans have a strong spiritual connection with the Condamine River. The Barunggam people believe that the Great Rainbow Serpent called *Gaiwar* carved out the rivers, creeks and lakes during its journey across the earth.

The Githabul people called the Rainbow Serpent *Mochel Mochel* and believe that it lived in the waterholes around Warwick. For the Githabul people swimming in the river was associated with strict rules. The genders were segregated and allocated separate times. Some water holes were also used for initiation ceremonies that were out of bound to the opposite sex³.

The Upper Condamine was rich in fish, freshwater turtles, shellfish and waterfowl as well as a triennial bumper crop of bunya nuts. The clans would gather every three years in the Bunya Mountains, north of Dalby, from May to November, for the bunya nut harvest.² European records of multi-clan Aboriginal gathering go back to 1866 when 400 – 500 individuals from Barunggam, Bigambul, Dalla, Giabal, Jagara and the Jarowair people gathered along Lake Broadwater near Dalby.

Nardoo, a plant which grows in the shallow margins of billabongs along the Condamine, was ground to make a type of pancake. The bulbs of the native leek and water lilies were used as vegetables³.

The banks of the Condamine River and its tributaries also provided the Aboriginal peoples with the fruits of ruby saltbush, native lime, winter apple and sandalwood. The richness of the Upper Condamine allowed local clans to trade with the clans from other catchments.

Although there have been some changes over the years, traditions associated with the river are as vivid now as they were before the arrival of the Europeans. As Sam Bonner, Githabul Elder, points out:

In past times aboriginals were required to remove rubbish from the river leaving it clean and tidy as they found it.



A creek in the upper Condamine River catchment with intact riparian vegetation. Photo: Condamine Alliance.

The arrival of the Europeans

The first European explorer in the area, Alan Cunningham, travelled through the catchment in 1827, naming the Darling Downs after the governor of NSW, Sir Ralph Darling. During the 1840s, the early settlers established several grazing enterprises. More settlements were encouraged after Queensland became a state in 1859, and legislation was passed to subdivide large pastoral establishments into smaller blocks to increase population².

The area witnessed a significant increase in the regions agricultural economy as the cropping and dairy industries expanded.

The Leslie Dam, south west of Warwick, was constructed in 1964 with a water storage capacity of 47 000 ML. It was later modified to increase its water holding capacity to support the irrigation industry.

Nowadays the river waters one of the richest agricultural areas in Queensland. The average annual rainfall is in excess of 600mm, mainly falling during the summer months. Alluvial flats adjacent to and east of the Condamine are fertile and particularly suited to cropping.

Intensive land use and development has resulted in a very different river to that of years ago. Water extractions and weirs have resulted in reduced high flows, minor changes to seasonality and variability and a reduction in annual water volumes within the Condamine. Reduced flows and nutrient runoff have also increased the incidence of blue-green algal blooms in the system.

The extensive floodplains are easily eroded and with the arrival of hooved stock the Condamine River changed and now the catchment is degraded significantly. Over 60% of the aquatic habitat is now considered in poor condition.

The River Improvement Trust



Photo: Greg Ringwood.

The River Improvement Trust is a statutory authority constituted under the *River Improvement Trust Act 1940* to protect and improve rivers, repair and prevent damage to rivers and prevent or mitigate flooding of land by riverine flood.

The primary role of the Trust is to plan, design, finance, undertake and maintain stream improvement works for the benefit of the community within its river improvement area.

The Trust has the powers to undertake these functions including the ability to raise funds, enter land, occupy land, enter into contracts and carry out works⁴.

In the upper Condamine River the Trust removed habitat, vegetation and snags, forming a channel with increased water velocities, leading to elevated erosion issues and increased down stream flooding in many cases. This impacted heavily on native fish populations.

Brian Kuhn – *The passion of a farmer*



Brian Kuhn has been working as a farmer since he was 17 years old. He lives on a property that borders Kings Creek, a major tributary of the Condamine River.

Brian has fished the Kings since he was old enough to fish.

Catfish and more

Fishing is a family past - time in this part of the world and the fishing skills have been passed down from generation to generation unchanged.

Brian learned how to fish from his father who had an easy way to teach the kids when they'd caught a fish.

He had a float on the end of his line and the line was suspended about probably 3 or 4 feet under the water and, you'd sit there in the afternoon and when the cork started to bob up and down you knew you had a bite.

So it was an easy way to learn to fish anyway.

Brian remembers catching many fish, but mostly catfish.

Well the majority of fish we caught were what we called the old eel-tailed catfish. He was the most predominant fish we caught. We caught the odd yellowbelly or golden perch, even rarer, was the odd Murray cod. But since we have started stocking golden perch and Murray cod in these systems they have become more prevalent.

The silver lining

Everyone has a secret about fishing – Brian's father was no exception.

I remember back to when Dad taught me fishing in the creek years ago. We had a little fish called the bobby perch. Now they only ever grow to about 15cm. That's probably as big as they grow and once you got them on the bite there was a little feeding frenzy, Dad used to put a little piece of silver paper out of his tobacco pouch and they'd take that. So I mean if you run out of worms just put a bit of silver paper on the end and put it in the water and flick. Probably works like an early version of a lure.

Spangled perch

(Leiopotherapon unicolour - bobby, spangled grunter, nicky)



Photo: Gunther Schmida.

- Average length 15cm, maximum length 25cm
- Extremely hardy: recorded travelling up to 16km in 2 hours along wheel ruts during thunderstorms
- Upstream spawning migrations triggered by summer floods and temperatures exceeding 26°C
- Highly predatory fish that will eat anything it can swallow
- Most widespread native freshwater fish in Australia
- River regulation, cold water pollution and reduced floods are threats to spangled perch
- Remains abundant across the northern Basin

When teaching her son to fish Olive Shooter loved the spangled perch.

Spangled perch are the most beautiful little fish you've ever seen. They're a dear little fish. For mothers introducing their sons to fishing, they were the best thing you could ever get, because as soon as the bait hits the water they grabbed it. You could catch them with a pin on a string. You could just throw it in, and whatever you had as bait, they would bite on it. I think they were the best fun for mothers and small boys.

Doing what young people do

To Brian, the river provided a lot more than just the fish.

Living on the creek, our house was less than 100 metres from the water. We'd just pop down in the afternoon and catch a fish. But as I grew older and started having friends we'd come out here, 15km out of Clifton, camp the night, have a fish and, you know, do what young people do.

The secret of preparing a fish

It seems regular fishing creates some practical ways of preparing and cooking fish, especially when the taste of the fish fillets is tainted with a somewhat muddy taste.

Gone are the old days of just throwing a fish on the BBQ, scales and all because you do get a very muddy taste out of the flesh. There are various recipes soaking them in milk or soaking them in salty water after you've filleted them. The best is to leave it overnight in the fridge and then next morning you will see all the fat areas on the flesh have solidified. All you do is cut that away and give that to the cat and the nice clear flesh it tastes fine. The Murray cod doesn't seem to have that problem as such.

Losing the banks

One of the major issues in relation to the habitat loss in the Upper-Condamine is the removal of snags from the river channel.

Brian remembers:

In the 1960s, there was a scheme going. It was run by the Condamine River Trust and their job was funded by the Government to remove all the trees and snags out of the streams. It was to let the water get away faster, to allegedly stop flooding down the streams. Well, I think it made it worse, because I think it made the water flow a lot faster and there was a lot more damage and erosion done to the banks.

Righting the wrongs

Brian notes how attitudes have changed over the years. He has worked with local authorities to improve this section of the Condamine River.

In the last three years, money was allocated here so we could start putting snags back in the water. In this general area of 500 metres there 12 big, big trees were plonked back in the water.



Resnagging at Bowenville Reserve. Photo: Noal Kuhl.



Noal Kuhl releasing a Murray Cod caught amongst reintroduced snags. Photo source: Condamine Alliance.

Sam Bonner – Traditional river connections

Sam Bonner is a Githabul Elder who lives close to Emu Creek, one of tributaries of the Condamine River. He has a close connection with the river.

Sam points to a river red gum whose trunk still bears the deep scar from bark removed to construct a canoe over 160 years ago.

According to Sam, canoes were made by the local aboriginals not for their own use but to trade with other aboriginal tribes for locally unavailable products such as ochre for painting.

Here we are, in front of a scarred tree. See how they cut around that sappy part, and took all that out. They used to do that with wedges. They had special material to make wedges out of, you know, like special stone. And they cut them and mark them all the way around and then they wedge it. They wedge all that out. That is what they used to make the canoe out of.

An underground sea

The Githabul people maintained a close relationship with the river, using stories to convey the connectivity of waters above and below ground.



Sam Bonner and the canoe tree. Photo: Greg Ringwood.

Since way back – I was told about it, back in the 1950s, they said 70 years before the animal thing was sighted here. Mum and the other elders told me every 70 or 80 years those things come back and show themselves. They come up from underneath

here, because it's deep, so deep it was bottomless, it goes into the big underground stream. It's like a big sea of water, all this country, underneath there. There are passage ways, and these things might come up down Tweed Heads or somewhere, or they might come up out at Cunnamulla. So this is a sacred water hole, this place. We're never allowed to swim here on account of they said there's some prehistoric animal or something that's in here. No one knows what it is, you know. But it has been sighted back in them days. Some describe it as like a big overgrown wombat.



An Upper Condamine River waterhole.
Photo: Greg Ringwood.

Only take what you need

Sam learned how to fish from his aunts. They often went fishing to bring home a feed for the family, always catching what they needed and only what they needed.

They would catch about five or six each, and then start packing up and put the fish in the bags, and I couldn't understand myself. I used to say 'Aunty, what are we going home for? We'll get some more.' And she would reply 'No, you're only allowed to catch so many.' That's what they taught me. You only catch what fed the family, see. You're not to get anymore.

Sam, his family and friends always kept the river clean and tidy. For others, such care for the river was not always undertaken, especially when it came to catching fish.

People these days they fill their fridge right up to the top with fish. That's stupid. That's greedy. They're still doing it. They take big eskies out there and they bring home as much as they can catch – unbelievable - what do they do with it all? They can't eat all that.

Timber mills and bobbing

Sam's father was a tree-cutter, so most family members worked in the local timber mill. They used some of their free time catching fish in Emu Creek.

We worked in sawmills and things. We never had that much spare time. Weekends were the only time we had, and then if we were lucky we'd get to town. If not we'd come fishing to these places. We've fished all along here. We used to catch a fair bit of fish back in them days, 18 or 19 jew and yellowbelly. You'd get a good feed every time.

Sam and his family used a variety of baits when they fished, attaching a cork to the line and using 'bobbing' techniques to attract the fish.

We used to use anything for bait. Maybe crayfish and frogs are number one, grasshoppers, crickets, and black crickets. We'd just lift up a log or cow manure to see and you'd see plenty of crickets. Use them, anything. Get the cork bobbing steady so it makes a big noise going 'pop' when it comes up. The bigger and wider the cork the better it makes that noise. The fish hear it and they come and they see the bait moving, and they just go and grab it.

Protecting the perch

Emu Creek flows straight into the Condamine River. Murray cod, yellowbelly and catfish all breed in the creek's waterholes. Occasionally you can get silver perch, but they are very small in the creek. Sam says:



A silver perch in Oakey Creek. Silver perch (*Bidyanus bidyanus*, also known as grunter, black bream, silver bream, bidyan) medium to large fish found in lowland turgid, slow flowing rivers. Potential threats include river regulation, barriers to migration, altered flow regimes and interactions with pest fish, like carp. Photo: Noal Kuhl.

Perch like a lot of protection, lots of trees, because they're fish that birds can get easily, especially Kingfishers and stuff like that, because perch are only small. You get silver perch here no more than about six, seven inches. Birds get anything that they can see. They can see out in the open, but around shade they can't see fish.

Along the Upper Condamine, the silver perch is considered to be the most vulnerable of all native fish. Although they are in abundance in stocked impoundments, they are not often found in the natural river system. Noal Kuhl puts this down to habitat loss from past human activities.

Much of silver perch's habitat has been destroyed and wild populations of them are very rare. There was a lot of discussion in our stocking group about releasing these fish. Fishermen told us 'its very difficult to catch legal sized fish for the esky'. Our stocking group committee's response was 'It's our group's responsibility to make sure this species is kept alive and healthy in our waterways'.

The importance of plants

Sam believes the river along Emu Creek has changed over the years. It is partly due to the clearing of vegetation in and around the river.

It's changed – there's not enough vegetation here now – timber and stuff. And you can see where it's gradually getting washed down and the banks on the creeks are getting narrower. That's because no vegetation is there to halt the erosion.

The water holes are getting smaller and shallower all the time because they haven't been allowed to revegetate themselves, now we've got to help them to revegetate. This is all part of the main catchment of the Condamine and definitely has to be looked after.



Riparian vegetation provides shade and is a source of snags, both of which are important aspects of healthy fish habitat. Photo: Condamine Alliance.



The revegetation of Myall Creek, a tributary of the Condamine River, was severely affected by the 2010 – 2011 floods. Photo: Condamine Alliance.

River vegetation

Water plants are important because they provide habitat, food, refuge, spawning and nursery sites for fish and invertebrates. They also stabilise and filter sediments and influence water quality.



Ribbon weed growing next to a snag. Photo: Scott Nichols.

The plants on the river bank ('riparian vegetation') are a key source of organic matter for the aquatic system. Many aquatic invertebrates feed on decaying material and these, in turn, provide a food source for other invertebrates and fish. Woody material which falls into rivers and streams provide fish with shelter and a substrate for food, such as algae, and breeding sites. Riparian vegetation provides shade, which reduces daily and seasonal extremes in water temperature, stabilises riverbanks, slows surface runoff and can act as a filter to pollutants and nutrients. It also leads to more diverse fish habitats through providing snags, undercut banks and variation in the channel bed.

Olive and Ray Shooter – A lifetime on the creek



Olive and Ray Shooter have been married since 1963. Ray has lived along Dalrymple Creek for over 77 years. Olive grew up a few kilometres from where they live today, moving to

their current home 48 years ago.

When he was a boy Ray could not keep away from the creek.

Oh, it was very carefree and we used to swim and play in the creek. There were willows in the creek at that time, and they were lovely shady tree. It was good.

Ray and his family also often had picnics along the river.

We used to – even when we were young, have a few picnics on the bank. We used to take the afternoon tea. It was lovely, it had the Condamine couch under the trees. It was a fairly nice little area. Mainly just us and other nephews and nieces that might come and stay. We'd just play around and maybe paddle a little bit, because you could get down into the creek very easily.

Fishing is a family pastime

Ray did not fish much when he was young, but his father and brother were keen fishers. They caught yellowbelly, jewfish (catfish) and cod.

They used to fish in Dalrymple and the Condamine. In my boyhood days the cod weren't here, but I heard stories from my father, when he was a boy, that there plenty of cod in the creek. They disappeared for some reason or other, and they come back in 30 years ago, I suppose. And they – well they lasted up until the dry, I think, that that would have finished them off. But our son has caught a small cod recently; we had to throw him back of course, so they are still about.

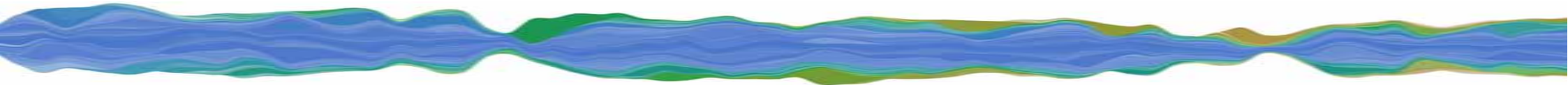
Although Ray does not engage in fishing, Olive is a keen fisher. She sees fishing as a relaxing activity.

I just love fishing. It's like looking for mushrooms, really. You never know when you're going to get one, do you? I used to always say, 'It doesn't matter whether you sit at the bank all day and you catch nothing, it's lovely.' The dragonflies, and everything that flits around the creek are there. Little wrens and kingfishers and all the other little bird life flittering around. It's beautiful.



Mayflies are important parts of the aquatic ecosystem – and particularly loved by fish as food.

Photo: Luke Pearce.



Learning to fish

Olive's father was a fisherman, and taught Olive and her sisters how to fish. They used several different methods of fishing between them.

Dad used to set us a line with a cork on it and we'd sit with that when we'd go fishing. Mum never fished. She would always take the New Idea and have a day out at the river. It was a good family day. When we were kids and we'd go down to Kings Creek, my eldest sister had an idea that if you bobbed you'd catch more. She caught 48 spangled perch one day by just bobbing the cork all the time. We couldn't ever repeat that.

I never even use a cork now, and I don't like rods either. You can't feel what the fish is doing with a rod. If you just hold onto the line, you know what the fish is doing.

Driven to distraction

When the fish are on the bite, not even a fear of the bait would stop Olive from catching a fish.

One time when I couldn't find any worms, my son said he'd get some willow grubs, something I don't like to handle. Anyway, I took the toilet paper with me, and I used to get a piece of toilet paper, and pick up the willow grub with that, and put it on the hook



Olive with one of her catches. Photo: Ray Shooter.

and bait up. I was going all right until they started biting, and then all of a sudden I didn't care if I picked up a willow grub or not. I picked up a willow grub and I put it on the hook, no trouble. I didn't need toilet paper after that.

Olive is now teaching her grandson Harry to fish the same way as she did her son.

Harry is 11 and a real fisherman. He can talk of nothing else but fishing when he's fishing. He comes up to me wanting to go fishing because he's not allowed to go to the creek on his own. He takes a lounge chair for me to sit on while he fishes.

A drier creek

Both Olive and Ray have noticed changes in the creek over the years. In the 1950s and '60s, Olive noticed that the local water hole dried out more regularly.

Just down here, where I always fished, the big hole. Well it's been dry on quite a few occasions lately and it never was dry in past years. We always had water in the creek. But those times are gone.

Some of the aquatic creatures have ways of coping with these changes, as Olive explains:

There's yabbies in the little hole down here. They're amazing really, 'cause the water hole goes completely dry and there's nothing there at all. Then as soon as it gets water in it there's yabbies and the little perch, spangled perch, in it.

Ray also says the river dries out more regularly than it has in the past.

I've lived on the creek all my life. I've noticed a big change in the creek. When I was a kid, we used to swim and play in the creek and it very rarely stopped running in those days. It's changed dramatically now. Partly I'd say because of the 16, 18 year drought that we've had, and the over-allocation of the irrigation water.

A changed creek

Removal of vegetation along the river has affected the flow and creek banks. Ray recalls:

In their wisdom, the River [Improvement] Trust decided to get rid of the willow trees, they were slowing down the stream too much. And they took them out, and as a result then, the stream ran much faster, and it scoured the banks and it made it into a different creek altogether. Instead of the nice sloped grassy banks, we finished up with a great scoured out steep bank. It used to take 24 hours for the water to come from the top down to here, and after that it came for 12 hours. Before the flow would get to the Condamine, it deposited all the silt.

In an attempt to address some of these problems, the River Trust carried out work on erosion effected areas, some more successful than others, as Ray explains:

They tried three different things to aid erosion control that I can remember. They battered the banks down and planted grass on them. That was moderately successful. They put a wall of tyres down the bank there; to hold the creek from washing back to the road. The tyres were successful. And then they put posts in and tied logs and brown saplings to them and they backfilled that then, but that wasn't a success because the saplings that they put in very soon rotted away and it washed away.



Denuded and eroding banks on the Condamine. Photo: Brian Kuhn.

State of river: 'moderate'

The Sustainable Rivers Audit (SRA) is an ongoing and systematic assessment of river health for 23 major river valleys in the MDB. Environmental indicators include hydrology, fish and macroinvertebrates, which are monitored and will highlight trends over time.

The Condamine Valley was surveyed in 2005. The Condamine Valley fish community and Ecosystem Health were considered to be in Moderate Condition. 56% of predicted native species were caught from the "Slopes Zone". Alien fish were widespread, and comprised just over half fish biomass (55%).

Bony herring were numerous and carp gudgeons, Australian smelt, golden perch, Murray-Darling rainbowfish and spangled perch also were common. Three alien species, Eastern gambusia, goldfish and carp, were captured frequently¹.



Oakey Creek – habitat for carp. Photo: Noal Kuhl.

Noal Kuhl – Angler, historian and fish habitat restorer



Noal Kuhl has lived in Oakey area all his life. Restoring the local waterways to their former natural glory has always been an ambition.

All you saw was sewage

As a youngster growing up Noal saw how poorly the river was treated.

When I grew up in the 1970s, all you could see was sewage flowing down the creek and it was foamy, brown, and that certainly wasn't eye-pleasing. It certainly wasn't appealing as kids to come down to the local creeks for a fish. So it became a challenge to change all of that. With the Environmental Protection Agency in place, the local council were forced to clean up the creeks. The improvement in treated water flowing downstream became noticeable. The creek landowners tell us they noticed better quality water in the creeks around 1997 as it got a lot cleaner and a lot clearer.

Noal became interested in the health of the waterways so future generations could respect and know that waterways are important ecosystems to have in the community and not a water source to be abused. In 1994 he joined the Oakey Freshwater Fish Stocking Association.

Through his involvement with the fishing association Noal began interviewing the long term residents for historical records and started piecing together some of the changes that had occurred to the waterholes and headwaters of the Condamine River, including Gowrie, Westbrook and Oakey Creek.

The first settlers only needed the water for their domestic use, where they'd be washing clothes, or feeding livestock. There was no large scale irrigation like we have now. So now during dry times, you will probably see the creek run dry. Back in the 1960s Toowoomba City was expanding and housing estates started covering over the surrounding natural springs, so there's less water seeping out and filtering into the creeks now. Not a lot of people noticed because sewerage treatment water was replacing the good spring water, so the water level basically stayed the same but the

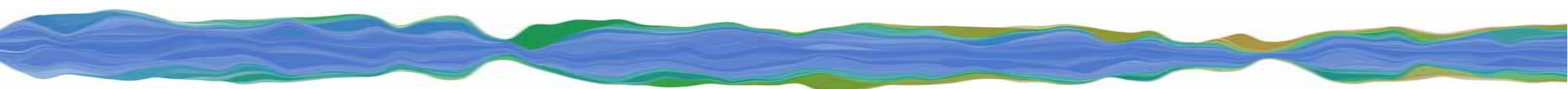
water quality was reduced. Now the sewerage water is no longer being released into the creek, all the fish have to rely on is the rainwater that falls in the catchment zone. The creek is not as permanent as what it used to be.



Noal with one of the water quality samples from Oakey Creek, downstream from Gowrie Creek. The water in Oakey Creek contains treated waste water from the Wetella treatment plant in Toowoomba City as well as stormwater comes from the city streets and surrounding farmland. Photo: www.nma.gov.au.

Carp country

It's not only the water flows that have changed in this part of the Condamine – many parts of the river and its creeks have had their vegetation cleared to the creek edge and removed from the creek channel. This has led to areas so disturbed that they



can no longer support a diverse range of aquatic life including the native fish that once thrived here. Despite carp only arriving in the Upper Condamine in the late 1990s, Noal describes these areas as 'carp country':

Basically, this is European carp country: if you fish here you will catch a lot of carp. There is basically no habitat here for native fish to live. There are no trees for native fish live under. It's just a 'glorified gully'. There's hardly any structure in the water, no logs in the water, or anything to hold native fish. It's also shallow, about four to six foot deep right through and that's what carp like.

A wriggly problem

There are many different types of bait used to catch fish in the Upper Condamine but, as Noal recounts, bloodworms are considered the best, especially the species that live in the black soil country of the Darling Downs.

The local fishermen come to the waterways collecting bloodworms for bait. The Darling Downs produces the best fishing bait on the Eastern Seaboard for catching native fish and this is because of the blood worms.

Because of the popularity of bloodworms, many fishermen regularly visit to dig for them. This is having a great impact on the riparian vegetation where the bloodworms are easily located.

Some friendly rules have been developed to lessen the impact on the riparian zones.

Local fishermen have their own little beds made up and they continually dig them over for worms and look after them. That's what is needed: to limit the diggings and reduce the need to go into new areas and stuff up the riparian zones.



Ground worked over for bloodworms. Photo: Noal Kuhl.

Ringtanks and catfish

Despite the numerous negative impacts that human activities have placed on the waterways, Noal believes sometimes man-made structures have had a positive effect by providing habitat to some native fish. One example is the role ring tanks (farm dams) play in the survival of eel-tailed or *Tandanus* catfish.

Back in 1991, there were only three ring tanks on Oakey Creek. What happened is that fish get pumped through with the water. When the dams are nearing empty you can see all the round hollows at the bottom of the dams indicating eel-tailed catfish nests. Eel-tails collect little pebble rocks and place them in the middle which help the eggs to stick. The eel-tailed catfish are a hardy native species that thrive in farm dams, as do silver perch. Other predatory fish are less adaptable to ring tanks so without the competition, catfish thrive.

Noal and his mates used to have great success fishing in the ring tanks.

All you'd catch was eel-tailed catfish. But they were the plumpest, healthiest, fattest looking eel-tails you're ever likely to see. Some were over 900mm long and you'd catch 14 or 15 in a session and take some home. Sometimes you'd put them in a hessian bag (especially if you knew they were female with a lot of eggs) and take them back down to the creek and let them go. Ring tanks are prolific sites for eel-tailed catfish breeding on the Downs. Oakey Creek has a large population in comparison to the rest of the Murray-Darling Basin where they are pretty scarce. I'd say the ring tanks are one area to nurture eel-tailed catfish to return them in big numbers elsewhere.

Pumping water, not fish

Irrigation pumps and drains are a problem for fish. These fish are removed from the natural system with little chance to return to the river, effectively being 'lost' from the main river channel. This situation has a major impact on the health of native fish communities in the Murray-Darling Basin.⁴



Photo: NSW DPI.

Some of the more resilient native fish species, such as spangled perch, are able to live in storages, but their ability to return to the rivers and contribute to their natural community is lost. Research is now being done into the designing effective screens and figuring out how they can best be used to benefit both irrigators and fish.



Research is ongoing to find out what sort of screens can be fitted to irrigation systems to minimise the damage to native fish populations. Photo: NSW DPI.



Ring tanks close to Oakey Creek. Photo: Noal Kuhl.

Making connections

Being involved with native fish

During the early settlement, fishing was a necessity as it provided a vital food source. Those interested in fishing only had the time to catch a feed of fish. These days fishing has become a passion for many who not only spend time fishing but also observe the health of the river and the native fish populations. Brian Kuhn explains:

We started the fishing club at Nobby in 1988. It was a family orientated fishing club focused on putting fish back into the river. It became evident there was a need for an educational program to aid native fish in this area. The fishcare volunteer program, which was orientated towards sustainable fishing, was kicked off by the Qld Department of Primary Industries (Qld DPI). They provided us with brochures and general material to educate the fishing public on the correct way of caring for native fish. The program was proactive - not just saying they could not take a fish. Further extension was provided by the Qld DPI in Brisbane, training us about fish and fish habitat. Now, from time to time I come out here and just check the river in general and make sure that everything looks reasonably healthy. That is part of being involved with native fish.

Moving toward zero till

Tilling of the fields around Dalrymple Creek has contributed to the turbidity of the creek water as soil was eroded off paddocks and into the creek. Recently farmers have made changes to land management practices and zero till is gradually becoming more prevalent. Ray Shooter observed that this has led to clearing of the creek waters:

I think that a lot of the farmers now have gone to zero till. Well that certainly has cut down the silt entering the creek. When we used to plough, the water that ran off the paddock after a storm was quite dirty. Since we knocked off cultivating, the water runs off mostly clear. I suppose it would be 80% zero till in this area now.

Escape the rat race

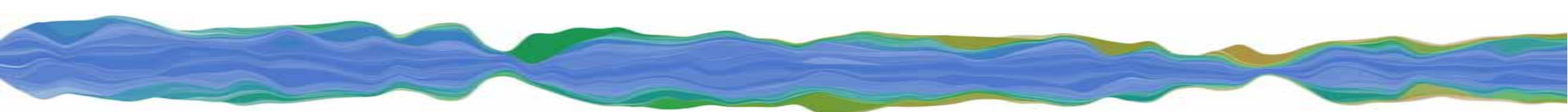
The river is enjoyed by many people for activities including fishing and as a place to spend quality time with friends and family. Brian Kuhn recalls it is mostly a place to relax:

At busy times, typically at Easter time you come out here and there are lots of families that camp here for the Easter weekend. People come from all over to get away from it all. They set up their camp, their little dog and a fire, it's marvellous to be out here away from the rat race. Just the river and nature to enjoy.

You have to take the time

Sam Bonner believes it's important to teach his young relatives to respect the river and their history. Sam explains:

They used to come here to swim. It took me two or three seasons to stop them. Because this is my area where I was brought up, I know all about it. I had to do my job, do my duty. You've got to keep them legends alive, see. In our days, we had to listen. These days it's different - they're brought up different culture now. You've got to get through - you've got to take the time to get through them now.



Visions for the Condamine

The fishing people who contributed to this project have all talked about their hopes for the future of the Condamine. Many felt they had seen some improvements but most don't feel the river is as healthy yet as they would like to see it. Each of these fishers suggested ways to help the river and in turn help provide healthy habitats for fish.

Helping fish in tough times

Fishing clubs including Nobby and District Fishing Club and Oakey Freshwater Fish Stocking Association are very active - giving native fish a hand when needed. Between 2001 and 2009 the Upper Condamine was gripped by one of the worst droughts in history, resulting in a significant number of water holes drying out. The native fish required human intervention to survive, as Brian Kuhn recalls:

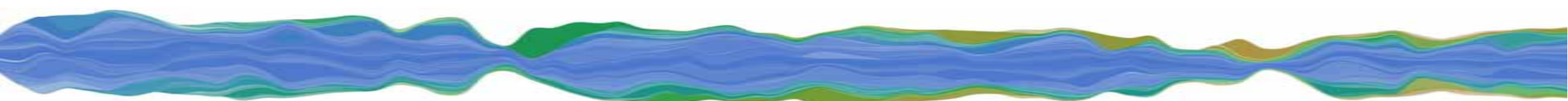
For the past 20 years the Condamine River has been in a pretty sad state with only occasional flow. More often than not it has been dry holes. Eighteen months ago, we walked some of the river, rescuing Murray cod and put them into more permanent waterholes. We've got a few very dedicated people who love fish.

With the help the Condamine Alliance and Fisheries Queensland, these two fishing groups approach the issue of sustaining fish populations in the Upper Condamine more systematically than just stocking fingerlings into the water. Both clubs have also been closely involved in habitat restoration works on the Upper Condamine. As Noal Kuhl explains:

We asked the question: when we put fingerlings in the waterways, is it worth the effort? To answer this question we needed to understand what the creeks were like before and what we see today. Once the changes were identified we looked at if we could rectify the bad aspects. We found that a lot of the vegetation had gone. Most importantly ploughing the banks had reduced the riparian zone. That required fixing so the native fish would want to return. Once we started putting fingerlings into the creek in the '80s, we noticed an increase of native animals as well. The farmers started telling us that koalas, goannas and birds, were appearing on the creek quite noticeably. Once revegetation began, there's been major improvements from 1995 and what you see here today.



Members of the fishing and stocking groups are involved in revegetating numerous creeks along with the local councils in the Condamine (above) as well as fish monitoring (below). Photos: Noal Kuhl.



Bringing back the fish

Source: Milly Hobson.



Bringing back the fish

Local projects aim to bring the fish back to the rivers of the Murray-Darling. These compliment large scale programs such as the MDBA's *Native Fish Strategy* and *The Basin Plan* that work with a wide range of stakeholders to ensure positive outcomes for the environment and fish of the Murray-Darling Basin.

The projects listed in this section provide examples of some of the projects being undertaken in each region across the Basin. Listing in this section does not imply endorsement. Contact details were correct at the time of publication (2011/2012).

Coorong and Lower Lakes

a) Coorong and Lower Lakes Recovery Program

In 2009 the Coorong and Lower Lakes Recovery program was developed to address environmental issues facing the region as a result of the drought and to rebuild healthy ecosystems that can better adapt in the future. The latest science, as well as traditional and local knowledge, was used to tackle issues like salinity, acid sulfate soils and loss of habitat.

It is hoped this will also help support the local communities and industries that rely on a healthy environment to prosper.

For more information visit
www.murrayfutures.sa.gov.au

b) Congolli match making

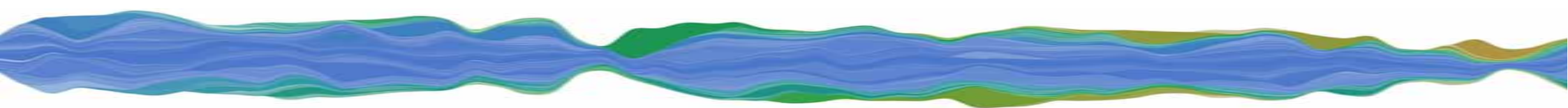
In July 2010, during the height of the drought, an emergency match making service was initiated to save the congolli population from possible extinction in the Murray-Darling Basin.

years, with the sexes remaining separated for much of the year until females migrate downstream from the Lakes to the Coorong to breed from July-September. By July 2010 record low water levels had disconnected the Lakes and Coorong and separated the male and females for over 3 years.

In August 2010, scientists, natural resource managers and river operators trialled the novel solution of operating the Goolwa barrage boat lock exclusively to assist downstream movement of female congolli into the Coorong. As a result, for the first time in 4 years, an estimated 20 000 congolli were observed moving through the lock over a 6 week period. Spawning was confirmed in spring/summer 2010 when thousands of 'young of the year' recruits migrated upstream through the barrage fishways.

For more information contact the SA DENR Lower Lakes and Coorong Icon Site Manager on (08) 8463 6800 or Brenton Zampatti at SARDI on (08) 8207 5491.

Adult congolli are thought to only live for 4-5



c) The Lakes Hub

The Lakes Hubs were established at Milang and Meningie were an initiative of the local community, through the Milang and District Community Association, as a way of sharing information between government and the community.

They have provided a local base for people to find out about urgent environmental works carried out as part of the Coorong and Lower Lakes Recovery program and also a way for the community to give their feedback and ideas to government about the long-term plan to restore the wetland.

The Lakes Hubs have also coordinated local volunteers, who have carried out water and soil monitoring, propagating and planting thousands of plants to restore habitat and manage acid sulfate soils and the rescue and recovery of native animals such as turtles and freshwater fish.

For more information about the Lakes Hubs visit www.lakeshubs.com

Resources

- Native Fish Strategy Coordinator, SA: Jonathan McPhail: (08) 8463 4418
- Goolwa to Wellington LAP: (08) 8536 5612
- Coorong Tatiara LAP: (08) 8757 2100
- Ngarrindjeri Regional Authority: (08) 8531 3868
- Murray Lower Darling Rivers Indigenous Nations: (02) 6051 9948
- The Lakes Hub (Milang): (08) 8537 0808
- Lower Lakes and Coorong Icon Site Manager: (08) 8463 6800
- SA DENR: (08) 8124 4784
- Native Fish Australia (SA): www.nativefishsa.asn.au
- Eastern Fleurieu Primary School: (08) 8537 0223
- Port of Goolwa & Inland Rivers Historical Society: 13 Goyder St, Goolwa SA 5214
- SA Memory: www.samemory.sa.gov.au
- National Library Australia: www.nla.gov.au

Katarapko

a) 'Katfish Reach'

The 'Katfish Reach' demonstration project within the Katarapko-Eckert Creek anabranch system is supported by the MDBA's *Native Fish Strategy*. The vision for the reach is 'A healthier and more productive aquatic and floodplain ecosystem that everyone can enjoy.' The key areas of activity to achieve this vision include:

- managing drainage water at the Berri Evaporation Basin to benefit the population of nationally threatened Murray hardyhead that lives there
- modifying or replacing road crossings, weirs and wetland structures to:
 - a) improve fish passage
 - b) allow flooding of the floodplain at low river flows
 - c) temporarily dry The Splash and Eckert Creek north and south arms
 - d) improve management of Ngak Indau, Katarapko Island, Horseshoe lagoons and Gerard wetlands.

You can get involved by volunteering, donating water to the environment and /or financial support. For more information contact the SA Department of Environment and Natural Resources (08) 8595 2111.



b) The Sea to Hume Dam program

This Murray-Darling Basin Authority project has begun restoring stream continuity within the Murray by constructing fishways on 14 mainstem structures on the river, including the tidal barrages at the Murray mouth – a distance of 2 225km! For more information contact the Murray-Darling Basin Authority on (02) 6279 0100.

c) Friends of Riverland Parks volunteers

If getting personal with water birds, bush birds, possums, Regent Parrots, or kangaroos is more your style you could join the Friends of Riverland Parks volunteers and help out with their fauna and wetland monitoring activities. The Friends group also conduct tree planting, weed control and walking trail maintenance if you are that way inclined. To find out how to get involved in these activities, contact the Friends of Riverland Parks (08) 8583 5430.

d) Wetland monitoring

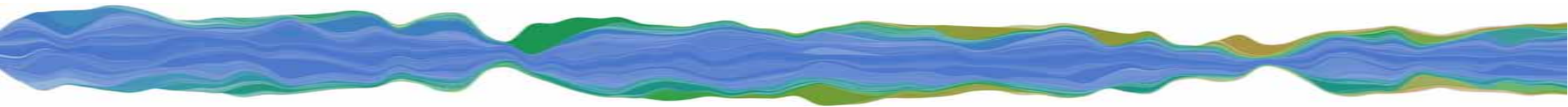
Both the Berri-Barmera and Loxton-Bookpurnong Local Action Planning (LAP) Associations undertake wetland monitoring activities either side of the River Murray including Martins Bend, Gurra Gurra Lakes, Yatco Lagoon, Spectacle Lakes, Loveday Lagoons and Overland Corner. Water quality, water birds, frogs, and tree health

surveys are conducted regularly. For more information and to get involved contact Berri-Barmera LAP (Paul Stribley: (08) 8582 2183) or Loxton-Bookpurnong LAP (Craig Ferber: (08) 8582 2824).

Similarly, the SA Murray-Darling Basin Natural Resource Management Board monitors over 40 different River Murray wetlands that are managed in some way – 21 of these have community wetland groups attached. The Board also conducts environmental monitoring technique training for the community. For more information and to get involved contact Rebecca Turner (08) 8532 1432.

Resources

- Native Fish Strategy Coordinator, South Australia: Jonathan McPhail: (08) 8463 4418
- Katfish Reach Demonstration Project: Kevin Smith (Chair), Katfish Reach Steering Group: (08) 8583 5430 or www.katfish.org.au
- Berri-Barmera LAP, Paul Stribley: (08) 8582 2183
- Loxton-Bookpurnong LAP: Craig Ferber: (08) 8582 2824
- SA Murray-Darling Basin Natural Resource Management Board, Rebecca Turner: (08) 8532 1432
- Gerard Reserve Council (Inc), Winkie SA: (08) 8583 7304
- Renmark/Berri Field and Game Association: 0488 587 101
- Berri & Districts Local Heritage Collection: Berri Community Library: (08) 8595 2666
- Murray Pioneer Newspaper: (08) 8586 8000



Lower Darling and the Great Anabranch

(a) The Lower Murray Darling Catchment Management Authority (LMD CMA)

The LMD CMA has been working with the local community to implement a number of activities within the Lower Darling River and the Great Darling Anabranch area:

- i) **Wetland rehabilitation** – Wetlands like Thegoa Lagoon have wetting and drying cycles reinstated. Wetlands that were disconnected now receive water and those that were permanently wet can be given a drying cycle for environmental benefits thanks to improved water delivery control structures. Other works include resnagging, weed control and a ground and surface water monitoring program.
- ii) **Fish passage** – vertical slot fishways have been installed at Burtundy Weir, Weir 32 and Pooncarie Weir, allowing fish passage within over 512km of the Darling River. Three Fish Habitat Management Plans have been developed and a fish monitoring program has been underway since 2004 with up to 65 sites monitored each year.

iii) **Native fish releases** – since 2005, the CMA in collaboration with agencies and industry, local schools, community groups, have released Murray cod and golden perch at locations including Fort Courage, Wentworth, Pomona, Burtundy and Pooncarie. In 2011, the LMD CMA also released threatened olive perchlets and southern pygmy perch fingerlings into Thegoa Lagoon.

iv) **Habitat improvement** - an 'Aquatic Threatened Species Habitat Management Zone' has been set up at Karoola Reach on 20km of the Darling River. Best Management Practices for protecting the aquatic environment are being demonstrated to landholders so they can improve 'their' section of river.

To be involved or find out more information about the above projects, contact LMD CMA on (03) 5021 9460.

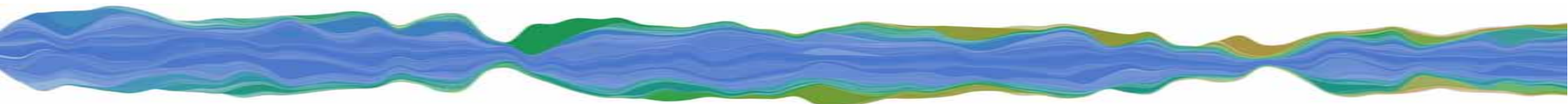
(b) The Murray-Darling Freshwater Research Centre (MDFRC)

The MDFRC has laboratories on the Murray River in Mildura and Albury-Wodonga where they research and monitor a number of aspects of aquatic ecology including environmental flows, water quality, nutrient cycles, algae, fish and invertebrate taxonomy and ecology.

The MDFRC can help community members to identify aquatic flora and fauna and assist with habitat use queries.

As part of some MDFRC projects fish are tagged to determine where they move. Apart from their own sampling, the MDFRC rely on recreational fishers to contact them if they catch a tagged fish so that they know can learn about their movements.

If you find a fish tagged as part of an MDFRC project or you want to find out more information about their work phone (03) 5051 4050 (Mildura) or (02) 6024 9650 (Albury-Wodonga) or visit www.mdfrc.org.au



River resources

- Native Fish Strategy Coordinator, Southern NSW Charlie Carruthers: (02) 6298 0802
- Lower Murray Darling Catchment Management Authority: (03) 5021 9460 or www.lmd.cma.nsw.gov.au
- Wentworth Angling Club, Fort Courage: (03) 5027 3097
- Menindee Local Aboriginal Land Council: (08) 8091 4541
- Dareton Local Aboriginal Land Council: (03) 5027 4721
- Northern Basin Aboriginal Nations: (02) 6279 0672
- Murray Lower Darling Rivers Indigenous Nations: (02) 6051 9948
- Wentworth Shire Library and Wentworth Historical Society: (03) 5027 5060
- National Library Australia: www.nla.gov.au

Murray River

a) Lake Hume to Yarrawonga Resnagging Project

Almost 25 000 snags were removed from the Murray River between 1976 and 1986. To reverse this impact, from 2006 to 2009 NSW DPI reinstated 4 450 snags in the river between Hume Dam and Yarrawonga (headwaters of Lake Mulwala).

It is hoped that resnagging will help to secure the long term viability of existing native fish populations such as Murray cod, trout cod and golden perch. These works effectively achieved 75km of habitat, connecting the remaining small isolated patches of fish habitat to create large viable areas of habitat.

For more information contact Cameron Lay on (02) 6738 8520.

b) The Sea to Hume Dam program

This project aimed to ensure native fish can migrate from the sea and Coorong estuary right up to Hume Dam at Albury-Wodonga, a distance of 2 225km. The Murray-Darling Basin Authority has begun restoring stream continuity within the Murray by constructing fishways on 14 mainstem structures on the

river, including the tidal barrages at the Murray mouth.

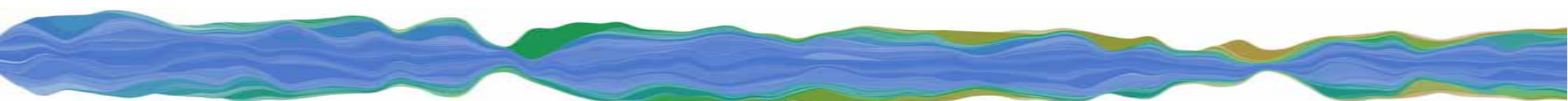
A tri-state (NSW, Victoria and SA) research and monitoring program accompanying the works has determined that some small fish like carp gudgeon, Murray rainbowfish and unspotted hardyhead actually migrate, but couldn't make it past the mainstem barriers. In response, dual fishways have been developed to allow for the movement of large and smaller species.

For more information contact the Murray-Darling Basin Authority on (02) 6279 0100.

c) Bidja Bila ('Men of the River') Indigenous Landcare Group

This group works on an area near Albury-Wodonga controlling weeds and planting native trees and grasses that will create more habitat for local endangered fauna. The group is supported by the North East CMA (Victoria).

For more information contact Richard Kennedy on 0428 266 786.



d) Community Fish Tagging Program

The Murray CMA (NSW) is developing a community-based fish tagging program for the Murray catchment, trialling it first in the Edward-Wakool system. Fish caught during competitions will be identified, measured, and microchipped, before being released. Fishers will be provided with hand held scanners, so they can identify fish captured and tell researchers about fish movements.

For more information contact John Conallin on (03) 5880 1400.



One of the snags soon to be providing habitat for Murray cod in the Murray River. Photo NSW DPI.

River resources

- Native Fish Strategy Coordinator, Southern NSW, Charlie Carruthers: (02) 6298 0802
- Murray Catchment Management Authority (NSW): (03) 5880 1400
- Goulburn Broken Catchment Management Authority (Victoria): (03) 5820 1100
- North East Catchment Management Authority (Victoria): (02) 6043 7600
- Murray Lower Darling Rivers Indigenous Nations: (02) 6051 9948
- Corowa Anglers Club: (02) 6033 3180
- Lake Mulwala Angling Club: (03) 5744 2258
- Corowa District Landcare Group: (02) 6033 0947
- Echuca Landcare Group (includes work on the banks of the Murray and Campaspe Rivers): (03) 5482 1560
- Waterwatch (hosted by the Murray CMA): Anthony Conallin: (02) 6051 2217
- Echuca Historical Society: (03) 5480 1325 between 11am – 3pm
- National Library Australia: www.nla.gov.au

Goulburn

a) Holland's Creek Demonstration Reach

This project is supported by the MDBA's Native Fish Strategy and managed by the Goulburn Broken CMA and Arthur Rylah Institute (DSE). The project aims to display the positive benefits of river rehabilitation for native fish, particularly the threatened Macquarie perch (*Macquaria australasica*). The creek is also highly valued for passive recreation, water supply and family heritage values.

Many actions are being undertaken including monitoring of fish populations, water quality and streamside condition and mapping of snags. On ground works have included weed control, fencing, erosion control and revegetation. A Community Reference Committee, comprising landholders and representatives from a range of organisations, meet regularly. Information sheets, fence signs and a webpage have also been developed and field days have been held.

To find out more about this project and how you can get involved, contact the Goulburn Broken CMA on (03) 5820 1100, or visit: www.gbcma.vic.gov.au/hollandscreek

b) The RiverConnect project

This project aims to establish a connection between the Greater Shepparton community and Broken and Goulburn Rivers. It aims to raise awareness of the environmental, cultural, recreational and economic value of the rivers. Many groups are involved in the project including the Greater Shepparton City Council, the Goulburn Broken CMA and other key natural resource management, Aboriginal and educational organisations. There are four working groups: Communications, Aboriginal Participation, Land Management and Education.

Regular RiverConnect newsletters provide information on current activities.

For more information on the RiverConnect projects and events contact Council's Culture and Community Strengthening branch on (03) 5832 9714 or visit: www.greatershepparton.com.au/council/environment/watermanagement/riverconnect.html

River resources

- Native Fish Strategy Coordinator, Victoria Fern Hames: (03) 5772 0273
- Goulburn Broken CMA, Shepparton: (03) 5820 1100
- Seymour Angling Club: PO Box 898 Seymour 3660 or (03) 5792 3260
- Alexandra Angling Club: PO Box 26 Alexandra 3714 or (03) 5772 1773
- Yorta Yorta Nation Aboriginal Corporation, Barmah: (03) 5869 3353 or reception@yynac.com.au
- Bangarang Goulburn Murray Tribe Aboriginal Corporation, Shepparton: marlenea@mcmedia.com.au
- Taungurung Clans Aboriginal Corporation, Tarneit: taungurung@gmail.com
- Murray Lower Darling Rivers Indigenous Nations: (02) 6051 9948
- Nagambie Landcare, Peter Robinson: (03) 5794 2274
- Seymour and District Historical Society, Seymour: (03) 5792 2311
- Shepparton Heritage Centre, Shepparton: (03) 5821 7717 (after hours)

Ovens

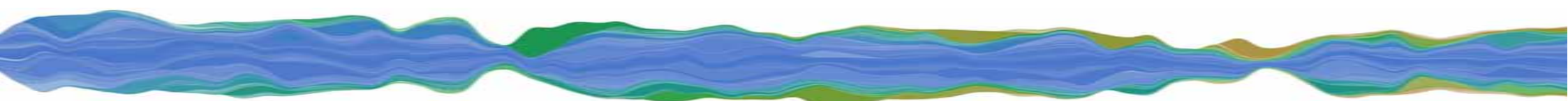
(a) Ovens River Demonstration Reach

Activities are being undertaken to improve conditions for native fish like the Murray cod and trout cod by maintaining, creating and restoring habitat within the river and reducing the effects of land use.

The North East CMA and Arthur Rylah Institute are working with community groups, LandCare, landowners and schools to control weeds and erosion, revegetate and install fencing along the river edge and map and reinstate snags in the water. Fish populations, water quality and riparian vegetation are being monitored to see what changes occur. Education activities, including electrofishing-survey, demonstrations have also been held. To find out how you can get involved, contact the North East CMA on (02) 6043 7600.

(b) Restoring Our Waterways (ROW)

This group works with community groups and government agencies on programs such as Adopt a Waterway, Water Week and National Tree Planting Day to raise awareness of water issues and provide opportunities for practical restoration of our waterways.



The group has several projects on the Ovens River and nearby One Mile Creek, working with local students to produce the *Croaker* newsletter and participate in local events. The group is part of the Wangaratta Sustainability Network. Get involved by contacting Di Farmer on (03) 5722 3823.

(c) Wangaratta Urban Landcare (WUL) Group

Wangaratta Urban Landcare group is working to improve river habitat in urban Wangaratta. The group has restored the degraded riparian (river edge) woodland in Kaluna Park Reserve, published a vegetation guide for riparian areas, and undertaken platypus and owl surveys.

To find out more, and get involved contact Elaine Jacobsen: jacobsen@netc.net.au

(d) Upper Ovens Valley Landcare Group

The Upper Ovens Valley Landcare group has been actively clearing willow and blackberry along the Ovens River from Porepunkah to Germantown over the past few years and is planning several projects including a native fish survey, Waterwatch and Adopt-a-stream programs. To find out more or get involved contact Trevor Danger 0439 393 019.



An electrofishing demonstration on the Ovens.
Photo: Fern Hames.



Ovens River Demonstration Reach sign.
Photo: Fern Hames.

Resources

- Native Fish Strategy Coordinator, Victoria: Fern Hames: (03) 5772 0273
- Bangarang Goulburn Murray Tribe Aboriginal Corporation, Shepparton: marlenea@mcmedia.com.au
- Yorta Yorta Nation Aboriginal Corporation, Barmah: (03) 5869 3353 or reception@yynac.com.au
- Taungurung Clans Aboriginal Corporation, Tarneit: taungurung@gmail.com
- Murray Lower Darling Rivers Indigenous Nations: (02) 6051 9948
- North East Catchment Management Authority: (02) 6043 7600
- Seymour Angling Club: (03) 5792 3260
- Alexandra Angling Club: (03) 5772 1773
- Nagambie Landcare, Peter Robinson: (03) 5794 2274
- Wangaratta Historical Society: (03) 5721 2957
- Bright and District Historical Society: (03) 5755 1949
- Australian National Library: www.nla.gov.au

Upper Murrumbidgee

(a) Upper Murrumbidgee Demonstration Reach (UMDR)

The UMDR was established in 2009 in a 70km reach of the Murrumbidgee River stretching from Bredbo in south-east NSW downstream to Casuarina Sands in the southern suburbs of the ACT.

In this reach a number of threatened native species are present including trout cod, Murray cod, Macquarie perch, silver perch, two spined blackfish, and Murray crayfish.

Landholders and agencies are improving conditions for these species and aquatic habitat generally by removing barriers to fish migration, controlling introduced carp and willows, reducing pollution inputs and monitoring the 'Bidgee and the organisms that rely on it.

To get involved or get more information contact Luke Johnson on (02) 6205 3168 or Lisa Evans on (02) 6207 2117.



Community-based monitoring of native fish populations is just one of the activities undertaken in the Upper Murrumbidgee Demonstration Reach.

Photo: Charlie Carruthers.

(b) ParkCare is a partnership between the ACT Government and community volunteer groups who have an interest in the natural environment. Volunteers can contribute to the protection of local parks, nature reserves and National Parks in the ACT, including the Murrumbidgee River Corridor.

Volunteers can get involved in seed collection, plant propagation, tree planting, weed removal, erosion control, vegetation mapping, water quality monitoring and maintenance of heritage sites.

To get involved, phone the ParkCare Coordinator on (02) 6205 7384 or 13 22 81, or for more information and registration forms go to:
www.tams.act.gov.au/play/pcl/get_out_there/volunteering/parkcare

(c) Southern ACT Catchment Group / Molonglo Catchment Group

Both these groups act as umbrella organisations for other environmental groups in ACT including LandCare, and WaterWatch and provide input into catchment management activities and plans.

The Southern ACT Catchment Group (SACTCG) represent all active environmental groups in the southern areas of the ACT. Contact Steve Welch from Tuesday to Friday on (02) 6296 6400.

The Molonglo Catchment Group is largely in NSW and extends from the Murrumbidgee to the headwaters of the Molonglo and Queanbeyan Rivers. Contact Andy Westcott on (02) 6299 2119.

(d) Upper Murrumbidgee Waterwatch

Waterwatch volunteers can be anyone who cares about their local waterway. Waterwatchers volunteer in their local region to collect and analyse water samples, undertake assessments of their local water bugs and riparian vegetation and help with an annual frog census. Volunteers can spend a few hours every month or a couple hours a year.

In the ACT, contact Tanya Noakes on (02) 6207 2246. In the upper Murrumbidgee (Cooma region) contact Antia Brademann on (02) 6452 4611.



Understanding alien fish distribution and abundance, such as these mosquito fish (*Gambusia holbrooki*-circled) is critical to their management.

Photo: Charlie Carruthers.

River resources

- Native Fish Strategy Coordinator (Southern NSW), Charlie Carruthers: (02) 6298 0802
- Upper Murrumbidgee Demonstration Reach: Luke Johnston: (02) 6205 3168 or Lisa Evans: (02) 6207 2117
- Murrumbidgee CMA: (02) 6229 7711 or matt.dejongh@cma.nsw.gov.au
- Kosciuszko to Coast: (02) 6299 2119 or projects@molonglocatchment.com.au
- Capital Region Fishing Alliance (CRFA): contact: info@crfa.org.au
- Billabong Aboriginal Development Corporation: (02) 6278 4799.
- Ngunnawal Land Council: (02) 6297 4152
- Murray Lower Darling Rivers Indigenous Nations: 02 6051 9948
- ACT Government: www.tams.act.gov.au/live/environment
- Australian National Library: www.nla.gov.au
- Queanbeyan Historical Society: 02 6299 7449

Namoi

a) The Namoi Demonstration Reach

Works are being undertaken over approximately 120km of the Namoi River and its tributaries between Gunnedah and Narrabri to benefit the river and improve conditions for native fish.

The MDBA's Native Fish Strategy supports NSW DPI, the Namoi CMA, local communities, industries, Councils and recreational fishers to reinstate snags, improve fish passage, control erosion, sediment and nutrient inputs, remove weeds and replant riparian vegetation.

To date over 240 snags have been reintroduced and over 14km of river opened up with 3 fish passage barriers addressed.

Twenty six kilometres of fencing and 13 off-stream watering points have improved stock management around the waterways, with over 20km of woody weeds removed and replaced with more than 11 000 native plants!

For more information contact NSW DPI Conservation Manager, Milly Hobson on (02) 6763 1206.



One of the Demonstration Reach signs.
Photo: Milly Hobson.

b) The Narrabri Amateur Fishing Club

In conjunction with NSW DPI, this fishing club have held 'Carp Musters' annually over the last four years to create awareness about the impacts of carp on native fish and to involve the community. The fishing club also undertake annual cod and yellowbelly stocking of Namoi River and contribute to tree planting days as part of the Namoi Demonstration Reach project.

For more information contact Tony Williams on 0428 661 358.

c) Red Chief Aboriginal Land Council

Cultural surveys and tree planting have been undertaken by Red Chief ALC as part of the Namoi Demonstration Reach project. The Council also has their own propagation unit growing native trees and aquatic plants.

For more information contact Red Chief ALC on (02) 6742 3602.

d) Boggabri Landcare-Rivercare Group

This group is active around Boggabri removing willows and other weeds and revegetating along the Namoi River.

For more information contact Robyn Watson on (02) 6743 4576.

d) Narrabri Community Bushcare Group

Narrabri Bushcare work with land owners to improve their property, promoting native vegetation around Narrabri. They hold community tree planting days at locations including the Namoi Demonstration Reach.

For more information contact Rose Broderick on (02) 6792 4596.

River resources

- Native Fish Strategy Coordinator, Northern NSW, Anthony Townsend: (02) 6763 1440
- Namoi Catchment Management Authority: (02) 6742 9220
- Narrabri Amateur Fishing Club
Tony Williams: 0428 661 358
- Red Chief Aboriginal Land Council
Robert Horne: (02) 6742 3602
- Narrabri Aboriginal Land Council
Koorine Trindall: (02) 6792 4228
- Northern Basin Aboriginal Nations:
(02) 6279 0672
- Boggabri Landcare-Rivercare Group
Robyn Watson: (02) 6743 4576
- Narrabri Community Bushcare Group
Rose Broderick: (02) 6792 4596
- Narrabri and District Historical Society
Don Douglas: (02) 6792 5100
- Narrabri Courier and Wee Waa News
Ian Dunnet: (02) 6792 1011
- National Library Australia:
www.nla.gov.au

Upper Darling: Brewarrina to Bourke

(a) Brewarrina to Bourke Demonstration Reach

This Demonstration Reach is being managed by NSW DPI Fisheries in collaboration with the Western Catchment Management Authority.

NSW DPI and the Western CMA have worked with landholders around Brewarrina and Bourke to undertake activities like resnagging the river, controlling gully erosion and planting riparian vegetation.

Demonstration Reach works also aim to minimise the effects of fish passage barriers and pest fish on native fish so that they can undertake breeding migrations within the Barwon-Darling and have decreased competition from introduced species.

If you would like to get involved or want to know more, contact David Cordina on (02) 6681 1277.

(b) Ngemba Billabong Restoration and Landcare Group

The rivers, lakes and floodplains of Brewarrina Ngemba Billabong are a significant historical and cultural site for the Ngemba Aboriginal people.

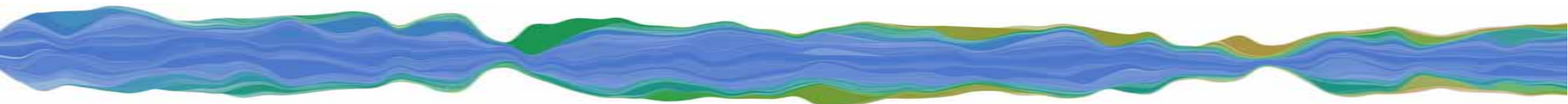
From 1876 to 1967 the Ngemba Billabong was the Brewarrina Aboriginal Mission for local Aboriginal people whose land was taken for grazing. Prior to this, Brewarrina was an important tribal meeting place.

The land is now listed on the NSW State Heritage Register as an Indigenous Protected Area and cared for by the traditional owners. While managing the river, floodplain and wetland, special emphasis is placed on educating members of the community about traditional values, Aboriginal history, and social inclusiveness.

To find out more about this project or to get involved, contact the Ngemba Billabong Restoration and Landcare Group on (02) 6872 2144.

River resources

- Native Fish Strategy Coordinator (Northern NSW) Anthony Townsend: (02) 6763 1440
- Brewarrina to Bourke Demonstration Reach Coordinator David Cordina: (02) 6881 1277
- Ngemba Billabong Restoration and Landcare Group: (02) 6872 2144
- Western Catchment Management Authority: (02) 6872 2144
- Northern Basin Aboriginal Nations: (02) 6279 0672
- Bourke Public Library: (02) 6872 2751
- Brewarrina and District Historical Society (via Brewarrina Tourist Information Centre): (02) 6839 2152
- Australian National Library: www.nla.gov.au



Paroo River

a) Interstate agreement on water extraction

The New South Wales and Queensland Governments signed an Interstate Agreement on the 18th of July 2003 to protect the Paroo River, its wetlands and flood plains. The agreement stops the issue of additional water licences other than those for minor irrigation and urban water uses. In addition the Queensland Government issued a moratorium on the construction of new water infrastructures on 9 June 2001.

The *Intergovernment Agreement for the Paroo River between New South Wales and Queensland* can be obtained at www.water.nsw.gov.au/Water-management/Law-and-policy/Intergovernmental-agreements/default.aspx#paroo

b) South West Natural Resource Management Group

South West Natural Resource Management is the designated regional body for natural resource management in South West Queensland. It works with the community and the community based groups, traditional owners, government

organisations and industry groups to achieve sustainable natural resource management and fosters landcare and catchment management ethics.

It is responsible for regional delivery of natural resource management program in the Bulloo, Nebine-Mungallala-Wallam, Paroo and Warrego catchments.

The main office of South West NRM is located in Charleville. For more information, phone (07) 4656 8500 or email swnrm@southwestnrm.org.au

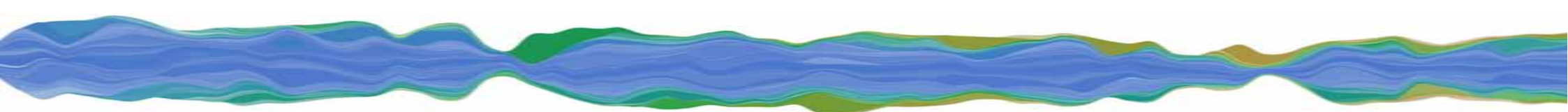
c) Western Catchment Management Authority

The Western Catchment Management Authority has been established to ensure the local community has a significant say in the management of natural resources including land, vegetation, rivers, groundwater and biodiversity. It assists the local community in being actively involved in natural resources management initiatives.

For more information, go to www.western.cma.nsw.gov.au

River resources

- Native Fish Strategy Coordinators:
Greg Ringwood (Qld): (07) 3224 2164
Anthony Townsend (NSW): (02) 6763 1440
- South West Natural Resource Management Group
Julie Frousheger: (07) 4656 8520 or email: biodiversity@swnrm.org.au or www.southwestnrm.org.au
- Western Catchment Management Authority
Maree Barnes: (02) 6841 2749 or www.western.cma.nsw.gov.au
- ABC Rural: www.abc.net.au/rural
- Charleville Fishing and Restocking Club
Judey Aiken: (07) 4654 1777
- Queensland Parks and Wildlife Service (Charleville): (07) 4654 4712
- NSW Parks and Wildlife Service: (02) 9995 5550
- Paroo Shire Council: (07) 4655 8440
- National Library Australia: www.nla.gov.au



Culgoa - Balonne

a) Queensland Murray-Darling Committee

The Queensland Murray-Darling Committee (QMDC) is a community-based, not-for-profit organisation that delivers natural resource management services along the parts of the Murray-Darling Basin within Queensland, including the Culgoa-Balonne Catchments. Its main objectives include improving the health of the rivers, wetlands and floodplains and reducing the threat of weeds and pest animals. One of the main pest species they target is the European carp. In addition to running regular carp-buster events to educate the members of the public about the impacts of the carp on native fish population, QMDC is planning to establish an integrated carp management program using fyke nets which are designed specifically for the control of carps. Further information can be obtained on (07) 4637 6200 or at www.qmdc.org.au

b) Aboriginal Rangers Program

The QMDC, in collaboration with the Federal Department of Sustainability, Environment, Water, Population and Communities has developed an Aboriginal Rangers Program to deliver environmental outcomes within the

Northern Murray-Darling Basin in Queensland. The area also includes the catchments of the Culgoa and Balonne Rivers. The Aboriginal Rangers work with land managers to boost the sustainability of the Basin. The program will result in an exchange of Aboriginal cultural knowledge along with strong natural and cultural outcomes. The catchment based activities that are carried out within the Aboriginal Rangers Program aim to improve aquatic habitat and fish populations by fencing river banks, undertaking weed control and protecting sites of cultural heritage. For further information and to get involved contact Mr Troy Turnbull (07) 4637 6200.

c) Western Catchment Management Authority (NSW)

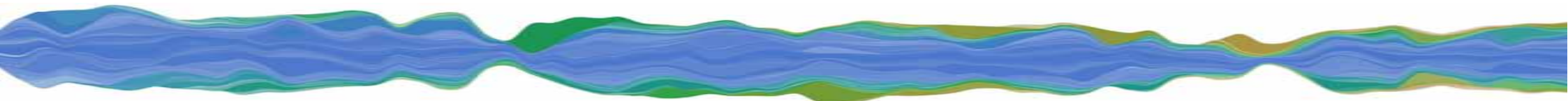
The NSW Western Catchment Management Authority has been established to ensure the local community has a significant say in the management of natural resources including land, vegetation, rivers, groundwater and biodiversity.

The Western CMA assists the local community in being actively involved in natural resources management initiatives.

Two of the management targets relating to improving rivers include:

- Habitat improvement in 20% of identified priority stream, floodplain, wetland and riparian areas by 2016.
- Water quality and salinity levels meeting ANZECC drinking water and recreational use criteria for greater than 95% of the time at key town use sites by 2016.

The main activities include management of floodplains, improvement and management of riparian zone, protection and rehabilitation of fish and threatened aquatic habitats, improving connectivity by providing fish passage and the control of alien species such as carp. For more information go to www.western.cma.nsw.gov.au



River resources

- Native Fish Strategy Coordinator, Queensland, Greg Ringwood: (07) 3224 2164
- Native Fish Strategy Coordinator, North NSW, Anthony Townsend: (02) 6763 1440
- Queensland Murray-Darling Committee: (07) 4637 6200 <http://www.qmdc.org.au>
- St George and District Fishing and Restocking Club Inc.: dkpanel@bigpond.com
- Culgoa Landcare Group: (02) 6836 1575
- Maranoa-Balonne Catchment Management Association: (07) 4622 6011
- Warroo Balonne Regional Landcare Inc., John Scriven: (07) 4625 3634
- Nindigully Landcare Group Inc., Liz Hill: (07) 4625 9159
- Balonne Beacon (newspaper): (07) 4162 2277
- Queensland National Parks and Wildlife Service: (07) 3227 8186
- NSW Parks and Wildlife Service: (02) 9995 5550
- Culgoa Dreaming Consultancy: (02) 6872 4647
- Balonne Shire Council: (07) 4620 8888

Upper Condamine

a) The Dewfish Demonstration Reach

The Condamine Alliance Natural Resource Management Group is undertaking the Condamine River Rescue Program to rehabilitate and protect the Condamine River catchment. Native fish are used as an indicator to gauge the health of the river system.

The Murray-Darling Basin Authority funded Native Fish Strategy 'Dewfish Demonstration Reach' is located within the Condamine catchment. This rehabilitation site is over 100km long.

The River Rescue Program and the Native Fish Strategy are working in partnership with landholders, local governments and stakeholders to deliver improved river health through improved land use practices like riparian fencing, off stream watering, erosion and weed control. Instream works include re-snagging, fishways and carp control.

You can get involved with this program by volunteering or providing financial support. For more information contact Kevin Graham or Condamine Alliance on 0418 411 351.

b) Restoring fish migration

Two weirs along the Condamine River were identified as major barriers to fish passage: Loudoun Weir and Reilly's Weir, a historical private weir. Both weirs have prevented fish passage since their construction. In 2009 both weirs had fishways retrofitted to improve fish passage. The improvements to Reilly's Weir allow fish movement along the Condamine River during flows for the first time since the weir was constructed in 1936.

For more information contact the MDBA Native Fish Strategy Coordinator on (07) 3239 0727.



The construction of Reilly's Weir. The recent installation of a fishway on this structure is giving fish access to habitat that have not had since 1936.

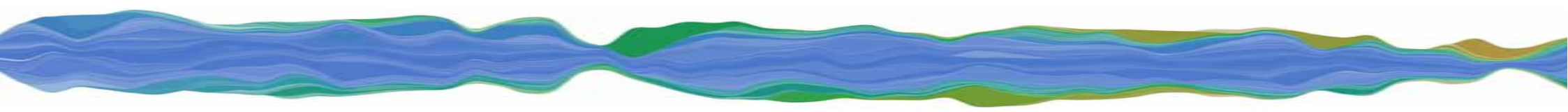
Photo source: Geoff and Sue Reilly.

c) Condamine Headwaters Landcare Group Inc

Condamine Headwaters Landcare Group's initiative 'Love My River' aims to engage the community to better understand the catchment and the river environment. It includes story telling, a catchment crawl, water-bug testing, waterway monitoring and more. The initiative covers the Upper Condamine Area around Killarney, Dalveen, Leyburn, Maryvale and Allora. For more information contact Elspeth Cooper on (07) 4685 2096.

River resources -

- Native Fish Strategy Coordinator, Southern Queensland, Greg Ringwood: (07) 3239 0727 / 0423 829 028
- Condamine Alliance, Kevin Graham: 0418 411 351, <http://condaminealliance.com.au>
- Condamine Catchment Management Association, Mary-Lou Gittins: (07) 4666 6290
- Condamine Headwaters Landcare Group Inc.: (07) 4661 9909, landcare@chlgroup.org.au
- Chinchilla and District Amateur Fishing Club Inc.: PO Box 342 Chinchilla Q 4413.
- Chinchilla and District Landcare Group Inc: chinchilla_landcare@bigpond.com
- Crows Nest Historical Society: (07) 4698 1776, suepechey@skymesh.com.au
- Oakey Freshwater Fish Stocking Association PO Box 262, Oakey Qld 4401
- Nobby and District Fishing Club Inc.: brian.kuhn@bigpond.com.au
- North east Downs Landcare Groups Inc.: 0427 024 921, krausebuilder@bigpond.com
- Toowoomba Historical Society: (07) 4638 7362, history@icr.com.au
- National Library Australia: www.nla.gov.au
- Warwick District Recreational Fish Stocking Association: kemp3@dodo.com.au





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Photo: Jodi Frawley.



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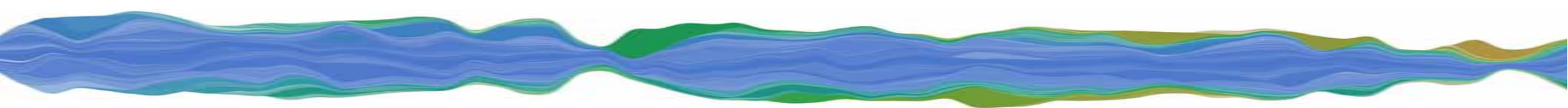
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Upper Murrumbidgee

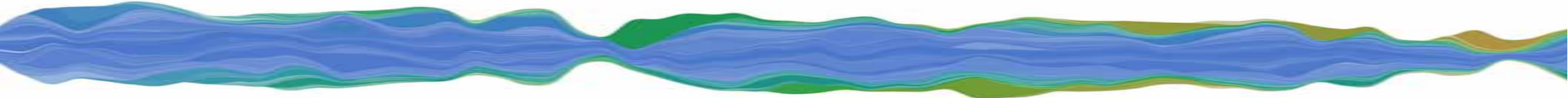
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Some of the aquatic species found in the Murray-Darling Basin

Native
(Not to scale)

Murray cod / Cod / Pondi



Mulloway / Jewie / Jewel fish / Butterfish



Macquarie perch / Macca / Black bream



Golden perch / Yellowbelly / Callop / Pilaki



Catfish / Eeltail catfish / Jewfish / Pomeri



Yabby / Craybob



Silver perch / Murray bream / Grunter / Tcheri



Blackfish / Slippery / Slimy / Greasy



Murray cray / Spiny cray



Introduced
(Not to scale)

European carp / Common carp



Redfin / English perch



Rainbow trout / Brown trout

